Thesis Ref. No. _____

ADDIS ABABA UNIVERSITY
COLLEGE OF VETERINARY MEDICINE AND AGRICULTURE
DEPARTMENT OF CLINICAL STUDIES

COMPILED CASE REPORTS ON COMMON MINOR AND MAJOR SURGICAL PROCEDURES, TECHNIQUES AND OUTCOMES IN DOMESTIC ANIMALS IN AND AROUND BISHOFTU TOWN, EAST SHOA ZONE, OROMIA, ETHIOPIA

MVSc THESIS

BY

MELKAMU BIRHANU MEHARU

JUNE, 2022
BISHOFTU, ETHIOPIA

ADDIS ABABA UNIVERSITY

COLLEGE OF VETERINARY MEDICINE AND AGRICULTURE

COMPILED CASE REPORTS ON COMMON MINOR AND MAJOR SURGICAL PROCEDURES, TECHNIQUES AND OUTCOMES IN DOMESTIC ANIMALS IN AND AROUND BISHOFTU TOWN, EAST SHOA ZONE, OROMIA, ETHIOPIA

A Thesis Submitted to the College of Veterinary Medicine and Agriculture of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Veterinary Science in Veterinary Surgery

BY

MELKAMU BIRHANU MEHARU

MVSc IN VETERINARY SURGERY

ADVISOR: JIREGNA DUGASSA (DVM, MVSc, Assist. Prof)

JUNE, 2022

BISHOFTU, ETHIOPIA

APPROVAL SHEET

Addis Ababa University

College of Veterinary Medicine and Agriculture

Department of Clinical Studies

As MVCs research advisors, I hereby certify that I have read and evaluated this Thesis prepared under our guidance by Melkamu Birhanu Meharu entitled **"COMPILED CASE REPORTS ON COMMON MINOR AND MAJOR SURGICAL PROCEDURES, TECHNIQUES AND OUTCOMES IN DOMESTIC ANIMALS IN AND AROUND BISHOFTU TOWN, EAST SHOA ZONE, OROMIA, ETHIOPIA**", We approved for submittal to dissertation assessment committee.

Submitted by: Melkamu Birhanu Meharu _____ _____

Name of student Signature Date

This thesis has been submitted for examination with our approval as advisors:

Jiregna Dugassa (DVM, MVSc, Assist. Prof) _____ _____

Academic advisor Signature Date

Haileleul Nigussie (DVM, MVSc, PhD, *Assoc*. Prof) _____ _____

Department Head Signature Date

Addis Ababa University

College of Veterinary Medicine and Agriculture

Department of Clinical Studies

As member of the examining board of the final MVSc open defense, we certify that we have read and evaluated the thesis prepared by Melkamu Birhanu Meharu entitled **"COMPILED CASE REPORTS ON COMMON MINOR AND MAJOR SURGICAL PROCEDURES, TECHNIQUES AND OUTCOMES IN DOMESTIC ANIMALS IN AND AROUND BISHOFTU TOWN, EAST SHOA ZONE, OROMIA, ETHIOPIA"** and recommended that it be accepted as fulfilling the thesis requirement for the degree of Masters of Veterinary science (MVSc) in Veterinary Surgery

Getachew Terefe (professor) _____ _____

(Chairman and title) Signature Date

Chala Mohammed Ahemad (DVM, MVSc, Assist. Prof) _____ _____

External examiner (name and title) Signature Date

Abeba Fromsa (DVM, MVSc, *Assoc*. Prof., PhD Cad.) _____ _____

Internal examiner (name and title) Signature Date

Haileleul Nigussie (DVM, MVSc, PhD, *Assoc*. Prof) _____ _____

Department Head (name and title) Signature Date

STATEMENT OF THE AUTHOR

First, I declare that this thesis is my *original* work and that all sources of materials used for this *thesis* have been duly acknowledged. This *thesis* has been submitted in partial fulfillment of the requirements for an advanced (MVSc) degree at Addis Ababa University, College of Veterinary Medicine and Agriculture is deposited at the university/College library to be made available to borrowers under rules of library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the awards of any academic degree, diploma or certificate.

Brief quotations from this thesis are allowable without special permission provided that accurate acknowledgement of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or part may be granted by the head of the major department or the dean of the college when in his or her judgment the proposed use of the material is in the interests of scholarship. In all other instances, however permission must be obtained from the author.

Name: Melkamu Birhanu Meharu Signature: _____

College of Veterinary Medicine and Agriculture, Bishoftu, Ethiopia

Date of submission: _____

AKNOWLEDGEMENTS

First of all, I would like to thank almighty God; for his blessing throughout my life.

Secondly, I am thank full to my academic advisor; Dr. Jiregna Dugassa for his unreserved technical and professional advice, rectification of the research work, the critical review, editing and provision of valuable reference materials for the accomplishment of this manuscript. It is also my pleasure to thank and appreciate Dr. Charu Telila for his unlimited help and advice in my clinical work time.

Thirdly, I would like to thank Addis Ababa University, School of post graduate studies for the overall coordination and financial support of this study. It is also my pleasure to acknowledge Dr. Amenu Amare, Dr. Taye, Taju Zakara and all other staff in Donkey Sanctuary Veterinary Clinic for their kind supporting during data collection. In addition am also grate full to acknowledge Dr. Yobsan Dagefa, Dr. Salomon Amante and Dr. Sultan Aliy who took part by giving information and assisting during surgical procedures.

Last but not least I would like to thank all the animal owners in and around Bishoftu town for bringing their animals to the Veterinary Teaching Hospital, Donkey Sanctuary Veterinary Clinic and Society for Animal Protection Abroad and trusting in me for overall employed surgical procedures, techniques, and outcomes.

LIST OF ABBREVIATIONS

AAU	Addis Ababa University
CVMA	College of Veterinary Medicine and Agriculture
CRT	Capillary Refill Time
DSVC	Donkey Sanctuary Veterinary Clinic
EGT	Exuberant Granulation Tissue
ERs	Estrogen Receptors
FNAC	Fine Needle Aspiration Cytology
GIT	Gastro Intestinal Tract
GDP	Gross Domestic Product
IM	Intramuscular
IV	Intravenous
LA	Local Anaesthetic
MGTs	Mammary Gland Tumors
MM	Mucous Membranes
OSCC	Ocular Squamous Cell Carcinoma
OVH	Ovariohysterectomy
PH	Perineal Hernia
PPF	procaine penicillin
SA	Small Animal
SPANA	Society for Animal Protection Abroad
TAT	Tetanus antitoxin
VTH	Veterinary Teaching Hospital

TABLE OF CONTENTS **PAGE**

LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXES

ABSTRACT

Livestock are one of the basic assets that provide livelihood and employment particularly for resource-poor communities in Ethiopia. However, their exploitation has been constrained by various hindering factors. Among them, poor animal feed and less coverage of veterinary services especially for the surgical treatment of different forms of congenital and acquired disorders. Surgery is an indispensable part of veterinary care though it has risks mainly associated with technical skill, inexperience, anesthetic risks, and nature of surgical procedures and animal condition. As a result, a few surgical patients may be get exposed to complications; peri, intra, and post-operations. The current study was aimed to document and compile minor and major surgical treatments and managements performed in different domestic animals presented to Veterinary Teaching Hospital of the Addis Ababa University, Donkey sanctuary and SPANA from September 2021 to June 2022. During study period, a total of 22 different animal species including 54% (12/22) large animals, 22% (5/22) small animals, and 22% (5/22) small ruminants were presented to different veterinary clinical centers with various ailments in the form of emergency and elective surgical treatments. Before performing and providing corresponding surgical treatments and managements, each and every case was examined carefully based on case history, clinical examination and findings. Different forms of surgical treatments were performed on animals including: cesarean section, ovariohysterectomy, herniorrhaphy, tail and penile amputation, correction of paraphimosis, excision of lymphomas, and eye enucleation, external coaptation, wound managements, rumenotomy, and surgical drainage of abscesses. From admitted surgical patients for treatment, about 86% (19/22) were completely recovered whereas 14% (3/22) of the animals were died. Besides, postoperative complications and outcome were followed and recorded. This finding indicate that, provision of aseptic surgical procedure, treatments and sound postoperative care by well-trained veterinarians on the surgery can save a significant number of life-threatening conditions in addition to improving overall animal condition

Keywords: *Case Report, Domestic animals, Surgery, Surgical outcome*

1. INTRODUCTION

Livestock are one of the basic assets that provide livelihood and employment for resource-poor communities in rural and urban areas of Ethiopia. The sector contributed 40% of agricultural GDP, nearly 20% of total GDP, and 20% of national foreign exchange earnings (World Bank, 2017). It is an integral part of country's farming systems (Ayele *et al*., 2002). The country is known for the largest number of livestock population in Africa, with 65 million cattle, 40 million sheep, 51 million goats, 8 million camels, and 49 million chickens (CSA, 2020). Besides, the country owns the largest equine (donkey) population in Africa and the second largest population in the world after China with 6.4 million in rural sedentary holdings alone (CSA, 2012). Since the population is growing rapidly and increasingly living in cities, and urban areas, and due to rising incomes, demand for meat, milk, and eggs is expected to increase soon. In addition, the country's foreign exchange from animal products has increased especially by supplying red meat to the Gulf and within Africa and providing leather and other livestock product to Europe (MOA, 2012).

Although there is numerous livestock in Ethiopia, the sector is still characterized by poor production and productivity due to various constraints such as low coverage of veterinary services (Gebreegziabher, 2009). Among them, veterinary surgery plays an important role in saving animals' lives through surgical treatment of various acquired and congenital disorders (Byron, 2015). However, surgical treatments and correction of various diseases and ailments in animals are not well-practiced and customized in most parts of the country (Bennett and Ijpelar, 2005). Veterinary surgery can be classified into three broad groups: orthopedics (bone, joint, muscle), soft tissue surgery (skin, body cavity, cardiovascular system, and GI/urogenital/respiratory tracts), and neurosurgery (Tobias and Ayres, 2006). In addition, advanced surgical procedures such as joint replacement (total hip, knee, and elbow replacement), fracture repair, stabilization of the Cranial Cruciate ligament deficiency, oncologic (cancer) surgery, herniated disc treatment, complicated gastrointestinal, urogenital procedures, kidney transplant, skin grafts, complicated wound management, minimally invasive procedures (arthroscopy, laparoscopy, thoracoscopy) are also performed by Veterinary Surgeons (Andrews *et al.*, 2013; Millard *et al.*, 2014).

In Ethiopia, the treatment of diseased animals gets less attention until recent years because the policy and manpower resources give more concern to preventive medicine. This contributed to a low level of infrastructure for veterinary practice similar to research in medical as well as surgical diseases of domestic animals (Tiruneh *et al*., 2014). Despite the fact, that veterinary surgery has achieved a level of sophistication equivalent in most ways to that of human surgery. This is because of the increasingly important role of veterinarians in basic medical research; veterinary surgeons are pioneering many of the surgical advancements to be used in human surgery in recent years (Woods, 2018). This created awareness and advances in treating the individual animal in both the rural and urban communities (Roman *et al*., 2014). Moreover, a growing trend of keeping pure or crossbred animals as companion pets (esp. dogs) in urban areas also contributed to the increased demand for the veterinary care of the individual animal (Angesom, 2015).

The origins of surgical and medical case reporting formats have been traced to many years before records on Egyptian papyrus around 1600 BC (Nissen and Wynn, 2017). Bloodletting is the most popular and known surgery in the history of ancient Egyptian, Greek, and Roman medicine and was used as a therapy for humans and animals (Krzyzewski, 2004). The case reporting and recording format remain feasible part of the array of methods for education and continuing training of professionals in all medical fields, including veterinary medicine. Besides, it provides novel and innovative ideas on the methods, techniques, and procedures for handling surgical cases of various congenital and acquired ailments, abnormalities, and deformities of animals (Burrow *et al*., 2006). This provides an advance in the quality of the surgical research through appropriately designed, equipped, and managed surgical facilities (NRC, 2010).

The evidence-based surgical case report is a well-practiced concept in medical school. However, to date, it is relatively new and undeveloped in veterinary practice (Grindlay *et al*., 2012). Surgery is an indispensable part of veterinary care though it has risks mainly associated with; experience, anesthesia, surgical procedures and techniques and these might be a root cause for various unexpected complications and uncertainty during and post-operation (Tiruneh *et al*., 2014). The chief role of the veterinary surgeon is to reduce potential risks and complications and hence to enhance better postoperative outcomes through knowledge-based surgical skills.

Moreover, the practice of documentation and recording, and publication of individual surgical cases help in improving surgical skills. This fills the knowledge gap existing among veterinary surgeons. Besides, it directs the way to come up with advanced surgical techniques and approaches in veterinary practices.

Therefore, the objectives of these case reports are:

- ✓ To document, and describe minor and major surgical cases regarding its procedure, technique, and outcome in different species of domestic animals presented to veterinary service centers of the study areas.

- ✓ To acquire all rounded surgical skills and experiences of surgical case handling in different species of domestic animals

2. MATERIALS AND METHODS

2.1. Study Area

The study was conducted from November 2021 to June 2022 G.C at Veterinary Teaching Hospital (VTH), Donkey Sanctuary Veterinary Clinic (DSVC), and Society for Animal Protection Abroad (SPANA) of College of Veterinary Medicine and Agriculture (CVMA), Bishoftu town. The town is located in Oromia Regional State lying at a distance of 47.9 kilometers southeast of Addis. Geographically it is stretched between 8 degrees 43' North 8 degrees 48' North latitude and 38 degrees 00' East 38 degrees 48' East longitude (Figure 1). According to spatial analysis in this study currently, the town covers a total area of about 14,878 hectares which was 4,520 hectares in the year 2005. Moreover, the town is suited to tepid to cool sub moist mid highland at an average altitude of about 1920 meters above mean sea level with the moderate weather condition. The temperature of the area ranges from 16°c to 24°c (NMSA, 2003).

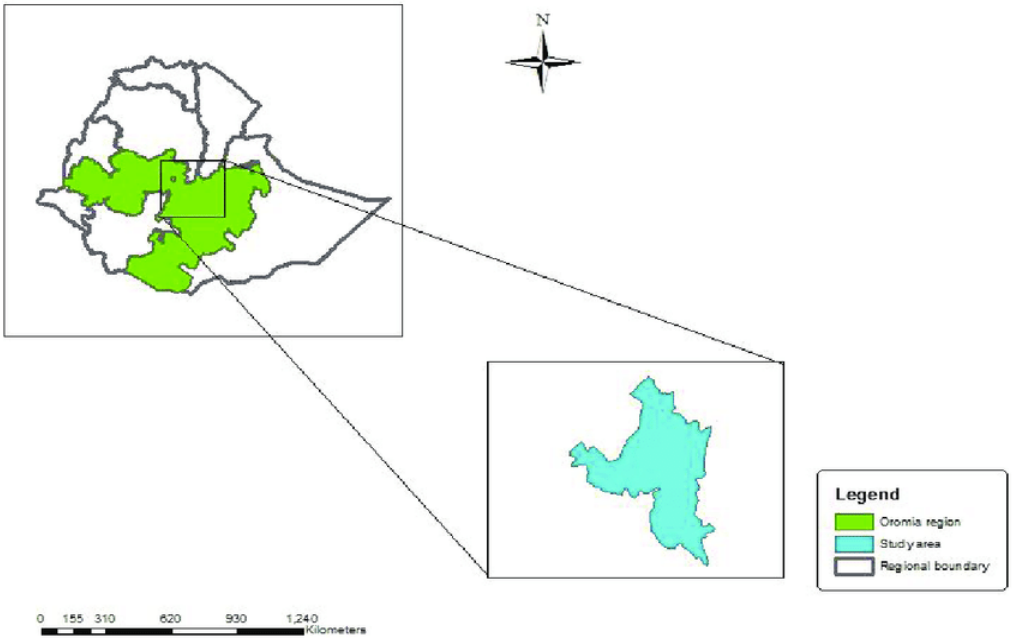


Figure 1: Geographical locations of the study area

2.2. Study Population

The study animals were domestic animals of different species, breeds, and ages that were presented from different management systems and admitted to the VTH, DSVC, and SPANA for various surgical treatments. Domestic animals including cattle, equines, and small ruminants were kept under semi-intensive management system and small animals (dogs and cats) were kept as companion animals being fed with homemade feeds. The report documented and recorded case reports of surgical intervention performed on ailments and deformities of twenty-two domestic animals of different breeds, species, sex, and ages were; 10 cattle, 2 sheep, one cat, 4 dogs, 3 goats, 1 donkey, and 1 horse.

2.3. Study Design

The study design was descriptive clinical case report on the compiled minor and major surgical procedures, techniques and its outcomes in domestic animals.

2.4. Study Method

The different species of domestic animals presented to VTH, DSVC, and SPANA with various surgical complaints either for elective or emergency cases requiring surgical manipulation and was subjected to thorough clinical examination. Based on clinical presentation, every case was assessed and evaluated and findings on different clinical parameters such as patient signallment, history, physical examination, and laboratory diagnosis were recorded accordingly. Pre-evaluation of the patient was performed carefully for anesthesia and surgical risk as well. Depending on the history and clinical findings, particular surgical correction and management were prescribed and performed under aseptic conditions and safe anesthetic protocol as per the presented cases' requirements. All animals undergoing the surgery were also followed through phone calls and physical contact, and visits to the field in addition to peri, intra, and post-operation for any discomfort and related complications. Later all the relevant data were recorded (photography based) and the surgical case reports were prepared and reported according to the

relative similarity of procedure and presentations same or/and different animal species with respective outcomes. Some of the record for case report includes the following.

2.4.1. Patient signallment record

Individual case recording sheet (Annex 1) was used to document every case that was presented to the VTH, DSVC, and SPANA. Identification of the animals was performed by a recording of species, age, breed, sex, and health status of each patient.

2.4.1. Case history

The owner was asked about his/her complaints about the presented animal to the VTH, DSVC, and SPANA. Based on the owner's complaints related to the case, all relevant information was documented. During history taking, different kinds of questions were presented to the owners to obtain information regarding the patient's conditions like duration of the illness, the severity of the problem, history of the previous ailment, and medication and recorded accordingly.

2.4.2. Physical examination

The cases were subjected to a detailed clinical examination. Heart rate (beats/min), respiratory rate (breaths/min), rectal temperature (°C), capillary refill time (CRT), and general body condition were recorded (Annex 3). General behavior, the color of the mucus membrane, and gastrointestinal motility were also examined and recorded accordingly. After the compilation of case history and clinical examination, surgical cases were judged as elective or emergency. Owners were requested to sign a written consent before surgery proceeds. Postoperative care was given for each patient and complications in each case were recorded if any. In addition, at the end postoperative care and follow-up of the outcome was done through appointments at the VTH, DSVC, and SPANA through phone communication to the owners and with a home visits.

2.4.3. Laboratory examinations

Whenever situations allowed depending on the availability of reagents, facilities, and nature of the cases (elective vs. emergency), certain laboratory examinations including cytology were conducted (Annex 5 and 6).

3. COMPILED CASE REPORTS ON COMMON MINOR AND MAJOR SURGICAL PROCEDURES, TECHNIQUES, AND OUTCOMES IN DOMESTIC ANIMALS

3.1. Surgical Excision of the Lipoma in Animals

3.1.1. Modified radical mastectomy in a bitch

Abstract

A complete surgical excision of lipoma is one of the most common and recommended treatment in dogs followed by the systemic administration of antibiotics and ant-inflammatory drugs and routine wound dressing. This case report describes surgical excision of lipomas in twelve-years-old local breed bitch that was brought to VTH, CVMA of the Addis Ababa University, with a history of large-sized and pendulous swelling on the ventral abdomen in between left and right parts of the mammary glands. Upon clinical examination via palpation, the mass was semisolid in consistency, which is apparently painless, and was moderately firm indicating attachment to structures beneath it. The vital body parameters like heart rate, respiration rate, and rectal temperature were 90beat/minute, 30breaths/minute, and 38.9°C respectively were within physiological limits. Based on history and rigorous clinical examination the case was tentatively diagnosed as infiltrative lipoma. Finally, it was removed surgically under adequate resuscitative measures followed by aseptic preparation. Then the removed mass was subjected to histopathological examination for confirmation and the incision layers were routinely closed with appropriate suture materials and patterns. At the end, the bitch was closely monitored at VTH for several weeks. This was done through systemic administration of antibiotics and anti-pain and routine wound dressing. In addition, it was kept on fluid therapy with dextrose normal saline via intravenous (IV) and Glucose 40% orally for 2-3 days of post-operation. Lastly, after multiple surgeries, it was uneventfully recovered without recurrence upon the follow-up period for five months.

Keywords*: Dog, Lipoma, Mammary gland, Radical mastectomy,*

Introduction

A mammary tumor is a common type of neoplasm that originates from the glandular epithelium of the mammary gland. It is prevalent in intact and older female dogs and cats (Fesseha, 2020a). Even though the exact cause of mammary tumors are not fully understood, the hormones of the estrous cycle are assumed to be involved. Female dogs that are not spayed or spayed later than the first heat cycle are more likely to develop mammary tumors (Klopfleisch *et al*., 2010). This is because; estrus hormones such as estrogen and progesterone play a chief role in normal mammary gland development. Consequently, they are also implicated in tumor development (Ali *et al*., 2016). Estrogens are promoters of initiated cells in addition to regulating the transcription of several nuclear proto-oncogenes (Garden *et al*., 2018). Mammary gland tumors, both benign and malignant, express Estrogen Receptors (ERs) (Canadas *et al*., 2019).

Tumors of mammary gland can be benign or malignant. Unfortunately, the distinction between them are considerably challenging but, histopathologically distinguishable (Goldschmidt *et al*., 2002). Lipomas are benign tumors of fatty tissue which are less perilous compared to their malignant counterparts' liposarcoma. The occurrences of the lipomas are more common in females (68%) than in males (32%), (Sharif *et al*., 2006). They may be single to multiple in the site and occur over the thorax, abdomen, thighs, and proximal limbs (Cowell *et al*., 2007). Those located between the skin and muscle layers are soft and freely movable while lipomas located between muscles have more firm consistency and are not mobile (Subapriya *et al.*, 2020).

In benign tumors, complete surgical excision is the right choice of treatment (Case *et al.*, 2012; Veena *et al*., 2013). Although there is no consensus as to the best procedure, there are some surgical procedures that can be applied to mammary glands of the dogs such as removal of the tumor alone (lumpectomy), simple mastectomy (removal of the affected gland only), modified radical mastectomy (removal of the affected gland and those that share lymphatic drainage and associated lymph nodes), and radical mastectomy(removal of the entire mammary chain and associated lymph nodes) all have their pros and cons (Garden *et al*., 2018). In a complete surgical removal of the lipoma postoperative complications are rare. However, sometimes it may be associated with the formation of seroma, hematomas, wound infection, and nerve injury,

depending on its location (Lamagna *et al.*, 2012). Surgical treatment requires good surgical planning as it is crucial to therapeutic success unless, the local recurrence of tumor masses is associated with incomplete excision techniques (Nishida *et al.*, 2007; Kaeser *et al.*, 2010). This case report describes a case of surgical excision techniques of non-infiltrative lipoma and its outcome bitch.

Case history and clinical examination: A twelve-years-old local breed bitch weighing 15kg was brought to VTH, CVMA of the Addis Ababa University with a history of large-sized pendulous mass swelling on the ventral abdomen in between left and right parts of caudal mammary gland directly on the midline and the most cranial part was unilateral from the right side (Figure 2A). The history stipulated that the size of the swelling had grown progressively starting in the form of lumps with lack of pain, limping, and licking of the site before two months. Clinical examination revealed semisolid, painless and firm mass indicating attachment to structures beneath it. The clinical parameters like heart rate, respiration rate, and temperature were 90beat/minute, 30breaths/minute, and 38.9°C respectively were within physiological limits. Based on history and rigorous clinical examination the case was tentatively diagnosed as infiltrative lipoma and decided to be removed surgically. Fine needle aspiration cytology (FNAC) and incision biopsy was sent for cytological examination and showed adipose tissue cells (Annex 5).

Preoperative and surgical site preparation: The bitch was withheld from feed and water for 12 and 6 hours respectively before surgery. After deep sedation, the area around the tumor mass was washed with water and soap thoroughly. Then, the hair surrounding the swelling was aseptically prepared by clipping, shaving, scrubbing, washing with water, and savlon® (Cetrimide 3% and Chlorhexidine gluconate 0.5% solution) (Figure 2B).

Anesthesia and animal control: The dog was premedicated with diazepam at the dose rate of 0.3mg/kg I.V. Later, it was induced by the combination of Diazepam (Intas pharmaceutical Ltd., India) @0.15mg/kg and ketamine (Ketamine Hydrochloride, Germany) @5mg/kg I.M then I.V infusion using lactated ringers solution was set at a surgical rate of 10 ml/kg/hr at calculated rate of 1 drop/sec and maintained also by ketamine (Ketamine Hydrochloride, Germany) @2.5mg/kg

I.M and finally the dog was restrained in dorsal recumbence on the patient table where all legs were loosely secured for ease of the surgical procedure.

Surgical correction and treatment: After aseptic preparation and keeping it in suitable position, an elliptical incision was performed on the base of the swelling and advanced gently with blunt dissection using a Metzenbaum scissor. After careful handling and divulsion of adjacent tissues including the one pair of caudal abdominal and inguinal mammary glands, the tumorous growth was surgically excised and removed en bloc (Figure 2C), weighed 3.5kg and taken for histopathological examination (Annex 5). During surgical procedure bleeding was controlled through ligation and crushing of the blood vessels. Then the removed areas were moped up and well cleaned before closure. During the closure, subcutaneous tissue was apposed with simple continuous sutures to obliterate dead space and accumulation of serosanguinous fluid using polyglycolic acid 910 (vicryl) 1.0. A large amount of skins were trimmed off. Finally, the skin was sutured with simple interrupted suture pattern using silk 2.0 due to the tension of the operation site (Figure 2D).

However, the most anterior part of the mammary gland (the right side of cranial thoracic gland) tumors was postponed to a week after the first operation (Figure 2E) because of the weak patient status during surgery and less developed masses at the site. Finally, surgery was commenced similarly. But the skin was sutured with a subcuticular (buried) pattern using polyglycolic acid 910 (vicryl) 2.0 (Figure 2F). At the end, the suture lines were scrubbed with diluted iodine solution and the dog stayed in VTH of Addis Ababa University for about a month.

.

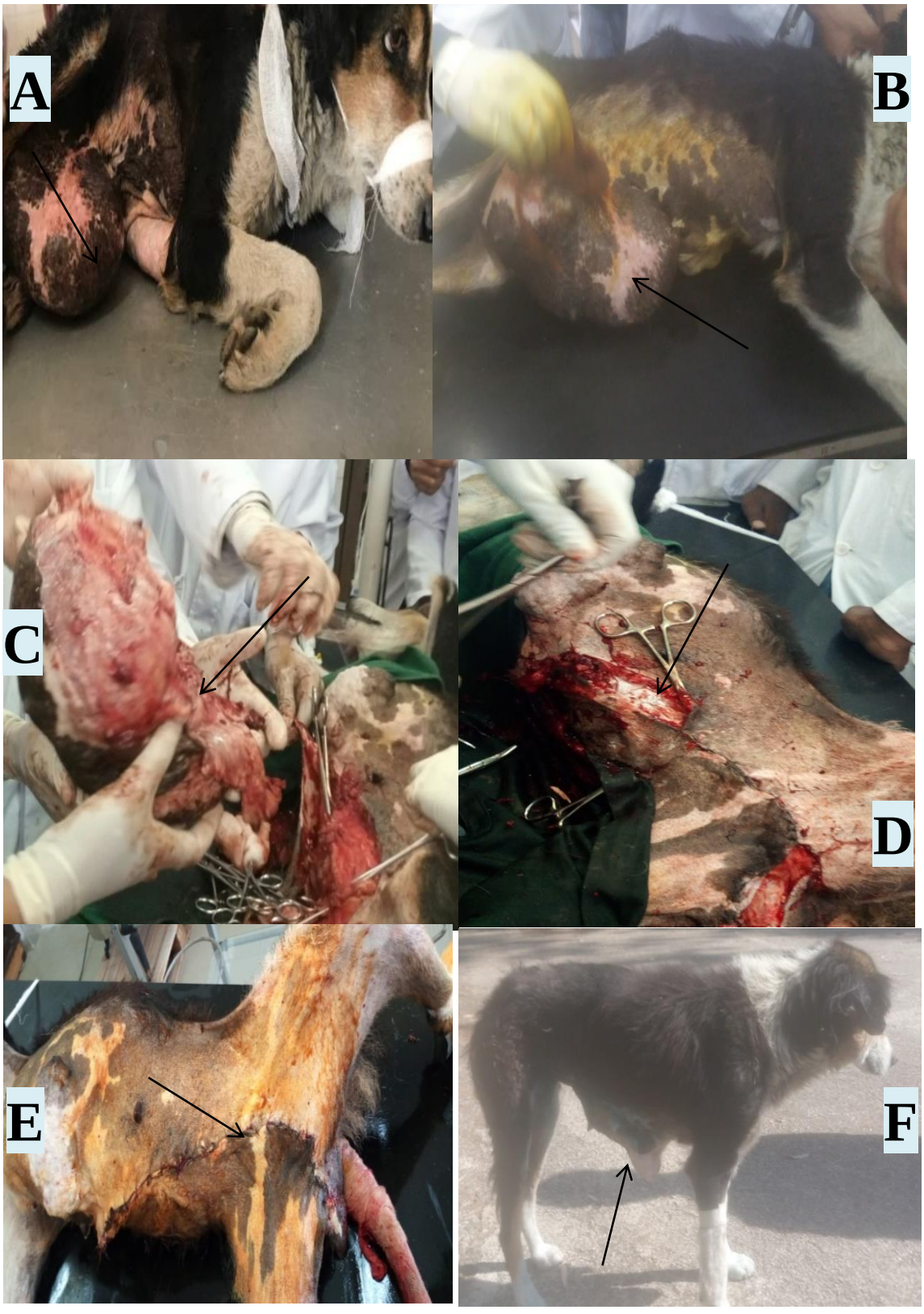

A
B
C
D
E
F

Figure 2: Surgical excision of the lymphoma in bitch

(A) Case presentation; (B) Surgical site preparation; (C) Tumor excision in progress; (D) Skin suture in progress; (E) After closure of the skin; (F) A case presentation for the next surgery appointment; (G) Skin closure with subcuticular pattern; (E) Patient status after multiple surgeries

Postoperative care and outcome: At the end, systemic antibiotics by using Penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (PenStrep®Norbrook UK) I.M was administered then continued for five consecutive days. Besides, Tramadol (Tramadol hydrochloride, Sakar Health care Pvt.Ltd, Gujarat, India) @2 mg/kg I.M q 12 hr for pain management was also administered for three consecutive days. The wound was lavaged on one day interval for several days. Moreover, the dog was subjectively assessed for any discomfort, unpleasant discharges, pain, and inflammation at the surgical site. Not only these but also, fluid therapy with lactated ringer's solution and dextrose saline solution through IV, and Glucose 40% orally was continued for 2-3 days of post-operation due to very weak patient status. The skin suture of first day surgery was removed at 21th day. Finally, it was uneventfully recovered without recurrence upon

follow-up period for five months. Surprisingly, the bitch was increased in body weight through owner`s home visits after four months post-surgery (Figure 3B).

Figure 3: The outcome of the surgical excision of the lipoma in bitch

(A) Observation of the surgical site at the day 45; (B) Visiting of the patient after four months of the operation

Discussion

The tumor of adipose tissue can be divided into benign (lipomas) and malignant neoplasms (liposarcomas). Although they may resemble one another macroscopically, they are histopathological distinct (Baez *et al.*, 2004). Among these tumors, lipomas are much more common than liposarcomas (Vegad, 2012). Lipomas are benign tumors consisting localized nodules of fat and originated from adipocytes of the subcutaneous tissue while infiltrative lipomas are locally invasive and may cause pain and/or clinical signs due to the compression of neighboring tissues (Kim *et al.*, 2005). In this particular case report, under appropriate care the mass was completely excised surgically with a certain pairs of mammary glands. This is compatible with Henry, (2014) stated that radical surgery remains the feasible treatment in the

benign tumor. The current case management was also similar with Gabli *et al.* (2017) who carried out mastectomy of all tumoral glands following routine surgical techniques. Macroscopically, lipomas are well-circumscribed yellow or orange masses of greasy consistency, surrounded by a thin capsule and adipocytes are the same size or slightly bigger compared to normal cells (Kaeser *et al.*, 2010). Microscopic examination of the lipomas may resemble normal fat tissue; hence expertise and careful examination of the mass is required to distinguish the benign lipomas from fatty change and normal fat tissue as well as the malignant fat tumor (Subapriya *et al.*, 2020).

In the analysis of age-wise incidence, conducted by O'Neill *et al.* (2018) high incidence of lipomas was recorded in 5-10 years of age in dogs. Unlike this, tumor in the current case was occurred in 12 years old bitch. Once the patient is anesthetized and the surgical area is clipped, it is clear to find additional mammary tumors that were not readily palpable with the dog awake and consequently, owners must be informed that a revised surgical plan may be required if additional mammary masses are discovered (Dantas *et al*., 2012). Similarly, after the removal of the most posterior tumors of the mammary gland (a pair of caudal abdominal and inguinal) on the first day operation the surgical plan was postponed to the next week for the rest anterior part of the mammary glands and the owner was also asked for the next surgical schedule and performed accordingly. Modified radical mastectomy was performed involving removal of the affected gland and those that share lymphatic drainage and associated lymph nodes and fat down to the rectus fascia without removing it. The tumor didn't recur on a dog during follow-up period for five months. The reason for non-recurrence in the current report might be due to its complete excision of the tumor mass as it was reported by numerous authors (Rao *et al*., 2011; Henery, 2012; Papazoglou *et al*., 2014). The modified radical mastectomy performed was successful and promising for similar cases involving the removal of the lipoma provided that appropriate care is taken.

3.1.2. Surgical excision of the lipoma in goat

Abstract

An approximately 3-years-old, castrated crossbreed male goat was presented to the VTH, CVMA of the Addis Ababa University for evaluation and removal of the large-sized masses at the level of the neck region and post scrotal area unilaterally from the right side. As per history, the animal was suffering from the aforesaid growth for the last 3 months and the size was growing progressively. Further history stipulated as the goat had been kept on systemic antibiotics for several days and Ichthammol 10 % Topical Ointment had also been applied to the swelling but no response. Upon clinical examination, the goat was found to be dull, depressed and anorexic. Fortunately, it exhibited normal body temperature; heart and respiratory rate were 38.9°C, 80beats/minute, and 20breath/minute respectively. However, feeding and drinking were severely affected. The mass was firm, apparently painless, spherical, and approximately 3.5-8cm in diameter in both anatomic locations. Finally, the case was tentatively diagnosed as intramuscular lipoma. Surgical excision was performed after aseptic preparation and controlling of the goat in suitable positions. The entire tissue was submitted for the histopathology (Annex 6). Regular antibiotics along with localized antiseptic dressing resulted in the complete recovery of the animal. The goat recovered well without any apparent complications and the skin suture was removed at 21th day postoperatively. Thus, surgical excision of the lipoma in this goat appears to be a viable treatment method.

Keywords**:** *Goat, Lipoma, Neck region, Surgical excision*

Introduction

Tumors of the skin and subcutaneous tissues are the most common neoplastic disorders in domestic animals including goats (Maxie, 2007; Hassanein and Mahmoud, 2009). Some of the known causes of skin cancer in human beings are also operative in animals. Thus, prolonged and continuous exposure to sunlight is the best known predisposing factor, and a sunlight-induced skin cancer relationship has been established in various domestic animals (Valentine, 2006).

However, the overall occurrence of tumors cannot be determined with certainty because sheep and goats are slaughtered for consumption at an early age before tumors have time to develop. Even though, tumors in small ruminants result in a severe economic loss (Goldschmidt and Hendrick, 2002).

Lipomas are benign tumors arising from mature adipocytes. Adipose tissues tumors are common mesenchymal skin tumors which are most common in dogs but they can also occur in other domestic animals (Julie *et al.,* 2013). Lipomas can be found between skin and muscle or in the muscle by itself. The lipomas located between the skin and muscle layers are soft and freely movable while those located between muscles have more firm consistency and are not mobile (Veena *et al*., 2013). Radical excision of the tumor was applied in such cases as a curative intervention (Abouelnasr *et al*., 2016). Otherwise, the probability of getting infected with myiasis and thereby exacerbating of situation will be high (Baniadam *et al*., 2010).

The proximal extremity of the limbs and the trunks are the most common sites for lipomas (Kumar *et al*., 2011). Subcutaneous lipomas have been reported to occur occasionally in cattle and are rare in sheep, goats, and pigs (Valentine, 2004). However, reported cutaneous neoplasms in goats include squamous cell carcinoma, squamous papilloma, epithelioma, apocrine sweat gland adenoma, fibroma, melanoma, mast cell tumor, histiocytoma, hemangioma, and hemangiosarcoma (Fletcher, 2001; Bildfell *et al*., 2002; and Lohr, 2013). Histologically, lymphomas are either dominated by small or large neoplastic lymphocytes or a mixture of many small and fewer large cells. Surgery has been reported as a radical treatment of tumors in sheep and goats (Mavangira *et al*., 2008). This report describes a case of surgical excision techniques of lipoma from two different anatomic locations (caudal aspect of the scrotum and ventrolateral aspects of the neck) of the male goat under aseptic manner.

Case history and clinical examination: An approximately 3-years-old castrated male crossbreed goat was presented to the VTH, CVMA of the Addis Ababa University for evaluation and removal of a large swelling along the right side ventrolateral neck and post scrotal area (Figure 4A&B). As per history, the animal was suffering from the aforesaid growth for the last 3 months and the size was growing progressively. Further history stipulates as the goat had been kept on

systemic antibiotics for several days and Ichthammol 10 % Topical Ointment had also been applied to the swelling and end up with no response. Upon clinical examinations, the mass was firm which is not painful, spherical in shape and approximately 3.5-8 cm in diameter in both anatomic locations. The animal exhibited normal body temperature (38.9°C), heart rate (80beats/minute), and respiratory rate (20breath/minute). However, feeding and drinking were severely affected. Based on history and clinical examination the case was tentatively diagnosed as massive benign infiltrative lipoma. Finally, surgical removal was decided.

Preoperative and surgical site preparation: Before coming to surgery the goat was withheld from feed and water for 12 and 6 hours respectively based on the appointment. Thence the hair surrounding the swelling was aseptically prepared by clipping, shaving, scrubbing, and washing with water and chlorhexidine solution (savlon) (Figure 4C&D).

Anesthesia and animal control: The goat was sedated with 2% xylazine hydrochloride (Rompun 2%; Bayer, Turkey) @ 0.05 mg/kg IM. Then it was controlled in left lateral recumbent position on the patient table. Manually the right side of hind leg was extended in upward position by assistant. Besides, circular anesthesia was infiltrated using 2% lidocaine (Norbrook Laboratories, UK).

***Surgical procedure and treatment*:** After aseptic preparation and fixing of sterile surgical drape on site incisions were performed on the middle of swellings for both anatomic locations. Then continued with advanced and gentle blunt dissection by using a metzenbum scissor and the tumor masses were excised with some healthy tissues (Annex 6). During operation, hemostasis was carried out by ligation of the bleeding vessels with polyglycolic acid 910 (vicryl) 3.0 and crushing by hemostatic forceps. After careful handling and divulsion of adjacent tissues, particularly in the ventrolateral aspect of the neck because the swelling was found underneath the Jugular vein, tumorous growth was meticulously excised and removed en bloc so that to prevent damage to the critical organs such as jugular vein, trachea, and esophagus and associated structures (Figure 4E&F) and the masses were sent for histopathological examination (Annex 6). Then the removed areas were moped up and well cleaned before closure. During the closure, subcutaneous tissue was apposed with continuous sutures to obliterate dead space and

accumulation of serosanguinous fluid using polyglycolic acid 910 (vicryl) 1.0 and the skins were closed with a simple interrupted suture pattern using silk 2.0 for both anatomic locations (Figure 4G&H). Finally, the suture lines were scrubbed with diluted iodine solution and sent home.


G
H
I
J
K
L

Figure 4: Surgical excisions of the lipoma and its outcome in goat

(A) Clinical presentation of the case; (C&D) Preoperative preparation; (E&F) Excision in progress from both scrotal and ventrolateral neck respectively; (G) Observation of jugular vein and associated structure after removal of the tumor from neck region (deep intramuscular); (H) Suture in advance; (I&J) Both anatomic locations were sutured with simple interrupted suture pattern; (K&L) at 14th day after removal of the skin suture and two months later respectively.

Postoperative care and outcome: Postoperatively the goat was administered with penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) for five days. In addition, the surgical sites were regularly dressed. The client was also advised to regularly monitor the goat for any complications. At 14th day of operation, the goat was in a good stage of healing and the skin sutures were removed accordingly (Figure 4K). Finally, upon the follow-up period, two months later the goat became increased in body weight (Figure 4L) and recurrence wasn't noticed until four months.

Discussion

The tumor of adipose tissue can be divided into benign and malignant. Although they may resemble one another macroscopically, it can be distinguished by histopathological examinations (Baez *et al*., 2004). The proximal extremity of the limb and trunk are the most common site for lipomas (Goldschmidt and Hendrick, 2002). This is in agreement with the current case report where lipoma occurs in the scrotal and ventrolateral aspects of the neck. The present case was managed by complete surgical excision of the tumor and there was no recurrence of the tumor up to four months. The reason for non-recurrence in the present case might be due to its complete excision and early diagnosis as opined by (Rao *et al*., 2011). As in other species, factors such as breed, genetics, coat and skin color, and environment likely contribute to oncogenesis in caprine skin. However, specific oncogenic factors have not been well studied in goats. As it have been reported in other animals, caprine cutaneous tumors often arise in lightly pigmented breeds or areas of white or lightly pigmented hair, suggesting that UV radiation may play a role in

oncogenesis (Narayanan *et al*., 2010). Most of the lipomas reported in animals are of subcutaneous tissue origin. These tumors may also be found in deeper tissues such as the pharynx, tendon, muscle, connective tissue, and extradural space (Hammer *et al*., 2005). Compatible with this finding, lipoma in the report was deeply in both anatomic locations but lipoma found around the neck level was deeper than scrotal. They are most commonly seen in dogs, occasionally found in cattle and horses, and are rare in sheep, goats, cats, and pigs. Surgical resection with wide margins in benign tumors proved to be effective in controlling the reoccurrence of the case (Umeshwori *et al*., 2011).

In this particular case, the growth was extensive with a voluminous blood supply particularly lipoma of the ventrolateral aspect of the neck. The trickiest part was its vicinity to the jugular vein. The surgical excision at this site was meticulously performed to avoid damage to vital tissues such as the jugular vein, trachea, and esophagus and associated structures since the tumor was deeply located. After meticulous retraction and holding of the jugular vein and associated structures to one side, the mass was en block and the incision closed routinely. Finally, after multiple surgeries, the goat was kept on postoperative treatment and follow-up. Amazingly, it was uneventfully recovered and increased in body weight and the recurrence wasn't noticed on it during follow-up period for four months. This method was found to be viable in this animal.

3.2. Surgical Managements of the Urogenital System in Male Cattle

3.2.1. Urolithiasis and penile amputation in cattle

Abstract

Obstructive urolithiasis is the retention of urine due to the lodgment of calculi in the urinary tract. This case report describes surgical management of urolithiasis through penile amputation in local breed bull and an ox that were brought to the VTH, CVMA of Addis Ababa University with a complaint of difficulty in passing urine that had developed certain days before presentations. Upon presentation, the animals were found to be dull, depressed, and tail wringing, stamping the feet, kicking at the abdomen, and stretching was observed in both cases.

However, the later had been treated with systemic antibiotics and anti-inflammatory drugs for three consecutive days at VTH and was finally admitted for surgery. Upon rectal palpation, the urinary bladder was distended in both cases and especially abdominal distension in the latter. Penile amputation was performed after retracting the penis adequately enough to fix with the skin. After amputation, the animals successfully urinated. Upon regular follow up, after fifteen days of the operation, the owner would preferred to slaughter though the bull was in a good prognosis for case 1, the case 2 was fattened for meat purposes and finally slaughtered after two months.

Keywords: *Cattle, Obstructive urolithiasis, Penile amputation, Urination*

Introduction

Obstructive urolithiasis is the retention of urine after the lodgment of calculi anywhere in the urinary tract (Makhdoomi and Gazi, 2013). In small and large male ruminants, the predisposition to obstructive urolithiasis involves a combination of both anatomic and dietary factors. Uroliths are most frequently lodged in the distal sigmoid flexure, near the insertion of the retractor penis muscle and vermiform appendage (urethral process) (Van and Divers, 2002) and may results in local rupture of the urethra and bladder (Jennifer *et al.,* 2008; Rafee *et al.,* 2015). It is also highly prevalent in young and early castrated animals due to hindering the hormonal impact that is necessary for the penis to reach full size (Kahn and Line, 2010; Tamilmahan *et al*., 2014).

The diseases can also occurs when uroliths usually comprised of phosphate salts, lodge in the urinary tract and prevent urination (Schoenian, 2005). The most prevalent uroliths observed in bovine urolithiasis were magnesium ammonium phosphate, calcium phosphate, calcium carbonate, calcium oxalate, hippuric acid, tyrosine and uric acid (Parrah *et al*., 2010). These can be prevented by dietary mineral supplementation so that it maintains the calcium-phosphorus balance in the animal body (Kalim *et al*., 2011). Urolithiasis becomes a common problem and affects 5 – 15 % of the population in the world and recurrence rates are close to 50 % (Machado *et al*., 2014).

Urolithiasis can be easily diagnosed but the selection of treatment modality may be a challenging issue. Treatment of urolithiasis mainly depends on the types of obstruction. For instance, medical dissolution of urolith is possible in case of mild or partial obstructions and occasionally, it may give temporary relief (Ewoldt *et al*., 2006). However, complete urethral obstruction needs emergency surgical intervention (Schott and Woodie, 2012; Tamilmahan *et al*., 2014). Treatment of urolithiasis is basically to establish normal urinary passage, which can be accomplished in various ways depending on the severity of the condition. The use of muscle relaxants, amputation of the urethral process, urethrostomy, and tube cystotomy are among the techniques to establish a patent urinary tract (Alimi *et al.,* 2018). Alternatively, tube cystotomy can help in passage of urine and consequently giving urinary acidifiers through it can dissolve the stone in the urethra (Gugjoo *et al*., 2013). However, surgical managements of obstructive urolithiasis have been associated with postoperative complications such as; recurrence of urolithiasis, damage of urethra, atonic bladder, and severe cystitis (Dubey *et al*., 2006). The present case report aims to describe penile amputations using post scrotal approach in two local breed cattle.

Case 1

Case history and clinical examination: A five years old, intact local breed bull was brought to VTH, CVMA of the Addis Ababa University with a history of difficulty in passing urine for the past two weeks (Figure 5A (Case 1)). Upon presentation, the animal was found to be dull, depressed, and tail wringing; stamping the feet, kicking at the abdomen, and stretching were also observed. Physical examination was performed by taking body parameters such as rectal temperature, heart, and respiratory rate were 39.3°C, 75 beats/ minute, and 48 breaths/ minute respectively. Per-rectal examination revealed the presence of a distended urinary bladder. Consequently, a wide catheter was placed into the bladder through a rectal approach to keep it empty and prevent rupture of the bladder and gave temporary relief. External digital palpation of the urethra was tried to locate the site of obstruction, but failed to identify any urolith through it. Hence, the condition was tentatively diagnosed as urethral obstruction due to urolithiasis and was decided to perform urethrotomy, but latter penile amputation.

Case 2

Case history and clinical examination: A seven years old local breed ox was brought to the Veterinary Teaching Hospital of the Addis Ababa University with a history of difficulty in passing urine for the past five days. History stipulated that the ox had been kept on systemic antibiotics and anti-inflammatory drugs for certain consecutive days at VTH before it was referred to operation. Upon presentation, the animal was found to be dull, depressed, and tail wringing; stamping the feet, kicking at the abdomen, and stretching were observed. On clinical examinations the animal exhibited normal body parameters such as rectal temperature, heart, and respiratory rate were 38.8°C, 60 beats/ minute, and 30 breaths/ minute respectively. Per-rectal examination revealed the presence of a distended urinary bladder. External digital palpation of the urethra was tried to locate the site of obstruction but failed to identify any urolith through it. Hence the condition was tentatively diagnosed as urethral obstruction due to urolithiasis. Finally depending upon history and clinical examination both cases were diagnosed urethral obstruction and admitted for penile amputation using post-scrotal approach.

Preoperative and surgical site preparation: Before undergoing surgery, the site proposed for surgery (area between the scrotum and ischial arch) were washed with water and soap thoroughly after restraining animals in appropriate position for both cases. Thence the hair surrounding the surgical sites were aseptically prepared by clipping, shaving, scrubbing, and washing with water and chlorhexidine solution (salvon) (Figure 5B(Case 1)) & (6A (Case 2)) after the animals were physically restrained.

Anesthesia and animal control: After preparing the surgical site in an aseptic manner, the caudal epidural anesthesias were administered with 2% lidocaine hydrochloride (2% lidocaine hydrochloride by jeil pharma. co.Ltd. Korea) @ 0.22 mg/kg using 16G needle as opined by (Azari *et al.,* 2014; Atiba *et al.,* 2015). Following this additional anesthesia was achieved through local infiltration of 4 ml of 2% lignocaine hydrochloride subcutaneously and into deep muscles before giving a nick incision at the site after restraining the animals in lateral recumbency by rope-assisted personnel in both cases.

Surgical procedure and treatment: After aseptic preparation and controlling of the animals in appropriate positions, a sterile surgical drape was fixed with the four towel clamps on the surgical site in case 1. Then about 12 cm vertical skin incisions were made using a surgical blade, between the base of the scrotum and ischial arch ((Figure 5C (Case 1) & 6B (Case 2)). Blunt dissection was performed on the penis to separate it from the surrounding tissues and pulled caudally and dorsally gently in both cases. A large carmalt (straight forceps) was inserted between the penis and pelvis to help retraction of the penis during dissection. After careful dissection and ligation of the dorsal artery, the penis was pulled out from the perpetual cavity and examined for calculi lodgment at the site ((Figure 5D (Case 1) & 3B (Case 2)). Unfortunately, the urethroliths weren't palpable during the examination of the urethra and was appreciated after the postmortem examination of the amputated penile in Case 1. However, in case 2 penile amputation was immediately performed after retracting the penis adequately enough to fix with the skin. In both cases, tourniquets were applied using sterile gauze at the base of the penis and blood vessels of the penis were ligated accordingly. Finally, amputation was done under careful examination and measurement of the penis for fixation ((Figure 5E (Case 1) & 6D Case 2)). For identification of any obstruction in the urethra, the catheter was passed to the bladder from the site of amputation. After complete passing of the urinary catheter, urine started to flow through the catheter indicating a patent urethra for both cases. Upon closure, the first layer and second layer were closed with a simple continuous suture pattern using vicryl 1.0 the skin was closed with an interrupted suture pattern using silk 2.0 for both cases. Trans-fixation ligature placed on penile tissue using vicryl 2.0. The animals were urinated then (Figure 5F (Case 1)).


A
B
C
D
E
F
E
H

Figure 5: Surgical management of urolithiasis in bull

(A) Clinical presentation; (B) Local infiltration of 2% lidocaine; (C) Surgical site scrubbing; (D) Incision in progress; (E) Exteriorization of penis through the incision (F); While cutting the penis distal to the tourniquet; (G) Urination in progress; (H) A bull presented after a weak of surgery.

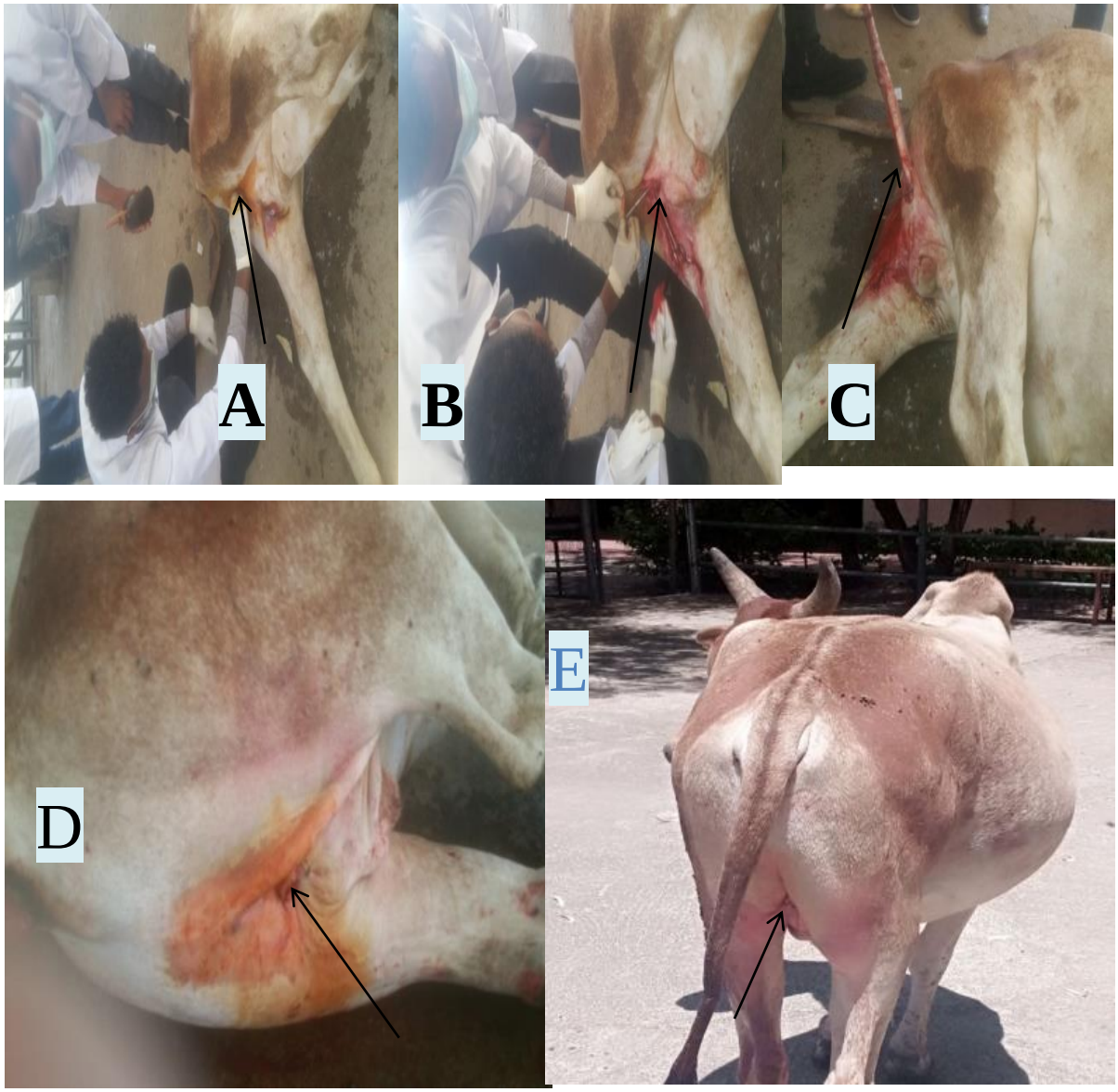


Figure 6: Surgical management of urolithiasis in ox

(A) Surgical site preparation; (B) Incision in progress; (C) Exteriorization of penis through the incision; (D) At the end of the surgery; (E) The ox presented at 3rd day of operation.

Postoperative care and outcome: At the end of the procedures, both case1 and 2 were administered with penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) I.M for five and three consecutive days respectively. In addition, dexamethasone sodium was also administered @0.04 mg/kg I.M for two consecutive days in case 1 to reduce swelling of the wound. Case 2 had been kept on systemic antibiotics and anti-inflammatory drugs for three consecutive days before referring to operation. The suture lines were dressed with a weak iodine solution every two days for both cases. The owners were also advised to inspect any discomforts associated with urination and suture and to provide well feeding and management especially. Upon regular follw up, animals were urinating through the stoma without any difficulty and sold to be slaughtered after fifteen days of the operation(Case 1) but kept on for fattening purposes(case 2) before slaughtered following two months.

Discussion

Urolithiasis is the most common urogenital problems of the male animals, because of various factors such as metabolic imbalance, nutritional status, infection, and environmental factors (Kumar, *et al*., 2006). Nutritional status may include feeding of heavy concentrate with low roughage diets, water deprivation, dehydration, alkalinity of urine, mineralized water, alkaline water supplies, and an excess amount of sodium bicarbonate in diet, vitamin imbalance, and high proteins ration are among the numerous factors which contribute in the development of urinary calculi in domestic animals (Makhdoomi and Gazi, 2013). It can be diagnosed based on the history, clinical findings and ultrasound and radiographic examinations (Radostits *et al*., 2003). Obstructive urolithiasis can be treated by both conservative and surgical means in all species of domestic animals (Janke *et al.,* 2009). However, successes of the treatment relay on duration of the clinical course so that early detection and management is very important (Elisa *et al.,* 2011).

A surgical treatment of the obstructive urolithiasis is a primary choice (Türk *et al.,* 2016). Surgical manipulation along with fluid, anti-inflammatory drugs, systemic antibiotics, and acidifying therapies will result in better outcomes. Selection of the surgical procedures and approaches may be relay on the characteristics of the individual case, which include the site of obstruction and rupture and value of the animal (Jennifer *et al.,* 2008). The most common complications associated with surgical treatments of obstructive urolithiasis are recurrent urolithiasis, calculi at multiple sites, badly damaged urethra, atonic bladder or severe cystitis (Dubey *et al*., 2006).

Kushwaha, (2007) evaluated surgical techniques like tube cystostomy, urethrotomy, and medical dissolution as the treatment for correction of urolithiasis in buffalo calves and stated that tube cystostomy was found to be the most preferable technique. However, in this case report both cases 1 and 2 were successfully managed through penile amputation and the animals were recovered uneventfully until the owners decided to prefer for slaughter house. Urolith formation with obstruction of the urethra is more common in steers, breeding and castrated rams, and goats (Radostits *et al.,* 2000). Thus, obstruction due to urolithiasis should be taken into consideration as an emergency and must be managed immediately to prevent mortality associated with it (Makhdoomi and Gazi 2013). Generally, surgical penile amputation in an aseptic manner followed by postoperative administration of antibiotics and anti-inflammatory drugs and continuous dressing of the wound was found to be effective because the owners have got the opportunity to fatten and sell their animals for the slaughterhouse.

3.2.2. Surgical management of the paraphimosis in ox

Abstract

Paraphimosis is inability to completely retract the penis into the preputial cavity because of acquired or congenital problem. In the current case report, an eight years old local breed ox was presented to the VTH, CVMA of Addis Ababa University with a history of anorexia, constant anuria, and sustained penile protrusion due to traumatic injury while mounting heifer. Besides, the history showed as the condition occurred immediately after an ox was attempted mounting

over a heifer in heat. Upon clinical examination of penis, the glans penis was swollen, hot, and fully soiled with dirt. Finally, the case was diagnosed as acute paraphimosis and admitted for surgical correction. After aseptic preparation of the surgical site by clipping, shaving, scrubbing, and washing with cold water, and savlon® (Cetrimide 3% and Chlorhexidine gluconate 0.5% solution) and stabilizing the ox through physical restraining and local desensitization (2% lidocaine hydrochloride 20mg/ml which is manufactured by jeil pharma. co.Ltd. Korea) the penis was gently repositioned into the preputial cavity and a purse string suture was applied as retention suture to prevent recurrence. Postoperatively the ox was administered an antibiotics oxtetracycline @10mg/kg IM for three days and dexamethasone sodium @0.04 mg/kg IM for two days to reduce swelling of the glans penis. Purse string suture was removed on the 5^{th} day and upon regular followup, an ox was recovered completely without any complications**.**

Keywords: *Ox, Paraphimosis, Purse string suture, Surgical management.*

Introduction

Paraphimosis is a disorder, where the protruded penis is unable to back into the prepuce once exposed. It may be due to congenital and acquired in origin (Ravikumar, 2019).The former can be because of the narrowness of the preputial orifice and shortened preputial sheath (Ramani, 2010) while the latter is due to trauma, neoplasia, infection, penile hematoma, and excessive sexual activity leading to damage of innervations on the penis resulting the paralysis of penile retractor muscles (Nevi *et al.*, 2015). Traumatic injury is particularly related to false copulation and occurs when the penis strikes the pelvis of the cow or the cow kicks the bull's penis leading to swelling of the distal penis which consequently, prevents the penis from retracting back into the prepuce (Adeola and Enobong, 2016). Besides, priapism, foreign objects around the penis and constricting band of hair at the preputial orifice are also causing paraphimosis (Davidson, 2016). This is because once the glans penis is swollen it is impossible to draw the organ back through the naturally small preputial orifice, difficulty in all through urination and painful erection (Mahesh *et al.*, 2016; Davidson, 2010).

Even though the protruded penile tissue appeared to be normal and non-painful at the initial stage, complication increases as time elapses, and erected penis render inflammation leading to oedematous and impaired blood circulation. Moreover, the condition aggravated due to persistent soiling and licking. Thus, if left untreated earlier, the protruded penis becomes necrotic, infected, and adhered strongly to the mucous membrane of the prepuce renders permanent damage to the penile tissue and death of the animal will occur (Johnson, 2003; Hedlund, 2007). Paraphimosis can be managed either medically or surgically. However, it depends mainly on the clinical signs and duration of the occurrence (Ali and Davoud, 2011). Purse string suture is a common retention suture that has been used to correct paraphimosis (Mallesh *et al*., 2017). The present case report aimed to provide a report of successful surgical correction and management of paraphimosis in a local breed ox due to traumatic injury by a heifer while mounting.

Case history and clinical examination: A seven years old local breed ox was presented to the VTH of the Addis Ababa University with a history of anorexia and sustained penile protrusion following traumatic injury by heifer (Figure 7A) since approximately one day on the date of admission. Besides, the history showed us the condition occurred immediately after the ox was attempted mounting over a heifer in estrus multiple times. Upon clinical presentations, the penis was red with moderate swelling and found out of its normal anatomic location. Physical examination was performed and revealed that the glans penis was swollen, hot, and fully soiled with dirt. All the body parameters were taken accordingly rectal temperature; respiratory rate, heart rate, and pulse rate were within a normal physiological limit. Finally, the case was diagnosed as acute paraphimosis and decided to be managed by surgical means.

Anesthesia and animal control: The ox was restrained in lateral recumbence for detailed clinical examination and treatment. Local anesthesia was achieved by injection of around 6ml of (2% lidocaine hydrochloride 20mg/ml which was manufactured by jeil pharma. Co.Ltd. Korea) at the site after the ox was handled with rope-assisted by personnel to adequately restrain it in the lateral recumbent position.

Preoperative and surgical site preparation: After controlling the ox in lateral recumbency, the aseptic preparation of the surgical site (prepuce), and correction of the protruded penis was

performed. The hair surrounding the swelling (prepuce) was aseptically prepared by clipping, shaving, scrubbing, and washing with water, and savlon® (Cetrimide 3% and Chlorhexidine gluconate 0.5% solution) (Figure 7B).

***Surgical procedure and treatment*:** The protruded penis was washed with saline solution to decrease the edema. After the edema was reduced, the glans penis repositioned into the preputial cavity, and retention suture was applied using purse-string sutures to the preputial orifice (Figure 7C). Lastly, the area was properly cleaned and dressed with a 1% povidone-iodine solution and admitted home.

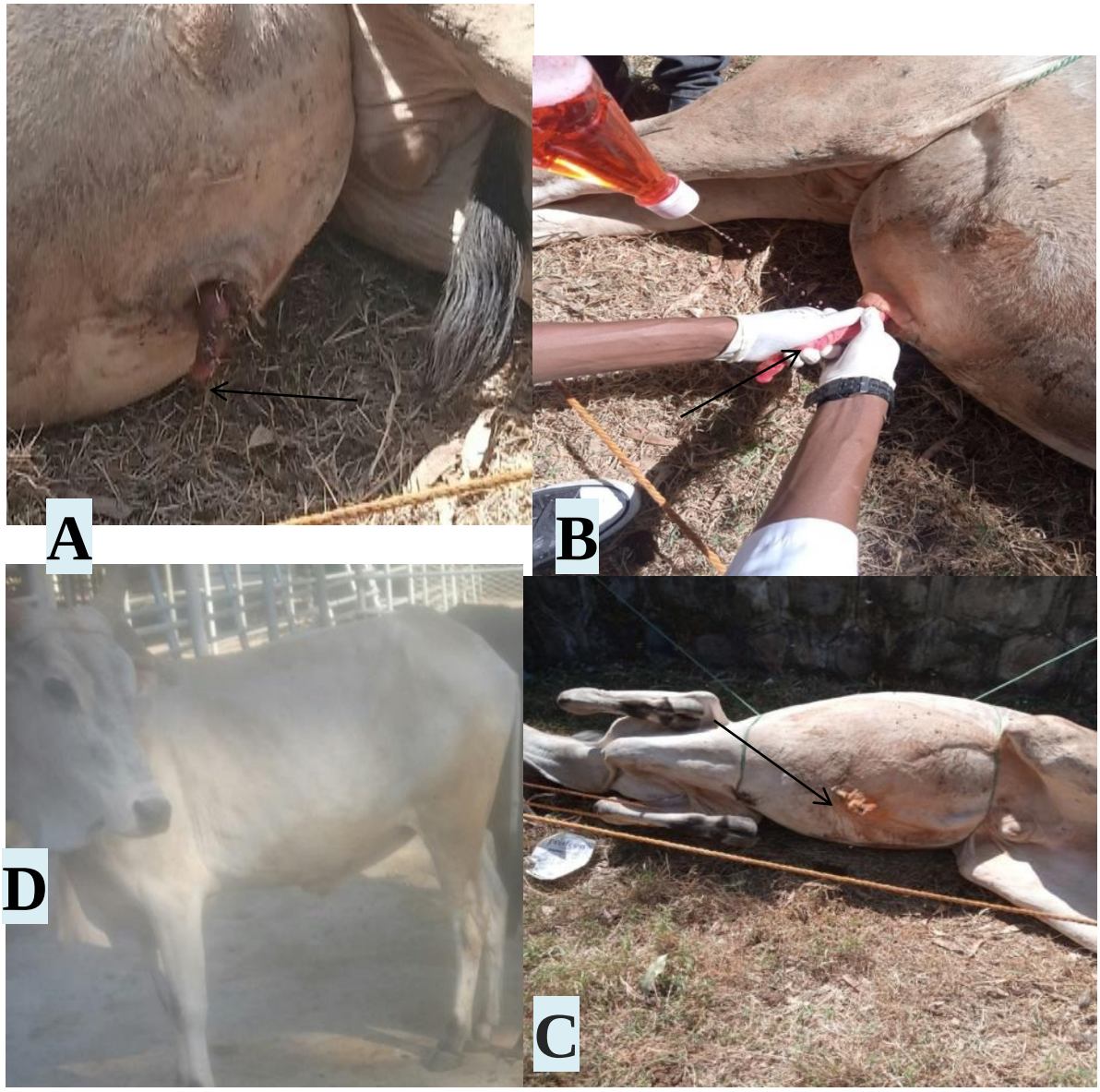


Figure 7: Correction of paraphimosis in ox

(A) Clinical presentation of ox; (B) Washing of protruded penis with normal saline and salvon®; (C) Reposition of the penis and putting retention suture; (D) After removal of the purse string suture at 5th day presentation

Postoperative care and outcome: Postoperatively, the ox was kept on antibiotic penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (PenStrep® Norbrook UK) IM for three days to reduce post-operative complications. Besides, Dexamethasone sodium @ 0.04 mg/kg was administered intramuscularly for two days to reduce swelling of the glans penis. Purse string suture was removed on the 5th day and the ox was recovered completely without any complications (Figure 7D).

Discussion

The principal goal in treating acute paraphimosis is reducing the edema and repositioning the prolapsed penis to the preputial cavity as early as possible to protect against further complications **(**Mahesh *et al*., 2016). The entrapment is associated with restriction around the penis from a small preputial orifice relative to the diameter of the penile shaft, which results in dramatic swelling of the exposed penis, and this is in agreement with a report conducted by (Michael, 2005). The immediate attempts to correct paraphimosis and the surgical technique are indicated by (Papazoglou, 2001). Because further delay may be associated with prolonged entrapment and strangulation which causes venous and lymphatic compromise that result in penile necrosis (Babalola, and Henshaw, 2016). Similarly, this case was managed immediately as soon as the injury to prevent it from the further complications. Nevi *et al*. (2015) mentioned that acquired paraphimosis are a result of trauma to the penis which causes damage to the innervations of the penis leading to the paralysis of penile retractor muscles. However, in this report it was due to the trauma of the heifer while the ox attempting to mount over her multiple times without paralysis of the penile retractor muscles. The occurrence of the paraphimosis is most commonly seen in bulls and dogs (Ravikumar *et al.* 2019; Adeola and Enobong, 2016) where paraphimosis is most commonly seen in bulls and dogs.

The time course of the paraphimosis depends on the underlying etiology such as swelling of the penis and prepuce which occurs within a few hours of its injury. With traumatic lesions, the resolution with medical treatment is generally rapid if the condition is observed and treated early. However, resolution may be protracted if the condition is due to penile paralysis (Hopper, 2016). Paraphimosis can be treated in various ways including reassuring the patient, reducing the preputial edema, and restoring the prepuce to its original position. Additionally, ice packs, penile wraps, and manual compression mechanically disperse the penile and preputial edema, while osmotic agents, such as granulated sugar or mannitol have been reported as effective agents to reduce swelling (Fossum, 2002). In case of difficult retraction, it is necessary to surgically enlarge the preputial orifice, while paraphimosis accompanied by penile necrosis is best managed with amputation (Kirsch *et al.*, 2002).

A temporary purse-string suture will be applied to the preputial orifice to keep the penis in the cavity as an initial surgical treatment of paraphimosis as described by (Kumaresan *et al*, 2014). In the current case, the paraphimosis was managed initially by reducing the swelling followed by retention in the preputial cavity by purse-string suture, antibiotic, and anti-inflammatory was used to facilitate recovery and prevention of secondary bacterial infection. Postoperatively, the prepuce of an ox was applied with a 1% Povidone-iodine solution recovered uneventfully without any complications (Fesseha, 2020a). In conclusion, during case management, the prolapsed penis was aseptically washed and gently replaced in the preputial cavity after the reduction of the swelling. Finally, a retention suture was placed at the orifice to prevent recurrence and this technique was found to be effective in acute acquired paraphimosis in ox.

3.3. Hernia Repair in Domestic Animals

3.3.1. Ventrolateral hernia in cow

Abstract

A hernia is one of the common surgical ailments in domestic animals and due to various factors in different anatomic locations. The case report was aimed to describe the surgical management of ventrolateral hernia on seven years old local breed pregnant cow that was brought to the VTH, CVMA of the Addis Ababa University with a history of the large swelling on the right side of the ventral abdomen in the lower flank. History stipulates that swelling was increased in size within a month. Upon physical examination the vital parameters were within the physiological limit clinical examination, through palpation, the content was reducible within a palpable ring and non-painful. Based on history and clinical examination the case was diagnosed as a ventrolateral hernia and herniorrhaphy was performed after aseptic preparation of the surgical site. During herniorrhaphy, a single horizontal skin incision was performed on the center of the hernia swelling under local infiltration of the lidocaine 2% and physical restraining of the cow in an appropriate position. After exposing the hernial contents it was assessed for adhesion and manually retracted to the abdominal cavity before closing the ring and abdominal wall by appropriate suture patterns and techniques. Finally, the cow was successfully recovered from the problem without recurrence upon regular follow-up period for four months.

Keywords: *Adhesion, Cow, Herniorrhaphy, Ventrolateral hernia*

Introduction

A hernia can be defined as a protrusion or displacement of an organ, part of an organ, or tissue outside the body cavity through an abnormal opening in the abdominal wall which can be noticed from the outside of an animal's body and can be palpated with an external examination (Farman *et al.,* 2018). It can be classified based on their anatomical locations into umbilical, inguinal, scrotal, femoral, perineal, and ventral (or abdominal) hernias (Narayanan *et al*., 2014). Ventral hernias can occur in the abdominal wall other than through a natural opening, it may occur higher or lower flank, along the costal arch, on the midline, and in the area of the prepubic tendon (Niehaus, 2008). The opening is caused by a tear in the abdominal wall or natural opening like the inguinal canal or femoral canal (Fossum *et al*., 2013). Almost all hernia consists of three parts such as; the hernia ring, sac, and contents (Amresh, 2009).

The abdominal wall is the most common site of a hernia in cattle due to violent force, such as from the impact of blunt objects (Al-Sobayil and Ahmed, 2007). Whenever any weakness occurred in the abdominal wall, the shield loses its strength and forms a hole called a hernial ring, and then part of the viscera of the abdominal cavity passes through the hole and then bulges; is visible on the skin as abdominal hernia (Singh *et al*., 2014). Besides, herniation can be also associated with a combination of muscle weakness and straining (Sutradhar *et al*., 2009). Because flank and ventrolateral abdominal region in ruminants lack a continuous muscle covering; it has a rather narrow fleshy portion with a holly tendinous nature and an extensive aponeurosis (Dyce *et al.,* 2002).

Unilateral ventral hernias are commonly noticed in ruminants on the right side of the abdominal floor which occurs infrequently in advanced pregnancy in cows, sheep, and goats, due to trauma, the increased weight of the gravid uterus and fetus, and possibly other changes such as weakening of the abdominal floor and characterized by a unilateral ventral sagging of the abdominal floor (Roberts, 2004). This is the reason why, the incidence of abdominal hernias is higher in females than in males (Narayanan *et al*., 2014; Yasin, 2017). There are numerous approaches to hernia repair depending upon the size of the hernial ring, as primary repair (herniorrhaphy) which is used for surgical repair of simple hernia and can be performed with sutures positioned in a straight line in the abdomen, surgical repair via using mesh (hernioplasty), large and complicated hernia by using networks and perhaps the usage of a laparoscope (Demirkiran *et al.,* 2003), and complex abdominal wall and hernia repair uses a combination of primary and mesh techniques (Whitfield *et al.*, 2011).

Herniorrhaphy is among the most commonly carried out operations in veterinary and human surgical practices (Bellavance *et al.,* 2010). The repair of the hernia should be performed early before the hernia ring becomes extensive and contents come to be increased in range from the nearby structure and organs due to the complication associated with incarceration and strangulation of the bowel (Radišić *et al.,* 2010). Considering that most hernia enlarges over time it need immediate surgical repair unless they may cause pain, anorexia, weight loss, and dystocia when a gravid horn is found in the hernial sac. Consequently, incarceration and strangulation of the bowel is the most dangerous life-threatening sequel of herniation, if left untreated (Yasin,

2017). The case report was aimed to describe the successful surgical repair of the ventrolateral hernia and its outcome in the pregnant cow.

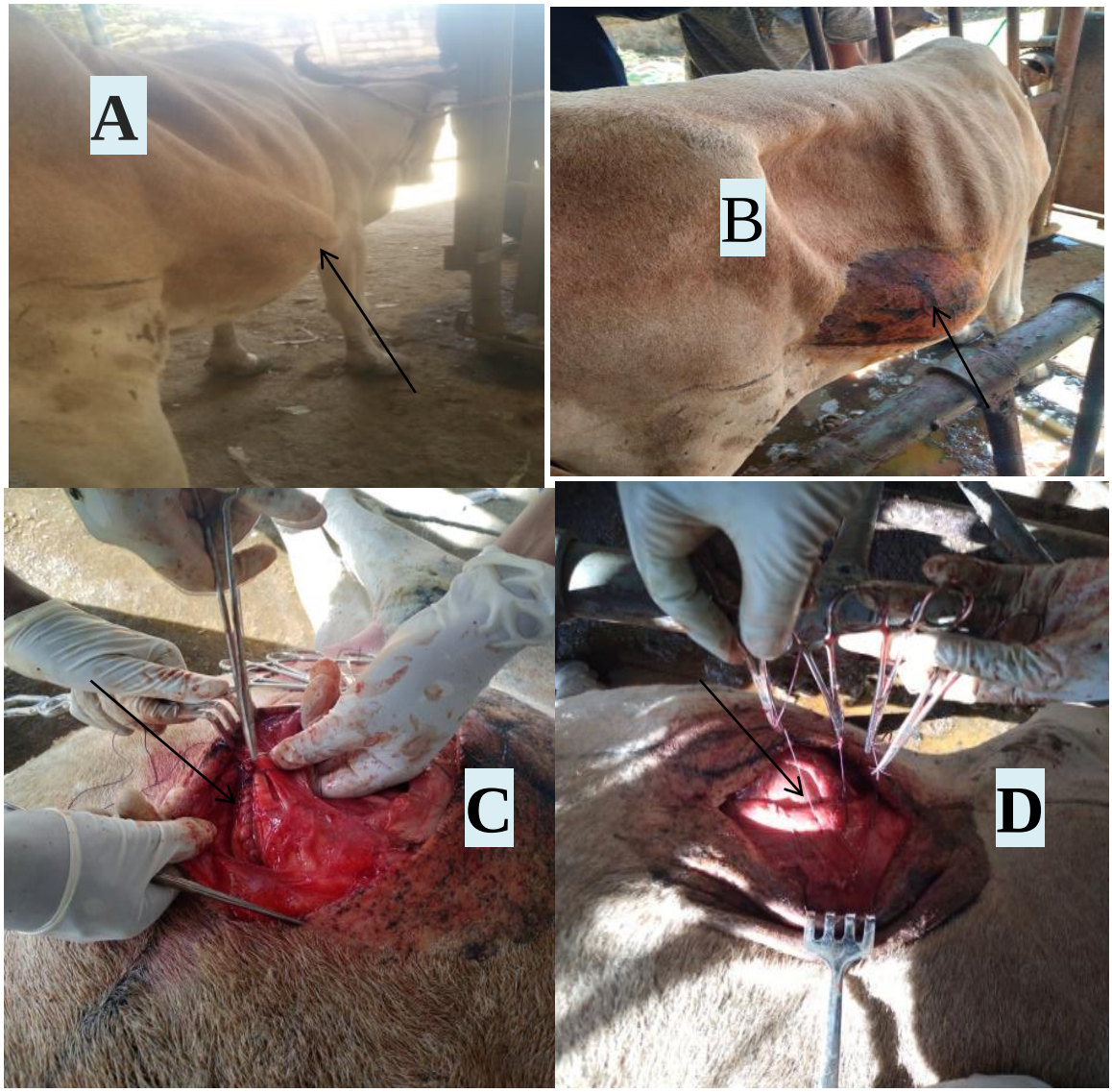
Case history and clinical examination: A seven-years-old local breed cow was brought to the VTH, CVMA of the Addis Ababa University with a clinical presentation of large swelling on the right ventrolateral part of the abdomen (Figure 8A). The history suggested that the cow had been purchased for fattening purposes and the swelling started growing in size gradually a months ago and lost his appetite since then. The hernia was also palpated to detect pain, heat, presence of hernial rings and their width, reducibility of the contents, and the presence of adhesion. Accordingly, the clinical examination revealed that hernial content is slightly firm, non-painful, and reducible within the hernial ring. Similarly, the parameters like heart rate, respiratory rate, and rectal temperature were within the normal physiological limits. Finally, based on examinations and clinical findings the case was diagnosed as a ventrolateral abdominal hernia and suggested for surgical hernia repair.

Preoperative surgical site preparation: Before a hernia repair was commenced, the incision site and its surrounding areas were aseptically prepared by clipping, shaving and scrubbing with povidone iodine (Figure 8B).

Animal control and anesthesia: Field block anesthesia was performed by making line infiltration of 2% lidocaine hydrochloride (manufactured by jeil pharma. co.Ltd Korea) enclosing the ventrolateral abdominal hernial borders. In addition to the local anesthesia, the cow was cast in left lateral recumbency in such a way that the complete exposure of the hernial sac could be accessed easily.

Surgical procedure and treatment: Following proper restraining and aseptic preparation of the surgical area, sharp horizontal skin incision was performed over the swelling and the adhesions between the abdominal muscle and parietal peritoneum were freed using both blunt dissection. Upon insertion of a finger, moderate adhesion of some a part of the small intestine with the lower abdominal wall was detected and gently detached before properly replaced in to the abdominal cavity. A massive tear of the abdominal muscle on the dorsal aspect of the hernial ring was

sutured earlier than the closure of the ring using the ford interlocking suture pattern by catgut 2.0 (Figure 8C). Then hernial ring was exposed and preplaced stay sutures using 1.0 silk were positioned with multiple forceps (Figure 8D) after freshening the edge of the ring and the knots were placed accordingly. Procaine penicillin powder was left between the muscle layers after closure to prevent infection and the subcutaneous tissue was then sutured with a simple interrupted mattress through catgut 2.0 (Figure 8E).




E
F
G
H
I
J

Figure 8: Ventrolateral abdominal hernia and its repair in cow

(A) Clinical presentation; (B) Surgical site preparation; (C) Ford interlocking suture of abdominal muscle other than hernia ring; (D) preplaced stay sutures; (E) Closure of the large hernial ring; (F) Skin suture in progression; (G) Visualization of the suture line; (H) Post herniorrphy; (I) Second day presentation of the case; (J) After removal of the suture material at 21^{th} day.

Moreover, excess skin of the sac was removed, and the subcutaneous tissue, and skin was closed with an interrupted horizontal mattress using silk 1-0 size and the surgical site was properly cleaned and dressed in a 1% Povidone-iodine solution and admitted home (Figure 8G).

Postoperative care and outcome: Post-operatively an antibiotic procaine penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) was administered intramuscularly for five days. The owner was advised to feed on soft food for about 2 weeks after the operation to minimize pressure on the site of the incision (Amresh, 2009). In addition, the suture line was dressed after two days intervals. The healing process was also clinically evaluated and the surgical wound was almost healed after 15 days of an operation. However, the skin stitches were removed after 21 days to be sure of complete healing (Figure 5K). Upon regular follow- through phone calls of the owner, the cow has given a birth to a live calf and the repair was completely healed uneventfully.

Discussion

Ventral and Ventrolateral hernias are usually noticed in the abdominal wall close to the midline and the size of its opening varies in diameter and the nature of contents relays on the site of the herniation (Yasin, 2017; Farman *et al*., 2018). It occurs generally as a result of external forces or trauma to the abdominal wall, automobile accident, weakening of the abdominal musculature or rupture of prepubic tendon. This is commonly seen along the costal arch, high or low in the flank, between the last few ribs or in the ventral abdominal wall near the mid line (Singh *et al*., 2014). In this case, the exact reason of the hernia couldn't be traced. But, it might be as a result of the weakening of the abdominal muscle because of violent trauma with blunts objects or any

unintended injury and pregnancy. Most of the ventrolateral hernias were reducible with palpable rings. However, there also are some ventrolateral hernias that have been irreducible with impalpable rings which are because of extreme adhesions of the contents with the hernial rings and hernial sacs (Das, 2012). Similarly, in the current case report, the ventrolateral hernia was reducible with palpable rings. However, there were mild adhesions of the intestinal content with the lower abdominal wall.

In a reducible hernia, the contents return to the abdominal cavity and its ring became evident (Salim *et al*., 2015). In this case report, hernial contents were found to be small intestinal loops that were extended in the subcutaneous space. After placing the intestinal loops inside the abdominal cavity, the ring was closed by using non-absorbable suture material silk 2.0 in a simple interrupted suture pattern. Whereas Rafid *et al.,* (2017) closed the hernial ring by overlapping suture using chromic catgut 3.0 or 4.0 with umbilical tape in case of a large ring. The abdominal muscles were apposed by Polyglycolic acid 910 (vicryl) 2.0 in a simple continuous suture patterns. Finally, the skin edges were apposed by silk 1.0 in a horizontal mattress suture pattern. Thus, herniorrhaphy was found to be effective and should be performed as early as possible to reduce complications.

3.3.2. *Ventrolateral abdominal herniorraphy in a goat*

Abstract

A four-years-old local breed doe was brought to VTH, CVMA of the Addis Ababa University with a complaint of swelling in the left ventrolateral abdominal region. Upon clinical examination, the content was reducible in the hernia ring. Examination also revealed a ventrolateral hernia with a large palpable hernial ring. Herniorrhaphy was performed using appropriate suture pattern techniques and suture material. Upon regular follow up, the doe was recovered uneventfully.

Keywords: *Doe, Herniorrhaphy, Recovery, Ventrolateral hernia*

Introduction

A ventral abdominal hernia is one of the most important developmental or accidental defects that have been seen in goats and is a subject of concern for people where goat rearing is largely practiced (Villar *et al*., 2011). It is commonly found as an acquired condition in ruminants and horses and also common in dogs and pigs compared to other domestic animals (Jettennavar *et al.*, 2010). It occurs due to weak muscles of the ventral abdomen and trauma to ventral abdomen in animals which results in protrusion of abdominal contents into overlying subcutis (Monsang *et al*., 2014). Abdominal content in direct contact with skin and these stimulates the formation of adhesions that can interfere with normal digestion if not repaired early. The hernial swelling varied in the location from the iliac crest to the lateral side of the thoracic cavity (Abdin and Ramadan, 2001).

Surgery is the only effective treatment for the abdominal hernia to restore the integrity of the abdominal wall and prevent incarceration and strangulation of herniated contents (Jahromi *et al*., 2009). Sometimes, the application of bandages, clamps, or ligatures may be helpful in a few cases where the hernial ring is small (Villar *et al*., 2011). Herniorrhaphy is important in case of large hernial opening but extensive ventral abdominal hernia may require hernioplasty (Das *et al.*, 2012). Herniorrhaphy is the method of correction of hernia by using strong suture materials to strengthen the suture and prevent its recurrence (Dey *et al*., 2018). In the current case report, through a horizontal incision, sterilized silk was used for the correction of the ventral abdominal hernia of a doe and a successful result was found upon phone call from the owner.

Case history and clinical examination: A four years old local breed doe was brought to the VTH, CVMA of the Addis Ababa University with a history of trauma with horn thrust by nearby and large palpable swelling in the left ventrolateral abdominal region (Figure 9A) since three days of the injury . The swelling was growing in size gradually as time advances following horn thrust l and lost his appetite then after. Palpation of the swelling also reveals slightly firm, painful, and reducible within the hernial ring. Besides, the parameters like heart rate, respiratory rate, and rectal temperature were assessed and found within the normal physiological limits.

Finally based on physical examination and clinical findings the case was tentatively diagnosed as a ventral abdominal hernia and admitted for hernia repair.

Preoperative and surgical site preparation: Before commencing hernia repair, the proposed site of incision and its surrounding area were aseptically prepared by clipping, shaving the skin (Figure 9B), and scrubbing with povidone-iodine and the sterile surgical drape was fixed with the towel clamps.

Animal control and anesthesia: Field block anesthesia was performed by making circular infiltration of 2% lidocaine hydrochloride (manufactured by Jeil Pharma. Co. Ltd). Besides, the doe was sedated with diazepam (manufactured by Intas Pharmaceutical Ltd.) @ 0.1 mg/kg I.V. Then the doe was positioned in slightly dorso-lateral recumbence for operation on patient table.

Surgical procedure and technique: After the aseptic preparation of the site and positioning of the animal, a horizontal incision at the center of the hernial sac was performed and followed by blunt dissection (Figure 9B). After skin and subcutaneous tissue dissection and excision, the underlying tissues were bluntly incised to expose and open the hernial sacs. Thence, the condition of the hernial sac and ring was examined carefully to assess presence or absence of adhesions of the parts of abdominal organs, and the identified adhesions were detached by gentle and blunt dissection.

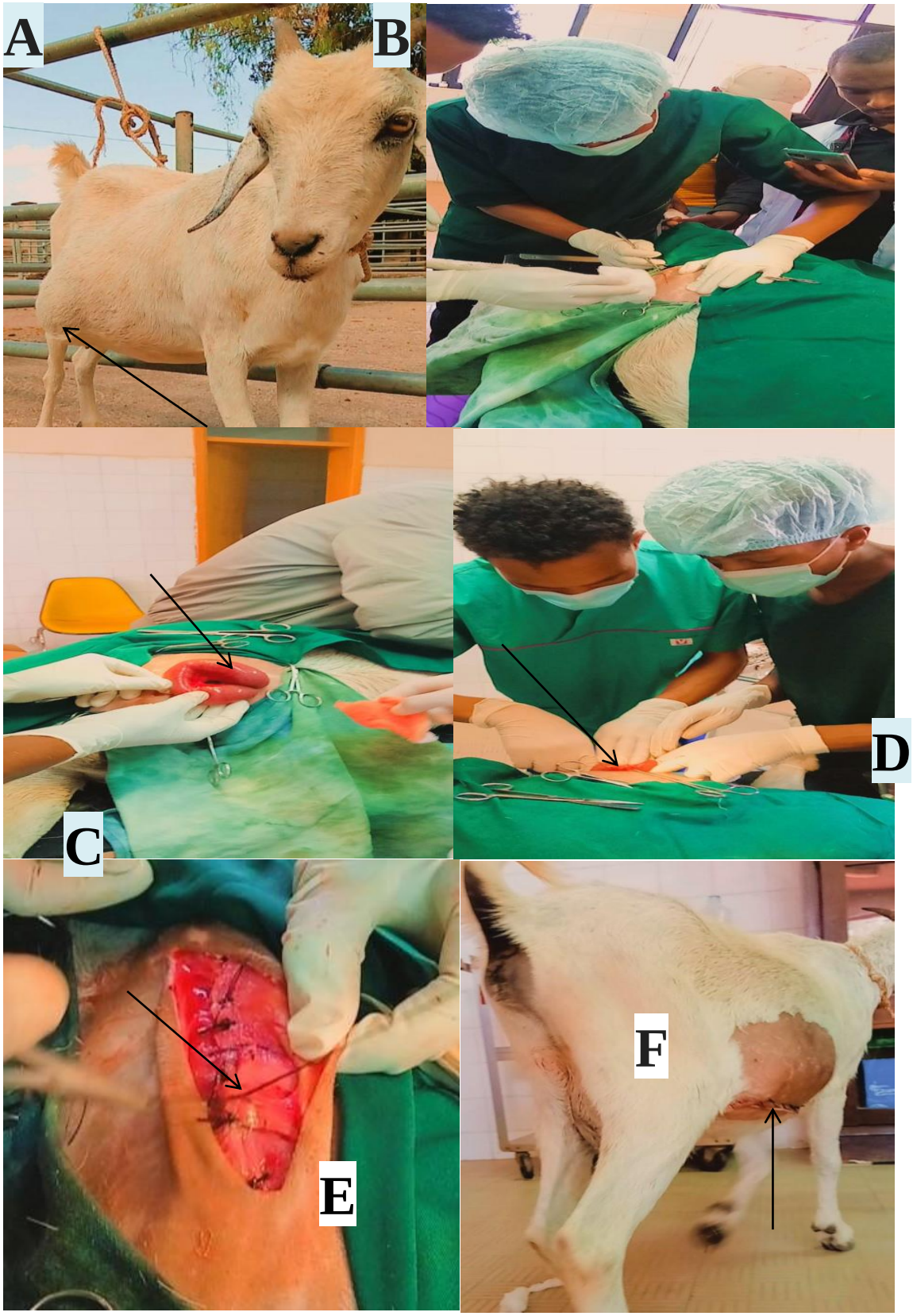

A
B
C
D
E
F

Figure 9: Ventrolateral abdominal herniorraphy in doe

(A) Clinical presentation; (B) Incision in progress; (C) Hernial content (Small Intestine); (D) While replacing of the content back to the abdominal cavity; (E) Closure of the abdominal muscles in progress; (F) Awake of the animal from the surgery

Thence, the herniated content (small intestine) (Figure 9C) was repositioned in the abdominal cavity by manual taxis (Figure 9D). Then herniorrhaphy was achieved by using sterilized silk 2.0 as a vest-over-pants closure technique between the hernia ring and abdominal wall. During these, single stitches were preset and held with artery forceps. Once all of the single sutures were positioned, then they were tied (Figure 9E). The excess part of the sac was removed and the muscles and subcutaneous tissue was routinely sutured with vicryl 2.0 size with a simple continuous suture pattern. During subcutaneous suturing, proper care was taken to avoid the formation of dead space, and the skin was close apposed with the horizontal mattress suture using silk (Figure 9F)

Postoperative care and outcome: In the postoperative period, antibiotics procaine penicillin (24 mg/kg) and dihydrostreptomycin sulphate (30 mg/kg) (Pen &Strep) was administered intramuscularly for 3 days. Besides, the suture line was dressed after one day's interval for three days. The healing process was also clinically evaluated by phone call from the owner. Finally, upon regular follow-up the doe died due to failure to ingest feed and the owner informed as it noticed the clinical sign of diarrhea.

Discussion

Unilateral ventral and ventrolateral hernias in large ruminants are most commonly found on the right side of the abdominal floor and lateral aspects respectively. These hernias are usually due to trauma, the increased weight of the gravid uterus and fetus, and possibly other changes that weaken the abdominal floor, characterized by a unilateral ventral sagging of the abdominal floor (Vinod *et al*., 2019). Compatible with this, in the current case report a pregnant doe was presented with a large swelling of ventrolateral aspect of the right side of the abdomen and the

cause of the hernia was a horn thrust in bull. They are usually occurred because of an accidental injury to the muscular part of the abdominal wall. Hence, trauma consisting of kicks by large animals (camel), horn thrust in cattle or violent contact with blunt objects or automobile accidents, and an abscess are principal reasons and result in weakening of the abdominal muscles. Besides, abdominal distension due to pregnancy or violent straining during parturition may result in ventral hernia, especially in sheep (Farman *et al.,* 2018). In agreement with this, ventrolateral hernia in a current case report was because of horn trust in a bull. Usually, a hernia is consisting of a hernia sac, ring, and contents. Any viscera that migrate through any part of the abdominal wall ventral to the stifle skin fold other than the natural orifice can be described as a ventral hernia (Yasin, 2004).

Even though most of the ventrolateral hernias are reducible with palpable rings occasionally they can be irreducible with impalpable rings which is due to extreme adhesions of the contents with the hernial rings and sacs (Al-Sobayil and Ahmed, 2007; Das, 2012). Similarly, in this particular case report, the ventrolateral hernia was reducible with palpable rings there was moderate adhesions of the intestinal content with the lower abdominal wall. In various studies of hernia repair, the rings have been closed using different suture materials and patterns. According to previous research outputs, absorbable suture materials like polyglycolic acid, polyglactin 910, or polydioxanone were recommended to close a different type of abdominal hernial ring through simple interrupted, simple continuous, or interrupted cruciate patterns; tension-relieving sutures such as near-far-far-near is used to close large abdominal wall defects (Baxter, 2004; Fubini and Ducharme, 2016). During these, single stitches were preset and held with artery forceps. After all of the single sutures were positioned, then they were tied. The excess part of the sac was removed and the muscles and subcutaneous tissue were routinely sutured with vicryl 2.0 size with a simple interrupted and continuous suture pattern respectively and the skin was apposed with horizontal mattress suture using silk (Kitessa *et al.,* 2021).

3.3.3. Umbilical herniorraphy in calf

Abstract

Umbilical hernia is classified as an external hernia and it must be differentially diagnosed from other swellings such as abscess, cellulitis, hematoma, cyst, and neoplasm. A three-month-old crossbred Holstein Friesian calf was brought to VTH, CVMA of the Addis Ababa University with a complaint of swelling at the umbilical region from birth since the last two months. Upon clinical examination by palpation, the content was reducible in to the hernia ring and with a hernial ring of 3 fingers breadth. The case was handled surgically employing herniorrhaphy using appropriate suture pattern techniques and suture material. Upon regular follow-up through phone call, and physical presence the case was successfully recovered on the 21th day of post-operation.

Keywords**:** *Calf; Herniorrhaphy; Interrupted mattress suture; Umbilical hernia*

Introduction

Umbilical hernia is one of the congenital hernias in calves. It can be classified into three broad categories including uncomplicated umbilical hernia, umbilical hernia with subcutaneous infections (abscess), and umbilical hernia with umbilical remnant infection (Al-Sobayil and Ahmed, 2007). The most common cause is the failure of normal development and closure of the umbilicus. However, infection at the site of the umbilicus, manual breakage of the umbilicus, clamping, or ligation of the umbilical cord, and potentially excessive straining could also exaggerate the condition (Abdin-Bey and Ramadan, 2001).

Umbilical hernia is the protrusion of part of organs or complete organs through a defect in the abdominal wall at the region of the umbilicus. It can be congenital or acquired at birth. The most important risk factors of congenital umbilical hernias in calves may due to the multiple births and shortened gestation lengths (Herrmann *et al.,* 2001). On the other hand, acquired umbilical hernias are noticed after a few weeks of birth. Many factors may predispose for its occurrence, including mal-handling of the animal at birth with improper manual cutting of cord rather than to break it on its own, breaking the cord too close to the body wall, more force applied during traction of a fetus during parturition. Besides, some systemic conditions like an umbilical

abscess, diarrhea, and constipation cause an increase in the abdominal pressure which results in the weakening of abdominal muscles resulting in a hernia (Steenholdt and Hernandez. 2004).

Naturally, the umbilicus in newborn animals consists of a tube-like structure that connects the fetal bladder to the placental sac known as urachus and remnants of umbilical vessels which transport blood from the fetus to its mother. Unfortunately after birth, this structure gets atrophied and remnants of urachus remain in the abdomen. The wound is healed by cicatrisation and represented in the umbilicus in the later part of life. Thus, part of the body where these parts are present if remains opened causes protrusion of organs through the opening due to faulty closure of umbilical opening at birth or hypoplasia of the abdomen muscles resulting in the formation of the ring in the mid-ventral part of the abdomen (Tyagi and Singh, 2010; Sutradhar *et al.,* 2009).

Umblical hernia is usually manifested as an external swelling that varies in shape and size and it must be differentially diagnosed from other swellings such as abscess, cellulitis, hematoma, cyst, and neoplasm. The nature of the hernial sac may be skin, fibrous tissue, and peritoneum. The contents are usually fat and omentum. However, a larger hernia sac may contain loops of the small intestine, sometimes a portion of abomasums or greater omentum (Haskell, 2008). Options for treatment of umbilical hernia may vary from conservative to surgical depending on the size, content involved, duration of the swelling, and severity of the condition. The application of bandages, clamps, or ligatures may be helpful in a few cases where the hernial ring is small. Herniorrhaphy can be used by using strong suture materials to strengthen the suture and prevent case recurrence of large hernial opening while extensive ventral abdominal and inguinal hernia requiring hernioplasty (Villar *et al.,* 2011; Kumar *et al.,* 2014). Radical surgery is one of the most common surgical procedures performed to repair symptomatic or asymptomatic umbilical hernias (Chavez and Demoor, 2012; Haile *et al*., 2017). This report was aimed at describing a successful surgical repair of umbilical hernia on three months old calf.

Case history and clinical examination: A three-month-old Holstein Friesian crossbred female calf was brought to the VTH, CVMA of the Addis Ababa University with a complaint of swelling at the umbilical region since birth and gradually increasing in size over the last two

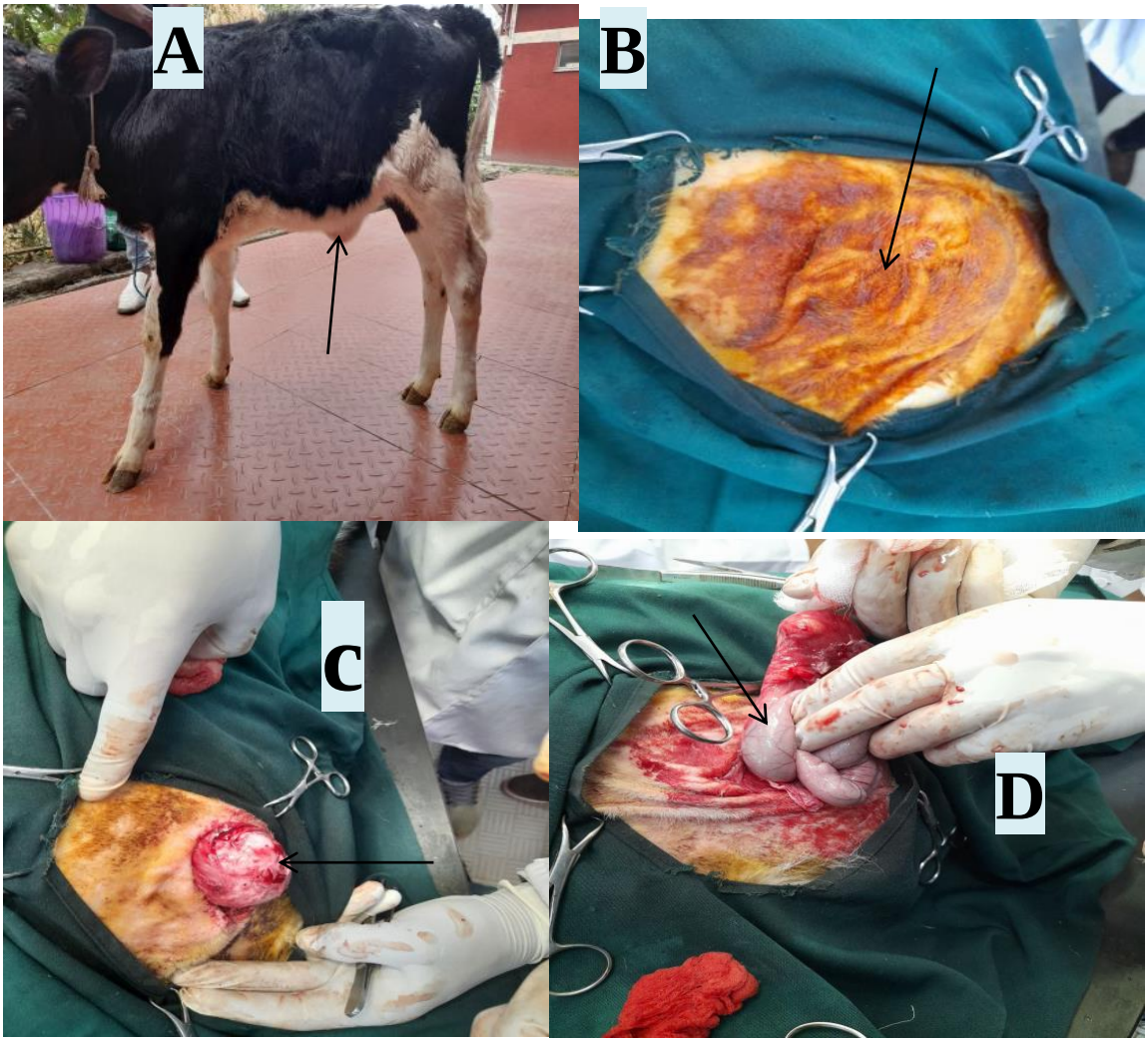
months (Figure 10A) . Upon clinical examination through palpation, non-painful, hot, and characterized by presence of hernial ring, small width with three fingers in width and slightly firm contents. The hernial content was also reducible in to the ring. Similarly, the parameters like heart rate, respiratory rate, and rectal temperature were 96beats/minute, 40breath/minute, and 38.7°C respectively. A thorough body examination was also carried out to identify the physical status of the animals and any defects in other parts of the body. Finally based on clinical examinations and findings the case was tentatively diagnosed as an umbilical hernia and admitted for herniorrhaphy.

Preoperative surgical site preparation: The animal was fasted from feed and water for 24 and 12-hours respectively up on an appointment. After proper sedation of the animal, the surgical site (umbilical area) was aseptically prepared by clipping, shaving, scrubbing, washing with water, and Savlon® (Cetrimide 3% and Chlorhexidine gluconate 0.5% solution). Then sterile drape was fixed with towel clamps (Figure 10B)

***Anesthesia and the animal control*:** The calf was restrained through physical and chemical methods to stabilize it in an appropriate position. The animal was sedated administration of Ana-Sed® (Xylazine hydrochloride, Heartland Vet Supply Ltd @ 0.5 mg/kg I.M. Besides, ring block with Lidocaine hydrochloride 2%, with the dose rate 1 ml/cm area to desensitize the abdominal muscle and alleviate pain during a surgical procedure. Besides, the calf was restrained and positioned slightly dorso-lateral recumbence for operation with an upward elevation of the hind limb on the patient table.

Surgical correction and treatment: After proper restraining and aseptic surgical site preparation, the calf was placed and controlled on the patient's table in a dorso-lateral position. A gentle and sufficient two elliptical incision was made at the periphery of the hernial ring and the flap of skin was dissected from the hernia and removed (Figure 10C). Then the skin became detached from the subcutaneous tissue through blunt dissection and the incision continued through the abdominal muscle and peritoneum. After careful dissection of skin and subcutaneous tissue, the hernial sac and the ring were critically evaluated to detect any adhesions in the abdominal organs. Upon insertion of a finger, slight adhesion of some part of the small intestine with the

lower abdominal wall became identified and it was gently detached and the herniated viscera (small intestine) (Figure 10D) were repositioned back in the abdominal cavity manually (Figure 10E). Then, after debridement of the hernial ring was done before suturing hernia by simple interrupted mattress pattern using synthetic sterile absorbable polyglycolic acid (Shandong Sinorgmed Int'l Co., Ltd, China) suture materials size 2.0 followed by putting stay suture fixed with multiple forceps (Figure 10F). Moreover, the excess skin was trimmed off after careful estimation of the area for adequate apposition. Then, the subcutaneous tissue and skin were closed with an interrupted mattress using silk 2-0 size and the surgical site was properly cleaned and dressed with a 1% Povidone-iodine solution and admitted home.




E
F
G
I
J
K

Figure 10: Umbilical herniorraphy in calve

A) Clinical presentation of umbilical hernia; (B) Surgical site preparation (C) Incision of of the skin in progress; (D) Hernial content (Small Intestine); (E) The appearance of the hernial ring after repositioning the content; (F) Putting multiple tension suture; (G) knotting in progress on hernial ring; (H) Skin suture with simple interrupted mattress pattern; (J) Surgical site after closure of skin

Postoperative care and outcome: Immediately after successful repair of umblical hernia, the site was dressed by using a 1% Povidone-iodine on one day's interval for three days. Besides, the calf was kept on antibiotic Procaine penicillin (24 mg/kg) and dihydrostreptomycin sulphate (30 mg/kg) (Pen-Strep® Norbrook, Great Britain) was given IM for successive five days and dexamethasone sodium was also administered @ 2 mg/kg IM for three successive days. Tetracycline wound spray was also applied over the wound area. Furthermore, the owner was advised to subjectively monitor the calf, allow some exercise, and supply good nutrition to facilitate wound healing. The complete healing was recorded on the 14th-day post-operation without reoccurrence and other complications. Finally, the skin sutures were removed 21st day post-operatively.

Figure 11: Outcomes of umbilical hernia repair in calf

(A) Observation of the suture line at 21th day after the skin suture removal; (B) A calf with complete healing after two months

Discussion

Umbilical hernia in calves can be managed by different forms depending on the size of the hernial ring; hernia with smaller rings can be easily handled through the application of bandages, clamps, or ligatures. However, in large hernial opening (more than 1 finger in size or if it persists for more than 3 to 4-weeks), herniorrhaphy should be applied, and extensive umbilical hernia warrants hernioplasty (Kumar *et al*., 2014). Most umbilical hernias repair may be fixed by herniorrhaphy, but if the ring is large and the wound closure is strained, the use of prosthetic materials is suggested (Park and Lakes, 1992; Mosbah and Abouelnasr, 2014). Primary closure of herniorrhaphy in this particular case report was carried out using a simple interrupted suture synthetic sterile absorbable polyglycolic acid 2.0. Surgical debridement and refreshment of the edges of the hernial rings were applied before suturing. Similar to this study, Attinger *et al.* (2000) reported that debridement of the hernial ring induced and facilitate wound healing.

Herniorrhaphy aims to obliterate the hernia sac and repair the defect back into the abdominal wall (Shah *et al*., 2016). This isn't supported, by the report conducted by Ober *et al*. (2007) and Sadan *et al*. (2019) where, polypropylene mesh is one of the most commonly used prosthetic tools for the exceptional recreation of abdominal wall hernias at a width of more than 3 cm. According to the present case at hand, congenital umbilical hernia is presented in Holstein Friesian cross breed young calf with a three finger breadth. This is similar to the previous reports that have been described as congenital umbilical hernias are common in Holstein's calf and which is mostly associated with heritability (Fesseha, 2020c). Umbilical hernias have quite commonly occurred in young calves (Kumar *et al.,* 2013). In agreement with this, the report describes the occurrence of an umbilical hernia that was seen in a three-month-old calf since the birth.

Umbilical hernia may be small at the beginning and enlarge over time as time elapse and must be differentiated from umbilical sepsis (Anderson, 2004). Naturally, the umbilical opening in the

calf should be closed after birth in a few days. Failure of this opening to close properly because of either congenital or acquired factors results in an umbilical hernia (Abdin-Bey and Ramadan, 2001). The complication can also develop in congenital umbilical hernias, which substantially can increase the complexity and expense to repair. Uncomplicated hernias may be easily reducible but the complicated hernias can't be reduced (Adam and Fessler, 2000). An umbilical hernia is not uncommon in newborn animals. It may occur in any breed and is consequently more common in females than males (Steenholdt, 2004; Tyagi and Singh 2010). This is also in agreement with the current case report where a female calve was presented for surgical repair. An umbilical hernia can be symptomatic or asymptomatic upon its clinical presentation and is normally visible shortly after birth. Besides, it is usually painless if it isn't complicated and the most common contents that appear in most cases of umbilical hernia consist of; the omentum, small intestine, and abomasum. The size and shape of the hernial ring vary from a ring diameter of much less than 2 cm to 2-5 cm, and even greater than five cm ring diameter. Furthermore, the nature of the umbilical ring determines the degree of fibrosis and the possibility of suture retention (Kumar *et al.,* 2013).

The surgical repair performed was successful and promising for similar cases involving the removal of the hernial sac, assessment of hernia contents and removal of internal umbilical remnants and direct apposition of incised margins of hernia in calves with an umbilical hernia.

3.3.4. Perineal herniorrhaphy in dog

Abstract

Perineal hernia refers to the weakness of the muscle of the pelvic diaphragm to support the rectal wall, thus resulting in protrusion of pelvic and, sometimes, abdominal viscera into the subcutaneous of the perineal region. The possible causes of pelvic diaphragm failure may include tenesmus associated with chronic prostatic disease or constipation, myopathy, rectal abnormalities, and gonadal hormonal imbalances. An 8 kg, six-year-old exotic breed intact male dog was brought to Veterinary Teaching Hospital of the Addis Ababa University, with a unilateral swelling on the right side of the perineal region. The history stipulated a four-day long

aquesia, emesis, loss of appetite, frequent constipation, and intermittent fecal impaction. Upon clinical examination, the content was reducible, and consequently dried fecal content was found during the rectal palpation. Finally, examination revealed the perineal hernia with bowel content and pelvic viscera so it was decided to undergo surgical repair through the internal obturator muscle transposition technique. After aseptically preparing the surgical site, a laterally curved, dorsoventral skin incision was performed over the hernia. Following detecting the sac and content for the presence of adhesion, the content was replaced with pelvic viscera and closed layer by layer. At the end of the procedure, the open castration through prescrotal approach was performed to prevent its recurrence. Postoperative care involves analgesics, antibiotics, a low-residue diet, and stool softeners. Clinical outcome including postoperative complications and recurrence rate was assessed and it didn't recur on the dog during follw-up period for five months.

Keywords: *Dog, Pelvic diaphragmatic muscles, Perineal Hernia*

Introduction

Perineal hernia is disruption of the pelvic diaphragm and protrusion of the abdominal or pelvic organs into the ischiorectal fossa, especially in middle-aged or aged intact male dogs (Gilley *et al.,* 2003). It occurrs unilaterally 59% or bilaterally (41%) which were may be due to sacculation, dilatation, deviation, and diverticulation of the rectum, retroflexion of the urinary bladder, or ureteral obstruction (Stoll *et al.,* 2002). In addition, factors including hormonal imbalance, prostatic enlargement, and straining, and congenital or acquired muscle weakness are also associated with the condition (Aronson, 2012). Surgical correction of the rectal diverticulum or large sacculation should be carried out to prevent the recurrence of PH (Head and Francis, 2002). Internal obturator muscle transposition is the most effective technique to repair a perineal hernia in dogs. Other techniques include superficial gluteal muscle transposition, semitendinosus muscle transposition, fascia lata grafts, placement of a synthetic mesh, use of canine small intestinal submucosa, and use of tunica vaginalis communis has been also developed (Bongartz *et al.,* 2005). Additional methods such as laparotomy for colopexy and cystopexy may

be required in complicated PH, in combination with any technique of perineal herniorrhaphy (Brissot *et al.,* 2004).

The use of the internal obturator muscle transposition technique in correction of the perianal hernia reduces tension on ventral sutures and thus prevents distortion of the external anal sphincter. Because the internal obturator tendon is transected to provide greater dorsal elevation of the flap and this reduces tension on the suture line (Seim, 2009). The utilization of muscle tissue and associated additional blood supply during hernia repair may facilitate the healing process and prevent the breakdown of the repair site (Lee *et al*., 2012). However, postoperative complications associated with this technique include recurrence of PH, surgical wound dehiscence and infection, tenesmus, fecal incontinence, and rectal prolapse (Morello *et al.,* 2015). There is also gastric upset and dehydration in addition to difficulty in defecation for the first few weeks (Gilley *et al.,* 2003). These overall complications may range from 20 to 46% (Bongartz *et al.,* 2005).

The groups of muscles of the pelvic diaphragm include levator ani muscle, coccygeus muscle, external anal muscle, internal obturator muscle, and sacrotuberous ligament (Bellenger and Canfield, 2003). Anatomically, the levator ani extends from the floor of the pelvis to the ventral aspect of the seventh caudal vertebra and the coccygeus muscle is a thick muscle lying lateral to the levator ani muscle. It originates from the ischiatic spine on the pelvic floor and inserts ventrally on caudal vertebrae 2 through 5. On the other hand, the internal obturator muscle is a fan-shaped muscle covering the dorsal surface of the ischium and originates from the dorsal surface of the ischium and pelvic symphysis. Other muscles involved in the repair of perineal hernias include the external anal sphincter, superficial gluteal muscle, and semitendinosus muscles (Gill *et al*., 2018).

Castration is recommended during perineal hernia repair due to the effects of testosterone or relaxin on the prostate gland and perianal musculature (Snell *et al.,* 2015). Castration in dogs can be approached either in scrotal or prescrotal ways. The prescrotal technique, by displacing the testis cranially and exposing is used as a midline prescrotal skin incision (Stone, 2003). Alternatively, the scrotal approach is used to castrate small dogs and cats and it can be safely

applied to dogs of any age (Howe *et al.*, 2000). However, prescrotal approach has many advantages over the scrotal in that it improves cosmesis and decreases anesthetic and surgical times, incision length and subsequent surgical trauma, postoperative discomfort, self-trauma, and scrotal hematoma formation (Boothe, 2003). Therefore, the current case report was aimed at surgical correction of the perineal hernia by using the internal obturator muscle transposition technique in male dogs and open castration through prescrotal approach to prevent its recurrence.

Case history and clinical examination: An 8 kg, six-year-old exotic breed intact male dog was brought to VTH, of the Addis Ababa University, with unilateral swelling on the right side of the perineal region (Figure 12A). The history stipulated a four-day long aquesia, emesis, loss of appetite, frequent constipation, and intermittent fecal impaction. Physical examination was performed and revealed mild dehydration (10%), apathy, fecal bulge, asymmetric swelling on the perineum, obstipation, tenesmus and dyschezia, tachycardia, pain in the abdominal palpation, replaceable firm and voluminous intestinal loops. Rectal palpation revealed as a dried fecal content was present. The clinical parameters like heart rate, respiration rate and temperature were 100beat/minute, 30 breath/minute, and 39.9 °C respectively. The overall examination showed a perineal hernia with bowel content and pelvic viscera so it was decided to undergo surgical manipulation.

Preoperative and surgical site preparations: On the first day of presentation the dog was administered with the antibiotic; penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) I.M to reduce the load of the infection due to normal physiological derangement of GIT and sent back home for withholding of feed and water for 12 and 6hrs respectively. On the second day, the patient was admitted to the VTH for surgery. Before undergoing a surgical repair, the hair on perineal swelling and its surrounding was aseptically prepared by clipping, shaving, washed with water and scrubbed dilute antiseptics after deep sedation. Then the animal was moved from the preparation room to surgical room and lactated ringers solution is given I.V using at a surgical rate of @10 ml/kg/hr with a calculated rate of 1drop/sec to restore and maintain the blood volume. Then sterile drape was placed over the surgical area followed by an attachment of it to the animal body using towel clumps (Figure 12B).

***Anesthesia and animal control*:** The dog was premedicated with Ketamine (Ketamine Hydrochloride manufactured by Germany) @ 5mg/kg and zylazine at the dose @ 0.04 mg/kg I.V. Later the dog was induced by the combination of Diazepam (manufactured by Intas pharmaceutical Ltd., India) @0.15mg/kg and ketamine (Ketamine Hydrochloride manufactured by Germany)@ 2.5mg/kg I.V and maintained by propofol (Aulife health care Pvt. ltd, Gujarat, India) @ 4.5mg/kg IV and the dog was kept in sternal recumbence on the operation table for surgical procedure.

Surgical correction and treatment: After aseptic preparation of the surgical site, the dog was placed on the operation table in sternal recumbency with the rear legs over the end of the table. The operation table was tilted 10 to 15 degrees head-down position. The tail was positioned over the back by wrapping with sterile gauze. The anal sac of the dog was evacuated and a purse-string suture was placed on the anus using non-absorbable suture material to protect the fecal contamination in the surgical field. Then sterile drape was placed over the surgical area followed by attachment of it to the animal body using towel clumps. A laterally curved, dorsoventral skin incision was done over the hernia (Figure 12C) starting from the tail base to a point midway between the pubis and ischial tuberosity then returned to the midline proximal to the scrotum. Thence blunt dissection was continued (Figure 12D) through the same opening and subcutaneous tissue was folded for further identification and inspection of the hernia sac to relocate the herniated structures into the abdominal cavity.

Then the hernial content was assessed for adhesion, content, and strangulation. Few adhesions of the hernia and omentum were loosened and detached gently before hernial content was gently reduced, replaced, and maintained with the aid of sterile gauze. After proper orientation, location, and replacement of the main anatomical structures, sterile gauze was applied to handle the contents in a place until the sutures were preplaced (Figure 12E) then the caudal lateral aspect of the internal obturator muscle was incised and elevated from the ischium with periosteal elevator to the caudal aspect of the obturator foramen and reflected dorsally. Then interrupted sutures were preplaced using Polyglycolic acid 910 (vicryl) 2-0 beginning from dorsal aspects and progressing to ventral aspect suturing the caudomedial border of the internal obturator muscle to the external anal sphincter muscle and the caudolateral border of the internal obturator

muscle to the sacrotuberous ligament (Figure 12F). After all these sutures on the ligament and the muscle were properly placed, subcutaneous tissue was sutured by simple continuous pattern using the chromic catgut of number 2-0, and the skin was closed by using the Polyglycolic acid 910 (vicryl) 2-0 in the subcuticular manner after it was trimmed for cosmetic appositions (Figure 12G).

After the complete herniorraphy the dog was positioned into dorsal recumbency, the prescrotal area was prepared. Then open castration was performed by applying a 2-3 cm long incision at the prescrotal area on the skin and subcutaneous tissues and one testicle was pushed cranially to the incision, to exteriorize the testicle (Figure 12H). Using both hands, the cranial pole of the testicle was pushed up to the incision by squeezing below the testicle while cutting incompletely incised subcutaneous tissue and fascia to make the testicle come out through the incision line. Then the testicle that popped out through the incision was grabbed and pulled with the right hand using a gauze sponge while the left hand was used to hold at the scrotum stabilize and break the scrotal ligament which attaches the scrotum to the caudal pole of the testicle. The cord was first clamped using three haemostats; double ligated using polyglycolic acid 910 (vicryl) size 2-0 where one circumferential ligation was applied below the distal haemostat from the testicle and one transfixation ligature was placed at the place where the middle haemostat made. The spermatic cord was then cut between the middle haemostat and the haemostat near the testis and removed. After the cut stump was checked for bleeding, the haemostats on the cord were released. The same procedure was followed for the second testis and removed. Once both testes were removed and effective hemostasis is confirmed, the incision was closed in two layers of skin and subcutaneous tissue using the absorbable suture material polyglycolic acid 910 (vicryl) 2-0. The subcutaneous layer was sutured with a simple interrupted suture pattern by thoroughly obliterating the dead space The skin was closed with a buried continuous horizontal subcuticular pattern, using absorbable suture material 2-0 polyglycolic acid 910 (vicryl). Finally, the incision is inspected for gaps, oozing, or any other problems.

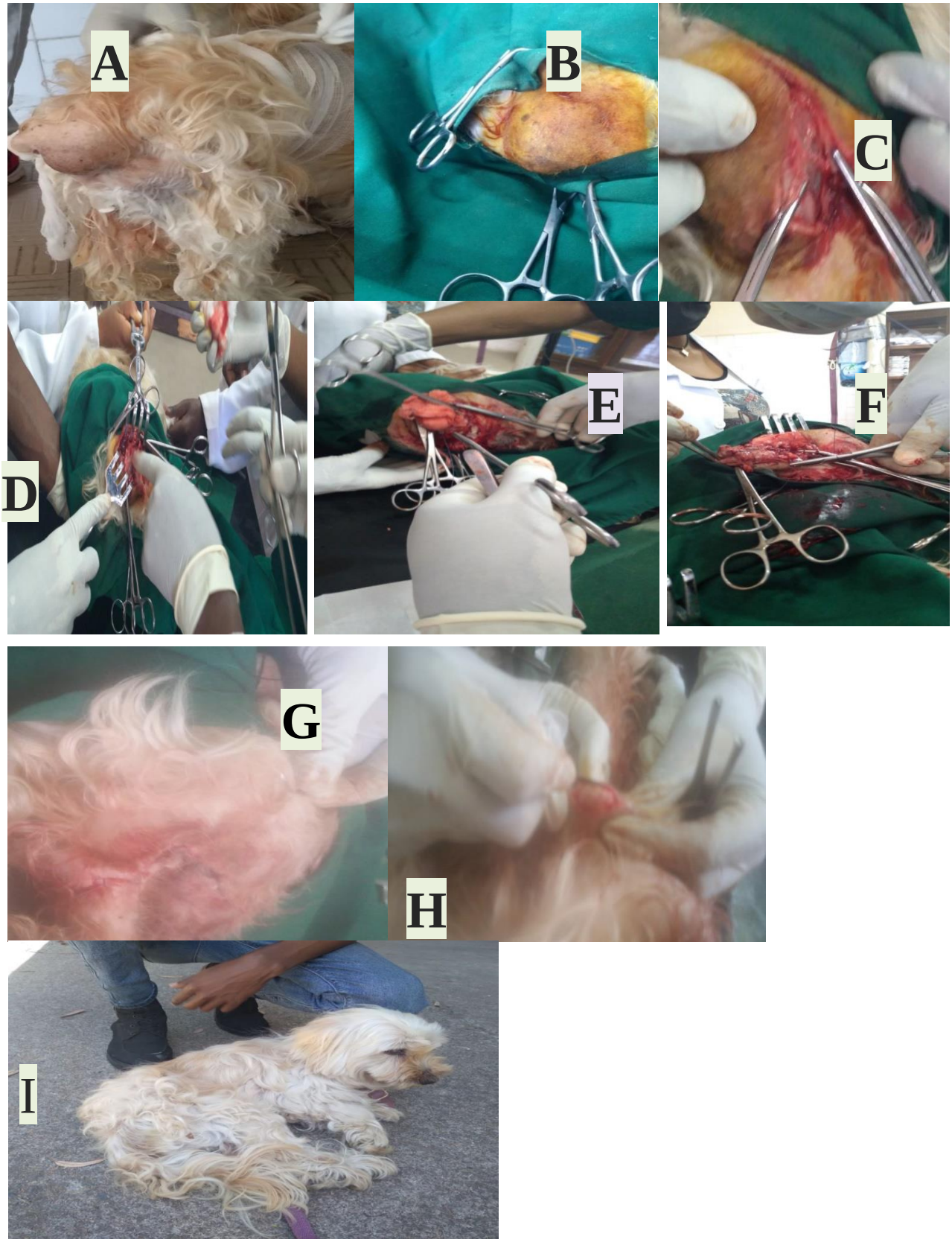

A
B
C
D
E
F
G
H
I

Figure 12: Perineal hernia, its surgical repair and outcome in dog

(A) Unilateral perineal hernia; (B) Surgical site preparation; (C) Curved skin incision; (D) Dissection of the adhered organs to replace the contents back to the place; (E) Pressing of the content back with sterile gauze and forceps; (F) After the interrupted sutures were preplaced; (G) Skin suture with subcuticular pattern; (H) Exteriorizing the testicle at prescrotal site; (I) After three months the dog presented to VTH with unrelated complications

Postoperative care and outcome: At the end of the surgical procedure, systemic antibiotics by using penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) was continued for five days and Tramadol (Tramadol hydrochloride, Sakar Health care Pvt.Ltd, Gujarat, India) @2 mg/kg I.M q 12 hr was also administered for pain management and the wound lavaged once daily with saline solution. In addition to these the owner was advised to kept dog with low residue diet and application of an Elizabethan collar. Moreover, information of the dog was subjectively assessed for pain, discomfort and inflammation at the surgical site, and defecation and urination behaviors from the owner by phone call. After three months of the operation the dog presented to the VTH with unrelated complication (Figure 12(I)) and no recurrence was seen until three months.

Discussion

Perineal hernia is a usually occurring disorder in intact male dogs. Despite the fact that, conditions that cause its development are not absolutely understood, PH is possibly a multifactorial disorder. It often requires surgical intervention for correction (Gill *et al.*, 2018). There are numerous treatment techniques used for the repair of PH in dogs including the standard herniorraphy (Özak *et al*., 2001), transposition of the internal obturator muscle (Alkan *et al.*, 2001; Vnuck *et al.*, 2006); semitendinosus muscle apposition techniques (Mortari *et al.*, 2006). Internal obturator muscle transposition is effective and recommended as the procedure of choice for more complex hernia. Advantage of this technique is to reduce tension on the suture line through transection of internal obturator tendon and providing greater dorsal elevation of the

flap (Seim, 2009). Compatible with this, current case report was used internal obturator muscle transposition approach to repair perianeal hernia in intact male dog. This is also recommended surgical protocol by Shaughnessy and Monnet, (2015) although recurrence rate of 17.4% was reported in six intact male dogs in their study out of 34 cases. In cases of lateral PH, the defect can be partially repaired by suturing the two edges of internal obturator muscle tissues at the midline, while ventral rectal support has been effectively provided through muscle transposition techniques (Morello *et al.,* 2015).

After the complete replacement and repairing of the perineal hernia in current particular case, the castration was performed through a prescrotal approach. Because castration is recommended due to the effects of testosterone (Head and Francis, 2002) or relaxin (Niebauer *et al*., 2005) on the prostate gland and perianal musculature. Some authors observed and reported partial wound dehiscence in 3%-21% of the cases after perineal hernia repair (Brissot *et al.*, 2004; Szabo *et al.,* 2007). Although this case recovered from this surgical intervention without significant postoperative complications except for a few signs of inflammation in the early phase, other studies have reported 11 to 45% wound infection (Coit *et al.,* 2008) and 7% perineal fistula (Kirpensteijn and Haar, 2013). Wound infection, associated with fecal contamination, extensive surgical dissection, and previous local infection were also incriminated as the main causes of postoperative wound dehiscence from this type of surgical procedure (Snell *et al.*, 2015). However, this wasn't observed in the current case, the reason for this may be due to the use of the prophylactic and antibiotics followed by wound lavaging for a few continuous days. The perineal hernia repair performed via internal obturator muscle transposition technique was successful and promising for similar cases.

3.4. Wound Managements in Equine

3.4.1. Wound management through primary wound intention in stallion

Abstract

The accidental wounds in equine are usually the result of the horse running over or into fixed objects. A seven-years-old local breed stallion was brought to the SPANA, CVMA of Addis Ababa University following accidental injury around ventral part of the thoracic cavity while it was running away from the car and impaled with sharp materials. On clinical presentation, active bleeding was noticed. The first attempt was to control bleeding and close the cavity so that prevent air moving into the thoracic cavity. The wound was packed with sterile gauze and the skin over the defect temporarily closed using stent bandages. Then it was further evaluated after sedation by buterfanol and zylazine through IV and controlling it manually. After broken foreign material was removed it was closed with appropriate suture material followed by aseptic site preparations. Finally, the wound was sutured in two layers. Postoperatively it was given tetanus antitoxin and procaine penicillin through IM. Moreover, the stallion was monitored at (SPANA) of Addis Ababa University for fifteen days. Finally, the horse was successfully recovered and released thereafter fifteen days.

Keywords*: Accidental wound, Horse, Primary intention*

Introduction

Equines are vital animals to the resource-poor society in Ethiopia providing traction power and transport services at reasonably priced (Dinka *et al*., 2006). In developing country, the poor terrain services, lack of well-developed modern transport networks and the prevailing low financial status of the community require the usage of equines for transportation (Mengistu, 2003). These working habits of equine may predispose them for various types of wounds. Wounds are open mechanical injuries of the skin (epidermis), underlying tissues, and organs. It is characterized by pain, gaping, bleeding, and functional disturbance. In working equines, the most common cause of wounds is overloading, accidents, improper position of load predisposing to falling, hyena bites, donkey bites, and injuries inflicted by horned Zebu cattle (DACA, 2006). Besides, some hobbling methods, inappropriate harnesses or yokes that may be heavy and ragged, and long working hours may cause discomfort and inflict wounds (Mekuria *et al.*, 2013). Among these, injuries of the thoracic cavity are common and rarely result in penetrating the thorax, and are usually the result of the horse running over or into a fixed natural object, such as

a tree, fence post, or other substantial stationary objects (Lugo, 2006). True penetrating wounds into the thoracic and abdominal cavity are associated with a guarded prognosis due to pneumothorax and infection (Barber, 2008).

The wound healing manner in equines is distinct from that recognized in different animals and frequently results in delayed recovery and large scarring, with compromised functional and aesthetic outcomes (Theoret, 2017). Second intention wound healing in horses is usually fraught with complications. These complications commonly affect wounds on the distal limb where healing is characterized by a weak acute inflammatory response followed by persistent inflammation, commonly leading to the development of Exuberant Granulation Tissue (EGT) and a subsequent delay in epithelialization, contraction, and wound closure (Theoret and Wilmink, 2013). In contrast to that, primary repair of the wound is the preferred for wounds that involve detachment of skin with the maintenance of an intact blood supply. Its advantage is to reduce complications such as sequestrum formation and facilitate wound healing. This is because; healing will be enhanced when the exposed bone and tendons are covered with skin and soft tissue in the immediate post-trauma. Besides, it improves the cosmetic and functional outcome and lessens the amount of healing having to occur by second intention (Hanson, 2005). However, excessive environmental contamination in the horse's surrounding and the proximity of the wound to the ground are considered contributing factors that affect wound healing (Kamus *et al.*, 2019).

Horses with extensive axillary wounds should be closely examined for the development of complications such as subcutaneous emphysema and impending pneumothorax, however, which may develop secondarily to axillary wounds that do not initially penetrate the chest. It may often expand deep into the axilla along the thoracic wall and tend to aspirate air into the wound and deeper structures (Holcombe and Laverty, 1999). To inhibit air from moving into the tissues the wound should be packed with sterile gauze and the skin over the defect temporarily closed using stent bandages (Hendrix and Baxter, 2005). In horses, penetrating wounds can involve any part of the thoracic cage, including the axillary or pectoral regions. Although traumatic pneumothorax from pectoral injury is possible and does occur, injuries in the pectoral region less commonly extend to intrathoracic structures because of the abundant musculature covering this area, the

parabolic shape of the anterior part of the thorax, and the narrow thoracic opening between the first ribs (Peroni, 2011).

After careful cleansing and aseptic preparation, wounds should be explored carefully with a sterile probe to ascertain depth and extent. Any irrigation should be done under low pressure to avoid compacting fluids or infective material into the depths of a wound that does or may communicate with the pleural cavity (Gemeinhardt and Molnar, 2005). Tension sutures and drains should be placed where required to support closure and primary healing followed by administration of a broad-spectrum combination of antimicrobials that includes, a nonsteroidal anti-inflammatory medication and other analgesics for multimodal analgesia if needed, and tetanus prophylaxis should be boosted (Sprayberry *et al* ., 2015). This report was focused on describing wound management in the horse through primary wound intention and its outcome.

Case history and clinical examination: A seven-years-old local breed of stallion was presented to the SPANA, CVMA of the Addis Ababa University Bishoftu Ethiopia following accidental trauma on ventral part aspect of thoracic cavity while the horse running away from the car and impaled by a sharp object (Figure 13A). On presentation, there was active bleeding and fortunately, it was controlled through packing with sterile gauze, and the skin over the defect was temporarily closed using stent bandages. Body parameters including temperature, respiratory, and heart rate were taken and all were within physiological limits of 38.3, 30, and 80 respectively. Finally, the horse was decided to be managed by primary wound intention since edges of wounds are adequately enough to close.

Preoperative and surgical site preparation: The wound edges were aseptically prepared for suturing through clipping, shaving and scrubbing with water and savlon after the removal of the gauze that had been wrapped over the wound to inhibit air from moving into the tissues (Figure 13B).

Anesthesia and animal control: After sedating the horse by using combination of the butorphanol @0.2mg/kg and Zylazine @1.1mg/kg through IV, the horse was controlled in right dorsolateral recumbency on patient ‘frash/ comfort’ through rope assisted by personnel.

Surgical correction and treatment: After wound edges were aseptically prepared for the closure the wound was debrided and lavaged. Finally, the wound was closed in two layers after removal of foreign broken materials. The first muscles of the pectoral region were sutured with a simple continuous pattern by using Polyglycolic acid 910 (vicryl) 1.0 (Figure 13C) and the skin edge was apposed with a horizontal mattress suture using silk 2.0 (Figure 13D). Then the suture was scrubbed with iodine. Finally, the animal was closely hospitalized at SPANA for around fifteen days.

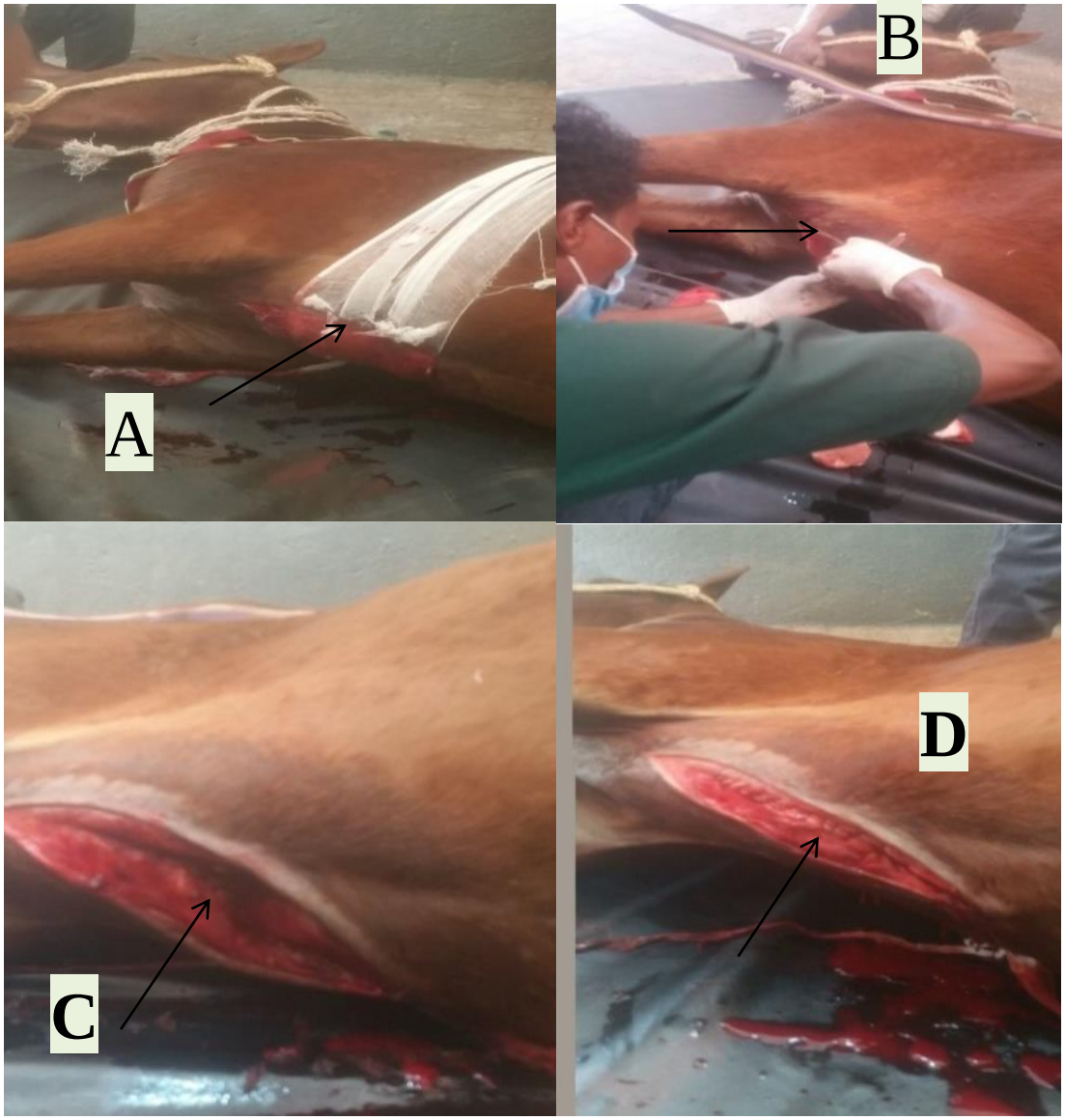


Figure 13: Wound management in horse through primary wound intention and its outcome

(A) Packing of the wound with sterile gauze before closure; (B) during site preparation; (C) After site preparation; (D) First layer closure; (E) Skin closure; (F) At 15th day of operation.

Postoperative care and outcome: Postoperatively the horse was administered with Tetanus antitoxin (TAT) 5ml/ IU and procaine penicillin (PPF) 15/IU intramuscularly for two consecutive days. The horse was closely monitored and examined for any additional complications in its stay time at SPANA of the Addis Ababa University. Finally, it was successfully recovered without any complications (Figure 13F) and discharged from the hospital 15th day of the surgery.

Discussion

Axillary wounds are common in horses and frequently result from traumatic injury that may include: running into a stationary object or being impaled by a sharp object, such as a fence post (Hassel, 2007). Initially, wounds may seem to be relatively minor; however, they need to be

monitored carefully as they can result in severe complications such as subcutaneous emphysema, pneumomediastinum, pneumothorax, and infection (Barber 2008). Wound management requires appropriate restraining, routine wound debridement, lavage, and removal of foreign bodies (Hendrix and Baxter, 2005). Similar procedure was performed by (Griffiths *et al.*, 2003). Proper site preparation will provides an accurate assessment of the wound and deeper structures. Wound healing manner should be performed on animal in an allocation and environment that will allow the clinician to best determine the status of the patient (Seid and Birhan, 2019). This is also compatible with the current case, in which the horse was closely monitored by the veterinarian for any associated complications at SPANA.

Primary closure is a technique of closing wounds and it most likely to provide the best cosmetic result. However, this technique is only acceptable in wounds with minimal tissue loss, less bacterial contamination, and minimal tension on the wound edges after closure. Regardless of whether primary closure or not, the wound should be cleaned and managed aseptically, because of the bacterial complications (Lott and Chaudhry, 2001). In this case report, the wound was completely and cosmetically healed by leaving a small scar on a surgical site within fifteen days. This technique was found to be effective and promising for similar cases.

3.4.2. Open wound management due to hyena bite in donkey

Abstract

Wounds of various types are among one of the most common health problem afflicting working donkeys in Ethiopia. The case at hand briefly describes the open wound management of hyena bite on seven-years-old local breed donkey that was presented to DSVC, CVMA of Addis Ababa University following a hyena bite. Upon clinical presentation, the donkey was bitten over posterior body part which was traumatized in the form of avulsion of the skin including the dermis and fascia of the upper quarter of left part of the hind leg. The wound edges were irregular and wide to estimate (close). Depending on rigorous and thorough clinical examination the case was diagnosed as an avulsion type of open wound and was managed as open wound management. After preparing the surgical site, the wound was thoroughly irrigated with normal

saline to remove all dirt, and loose and unviable flesh was trimmed off. Since there was the loss of part of the tissue and wide to close, it is left as an open wound and will heal through the second intention of wound healing. Finally, the peripheral area of the wound was pasted with Zinc oxide. However, the donkey died after two days of the presentation, which may be due to shock due to active bleeding during presentation and stress.

Keywords: *Donkey, Hyena Bite, Open Wound, Zinc oxide*

Introduction

Donkeys are an important farm animal species that descended from the African wild-ass (*Equus africanus asinus*) and early domesticated equines that have been around as long as mankind (Burden and Thiemann, 2015). They are economically very essential animals in Ethiopia. The low-level development of the road, transport network, and the rough terrain of the country make the donkeys the most valuable, appropriate, and affordable pack animals under the smallholder farming systems of the country (Gebrewold *et al*., 2004). Ethiopia owns the largest donkey population in Africa and the second largest population in the world after China with 6.4 million in rural sedentary holdings alone (CSA, 2012).

Donkeys have the greatest importance for the resource-poor communities in the rural and urban areas of Ethiopia (Agajie, 2000). They are mainly used to transport agricultural products, water, and firewood to rural households (Tesfaye and Curran, 2005). Donkeys are assumed to be better than other drought animals because of their inherent tolerance for dehydration, low sweating rate, and good thermo-ability (Singh *et al*., 2005). However, due to apparent lack of awareness by the owners, donkeys in Ethiopia suffer from a multitude of health, management, and welfare problems (DFID, 2006). Despite the donkeys' invaluable contributions to the people in Ethiopia the donkey is the most neglected animal and has a very low status (Biffa & Woldemeskel, 2006).

A wound is a breakdown in the protective function of the skin or loss of continuity of epithelium, with or without loss of underlying connective tissues, muscles, nerves, bones following injury to the skin, surgery, a blow, cut, chemicals, heat, cold, friction, shear force,

pressure or diseases such as leg ulcers or carcinomas (Fernandez and Griffiths, 2015). Wound healing is a survival mechanism and represents an attempt to maintain the normal structure and function. The capacity of a wound to heal depends partly on its depth, overall health, and nutritional status of the animal (Atiyeh *et al*., 2005). Wounds of different forms are among one the common health concerns afflicting working donkeys in many countries (Behnke and Metaferia, 2011). Similarly, the study on donkey in Ethiopia has demonstrated that working donkeys suffers from animal welfare problems such as gait abnormalities, tendon and joint swellings, skin lesions, ectoparasites (Amante *et al*., 2014). Wounds in working donkeys are seen on the leg, girth, tail, saddle and wither regions (Gizachew *et al*., 2013). These wounds are often caused by a combination of poorly fitting and designed tack or harnesses, beating with sticks and improper management practices.

One approach used to reduce the prevalence of wounds equine is through training and education of donkey users (Asfaw *et al*., 2012). One of the most problems which are a potentially threat the lives of working donkeys in central Ethiopia is hyena bite (Donkey Sanctuary, 2006). Hyena bite are commonly resulting from minor laceration to deep avulsion on exposed body parts especially in developing countries where management is poor especially at night (Theoret, 2008). Enormous variation exists in treatments, medications, bandages, and bandaging techniques applied to wounds in horses and donkeys (Gomez, 2008). Therefore, the objective of this case report was to describe the open wound management of hyena bite in donkey.

Case history and clinical examination: A seven years old, local breed male donkey was brought to DSVC, CVMA of the Addis Ababa University Bishoftu Ethiopia following a Hyena bite over perianal and thigh muscles from both sides of the hind limb 12 hours ago. Unfortunately, the donkey was hemorrhagic with hanged huge tissue and varying degree of lameness and the history showed that the bleeding started as soon as the hyena bite occurred. The donkey was examined by taking the body parameters. Accordingly, the temperature, respiratory rate, heart rate were 36.5ºC, 30breaths/min and 80 beats/min respectively. Clinical examination also revealed a pale mucus membrane. Finally, depending on rigorous and thorough clinical examination the case was diagnosed as an avulsion type of open wound and decided to manage open wound management.

Preoperative and surgical site preparation: After physical restraining and stabilizing of the animals with the hair surrounding the periphery of the wound was shaved and washed with water and soap (Figure 14A).

Anesthesia and animal control: The donkey was physically restrained by lifting one of its forelimb and keeping it in a hanging position by the owner. However, we didn't use the chemical method of restraining because of lack of access to anesthetic agents at the time and main attention was given to control bleeding since active bleeding was noticed. The operations were conducted in a standing position.

Surgical procedure and treatment: After preparing the surgical site, the wound was thoroughly irrigated with normal saline to remove all dirt, and loose and unviable flesh and hanged huge tissue was trimmed. Active bleeding was controlled by crushing with multiple hemostatic forceps. Since there was the loss of part of the tissue and too wide to close, it was left as an open wound and will heal through the second intention of wound healing. Finally, the peripheral area of the wound was pasted with Zinc oxide (Figure 14C). After finishing the procedure the donkey was sent home.

Figure 14: Open wound management in donkey due to hyena bite

(A) Case presentation and site preparations; (B) Procedure in progress and controlling of the bleeding with hemostatic forceps and ligation**;** (C) After cleaning, washing, shaving and pasting with zink oxide at wound edges

Discussion

The common anatomical site for hyena bites in donkeys is the thigh and perianal muscular areas. This might be because of the quantity and quality of muscle (Addis and Tesfaye, 2017). This does agree with the current case presentation in which the donkey was bitten around the thigh and perianal muscles with varying degrees of hemorrhage and huge tissues around the bite were hanged over. Also, the case at hand was characterized by a wide area and avulsion type of wound

in which the wounds were impossible to close and only intended to be managed as an open wound for second intention wound healing. This isn't similar to the wound management way of the horse Hansen, (2005) in which primary repair of the wound is preferable to secondary healing because the former involves detachment of skin with the maintenance of an intact blood supply. This is because; tissue integrity and perfusion, wound repair processes, bacterial challenge, and host responses heavily influence infection if left open. Excessive tension of sutured skin often also leads to complications of healing because of local ischemia with pressure necrosis of the surrounding skin and the pull through of sutures at the skin edge with subsequent wound disruption (Singer *et al*., 2003).

The present case was a mechanical injury due to a hyena bite. Compatible with this, the study conducted by Addis and Tesfaye, (2017) found that hyena bites in working donkeys were very common and severe in the same locality. Hyenas seem to consume domestic prey species in the Ada'a district, Bishoftu, Ethiopia indicating the virtual absence of wild prey species. Hyena bite can result in loss of mass of tissues and or even death of the donkeys depending on the severity of the wound. However, the survived donkey from a hyena bite may be extremely painful, stressful, and undoubtedly the most critical welfare issue facing donkeys with various degrees of wounds occurring at different anatomical locations (Singh *et al.,* 2005). In the present particular case, hyena bite in the form of varying degrees of avulsions was brought to DSVC and managed in the form of open wound management. However, the donkey died soon after treatments. The reason to this might be shock due to active bleeding and stress.

3.5. Surgical Affection of Eyeball

Abstract

Ocular disease and injury remain common problems in ruminants. Even though most of these cases are feasible to medical treatments in sever case it demands surgical intervention. Fortunately, field surgery remains a viable in most cases ocular disease. An eight-years-old local breed plough ox was brought to the VTH, CVMA of the Addis Ababa University followed by unilateral loss of sight and damage to the eyeball. The history stipulated that the condition started

as growth of mass inside of the eye and swelling, and progressed into then situation over several months. On clinical examination, the eyeball was necrotized and infested with a large number of myiasis. The animal exhibited normal body parameters. Based on history and clinical examination it was tentatively diagnosed as eye cancer probably squamous cell carcinoma. The eyeball was therefore surgically removed under xylazine sedation and local nerve block on standing animal. The infection lasted for three weeks after surgery and the orbit was severely infected with purulent discharge. The condition was corrected by repeated antiseptic dressing and systemic antibiotics. It took over months for the infection to clear out and the wound to start healing properly

Introduction

Ocular disease and injury remain the most common problem in domestic animals. Even though medical treatments are sufficient for the resolution and amelioration of clinical signs some ocular cases may require surgical intervention (Irby, 2004). The animals with many ophthalmic diseases may continue to eat and produce milk reasonably well, but they usually tend to lose bodyweight and production (Rahman *et al*., 2012). As a result, they are condemned to slaughter especially in the case of cancer eye which is by some estimates responsible for 12% of all carcass condemnation, and are refused by auction markets (Samad, 2001). Ocular squamous cell carcinoma is the most common tumor of the bovines. It results in significant economic loss and shortened productive life (Tsujita and Plummer, 2010). The peak age of incidence is between 7 to 9 years with an incidence rate varies from 0.8% to 5.0% among herds (Cordy, 1990). Multifactorial causes of the neoplasm include heritability, sunlight, nutrition, eyelid pigmentation, viral involvement, and irritation caused by dust, insects, and chemicals (Narayanan *et al*., 2010).

Enucleation is used to refer the removal of the eye globe, leaving behind the muscle and adipose tissue. It is particularly indicated for irreparable ocular trauma and septic panophthalmitis (Potter, 2007). There are two potential methods of local anesthesia for enucleation; the retrobulbar and the Peterson block. These techniques need adequate head restraining with a halter or nose grip. The four-point retrobulbar block is performed by injecting through the

eyelids, both dorsally and ventrally (at the 6 and 12 o'clock positions) and at the lateral and medial canthi. The aim is to deposit about 60 ml (divided between the four points) of local anesthetic at the apex of the orbit where the nerves emerge from the foramen orbitorotundum (Anderson and Muir, 2005). If the underlying disease allows for salvage of an eye with retention of vision, efforts should be made to preserve the eye if practical unless enucleation offers the potential for complete removal of diseased tissue and a rapid return to function (Schulz and Anderson, 2010). Thus, a case report describes eye enucleation in ox due to the irreparable injury to the point that infested with myiasis and foul-smelling.

Case history and clinical examination: An eight years old plough local breed ox was brought to VTH, CVMA of the Addis Ababa University with a history of losing unilateral sight and damaged eyeball (Figure 15A) due to the prolonged swelling of the eye. The owner complained that the condition started as growth of mass inside of the eye and swelling, and progressed into then situation over several months. During clinical examination, the eyeball was necrotized and infested with a large number of myiasis. The animal exhibited normal body parameters. Based on history and clinical examination the case was tentatively diagnosed as eye cancer probably squamous cell carcinoma. Lastly, eye enucleation was decided to remove after pumping the myiasis with normal saline.

Preoperative and surgical site preparation: The area around the affected eye was cleaned, clipped and shaved, and disinfected with antiseptic solutions.

Anesthesia and animal control: A four-point retrobulbar nerve block is applied around the eye at lateral and medial canthi and middle point on the upper and lower eyelid. In addition, the palpebral nerve block was also applied to compliment the retrobulbar nerve block because the incision was going to be at least 2cm from the eyelid margins.

Surgical correction and treatment: The tarsorrhaphy of eyelids was performed using a simple continuous suture pattern by polyglycolic acid 910 (vicryl) 2.0 (Figure 15B), allowing easier manipulation during operation. An elliptical incision was then made in the skin about 2 cm from the margins of the eyelids. The incision was continued through the subcutaneous tissue and down

to the orbital muscle. Care was taken to avoid incision into the conjunctiva, as the conjunctival sac is a source of potential contamination for the surgical field. Then blunt dissection is continued for 360º around the orbit until the eyeball and the conjunctival sac were released from their muscular attachment. Since all the contents of the orbit are necrotized and infected all muscles, adipose tissue, the lacrimal gland, and fascia are removed along with the eyeball and the margins of the eyelid, to ensure all sources of infection and dead tissue is removed. Once the eyeball was freed from its muscular attachments, the optic stalk and associated blood vessels were grasped with a pair of forceps and transected close to the eyeball with curved blunt scissors. After removal of the eyeball and orbital contents, the orbit is packed with a gauze sponge to stop bleeding (Figure 15C). In this case, excess bleeding wasn't noticed because retrobulbar contents were long dead though considerable dead space is left within the orbit. The orbit was thoroughly cleaned with normal saline and blood clot and pieces of necrotic tissue were removed. Then the dead space is packed with gauze sponge soaked in tincture iodine. The eyelids are apposed using simple interrupted mattress sutures using silk 1.0 (Figure 15D), by leaving space to remove and change the gauze pack later.

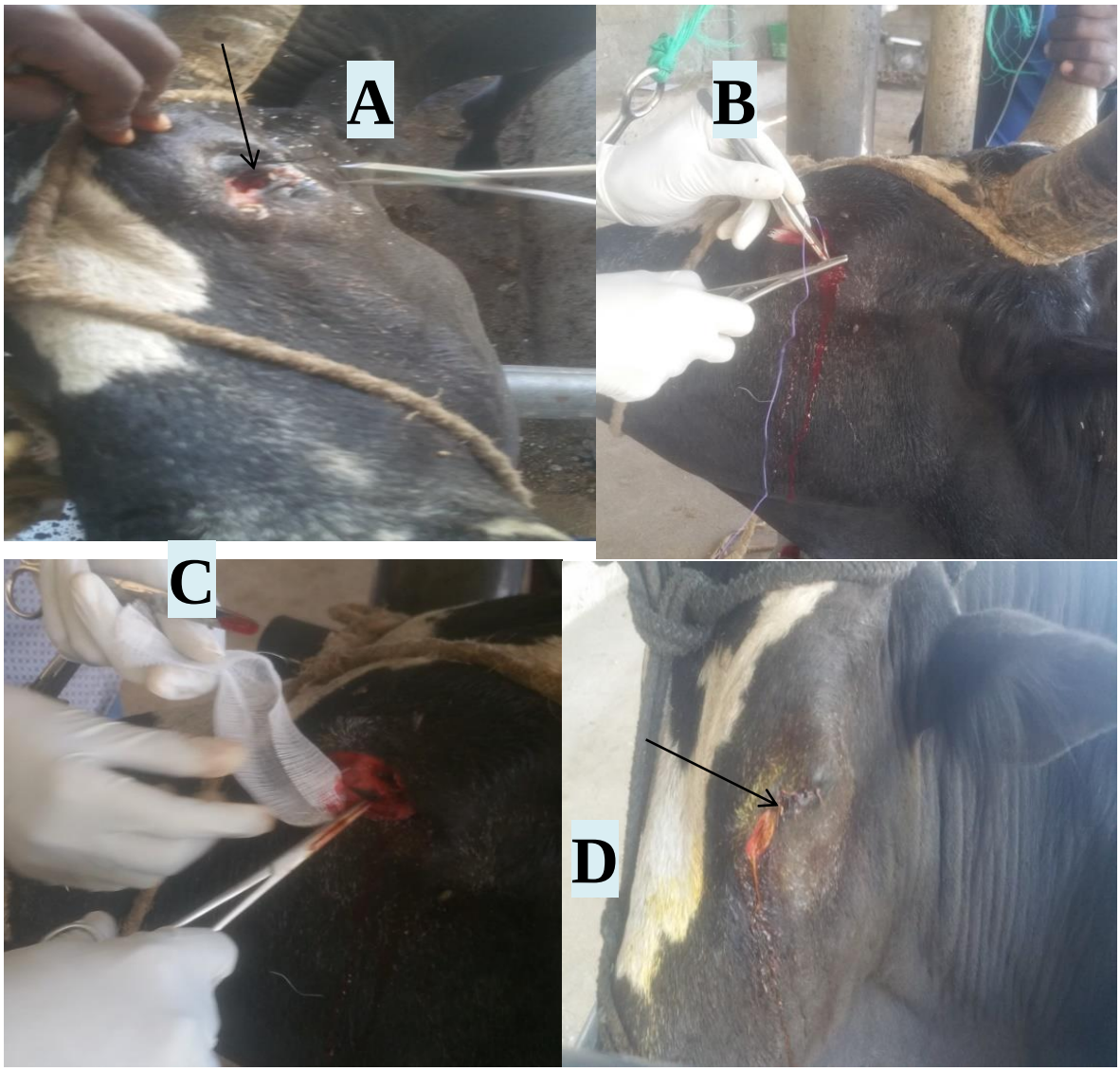


Figure 15: Enucleation of the eye ball in ox

(A) The affected eye before surgery; (B) After aseptic preparation of the eye while putting tarsorrhaphy; (C) surgery in progress; (D) Closure of the skin

Postoperative care and outcome: Postoperatively the ox was administered penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) for five days. The packed gauze was changed every day for three days. However, the animal developed a severe infection in the operated eye. Blood-tinged purulent discharge was oozing from the orbit a week

after surgery. The infection persisted after a repeated change of gauze pack and antiseptic dressing. The second round of systemic antibiotics was administered. The infection started to clear in the second weak surgery after the removal of the gauze pack and repeated flushing of the cavity with tincture iodine. Finally, after it took several weeks for the infection to clear out completely the owner decided to slaughter an ox.

Discussion

Enucleation remains a feasible, simple, and inexpensive option of treatment for many types of severe ocular pathology. It has the potential to resolve chronic pain, infection, and neoplastic disease. It can be performed with routine restraint and surgical equipment at minimal cost to the client (Schulz and Anderson, 2010). Bovine ocular squamous cell carcinoma commonly called "cancer eye" is the most common tumor affecting the bovine eye, as well as the most frequently diagnosed cancerous tumor in the bovine (Fazili *et al*., 2001). Indications for enucleation include a blind, painful eye; ocular neoplasia; severe corneal or intra-ocular infection; and ocular trauma not amenable medical treatments (Gilger, 2011). Though confirmative diagnosis wasn't done for this case because of too late presentation, according to history and clinical examination the case was tentatively diagnosed as eye cancer possibly squamous cell carcinoma. The eye enucleation in this case was end up with severe complications latter the second round antibiotics was started followed repeated flushing of the cavity with tincture iodine. Finally, it was slaughtered by owner without complete follow-up history due fear of further complications.

3.6. Tail Amputation in Small and Large Ruminants

3.6.1. Surgical amputation of tail and its outcome in ram due to dog`s bite

Abstract

Tail amputation is a surgical procedure in which an incision is given through the dorsal or ventral aspect of the tail to remove an irreparably injured part. The case report is aimed to describe the surgical management of tail amputation on a three-year-old local breed ram that was presented to

VTH, CVMA of the Addis Ababa University, with a complaint of tail injury due to the dog`s bite. On clinical examination, the tail was infested with myiasis and complicated severely to the degree that the routine wound management appeared to be of no value. Based on the history and clinical examination it was diagnosed as irreparable tail necrosis. Finally, tail amputation was performed after aseptic sit preparation and anesthetizing. The wound edge was routinely closed in two layers using appropriate suture material and pattern. As a postoperative care antibiotic procaine penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) was administered IM for five consecutive days followed by daily wound dressing. Complete postoperative information was obtained from the owner through phone call and physical contact. Finally, at 21th day of the operation, the skin suture was removed and the ram was successfully recovered and in body weight.

Keywords: *Myiasis, Necrosis, Ram, Tail amputation*

Introduction

There has been an increase in the range and extent of dog bites and predation on livestock especially the sheep worldwide (Esther *et al*., 2007). Increment in the number of stray dogs is major problem of animal bites. Dog bite usually occurs in different any animals due to being furious while threatened during feeding and their territory is being invaded. Sometimes they can be jealous in case of new entry into their territory (Appleby *et al*., 2002). Injuries caused to sheep may be characterized by slashing and biting different parts of the body. Within a flock of the sheep, differences in breed, age, and physical condition may determine which sheep are likely to be attacked by dogs and wild canids (Bangs, 2000). Large number of dog bites can be commonly occurred in domestic animals like cattle, sheep, and goats even in dogs and cats. However, its fatality may be depend on the health status of the dog is either rabid or not and the case fatality is notably higher in rabid than the normal dog (Marina *et al*., 2007).

It is believed that every year a high number of humans and livestock are attacked by dogs nevertheless of the available records are incomplete and fragmented (Al Salihi *et al*., 2017). Wounds due to dogs bite in different domestic animals are one of the most common types of

traumatic injuries (Hossain *et al*., 2010). The economic losses from tail necrosis can be summarized as reducing the price of the affected animal, the cost of the treatment, predisposing the affected animals to infections and gangrene, loss of communication way, and loss of the animal beauty (Radostitis *et al*., 2007). The routine treatment for dog bites in sheep may involve washing the site of bite injuries with an antiseptic solution and topical antibiotic application accompanied by systemic antibiotic and sometimes suturing of the large macerated areas based on the nature of the wound (Morales *et al*., 2011). Amputation of the tail is indicated for the therapeutic purpose of different conditions such as traumatic lesions, infections, neoplasia, and perineal fistula. However, it is associated with postoperative complications such as infection, dehiscence, scarring, fistula recurrence, and anal sphincter and rectal trauma (Olatunji *et al*., 2010). Moreover, in sheep tail amputation mainly predispose to rectal prolapse. This is because, the tail is amputated so short that the innervation of the anal sphincter and perianal muscles is compromised, resulting in chronically progressive rectal protrusion and ultimately prolapse (Anderson and Miesner, 2008).

Amputation of the tail is usually performed in the intervertebral space. The space can be identified by palpating the vertebral bodies while flexing and extending the tail near the proposed amputation site. The joint will be at the site of greatest motion and just cranial to the mammillary processes, which are located on the dorsolateral surfaces of the cranial vertebral bodies. The joint regions are palpably wider and thicker than the vertebral mid bodies. The skin is incised distally to the joint space to leave a flap of tissue that can be rolled over the bone end (Salib and Farghali, 2016). Therefore, this case report describes the surgical procedure of the tail amputation and outcome in a three-year-old ram.

Case history and clinical examination: A three-year-old local breed ram was presented to the VTH of the Addis Ababa University, with a complaint of tail injury due to biting of the dog approximately two weeks on the date of admission. Further history stipulated that the ram was treated with systemic antibiotics (oxtetracycline) at Dire Veterinary Clinic. Then it admitted to VTH. Upon clinical examination, the tail was necrotized with a faulty odor and infested with a large number of the myiasis and which was complicated severely to the degree that the routine wound management appeared to be of no value (Figure 16A). The ram was diagnosed with

different clinical parameters like heart rate, respiration rate, and temperature and accordingly 60beat/minute, 20breath/minute and 38.9 that were within physiological limits but, pale mucous membrane. Finally, the case was diagnosed as tail necrosis and decided to amputate the tail above the level of necrosis.

Preoperative and surgical site preparation: The ram was withheld for 24 and 6 hours from feed and water respectively. On admission, the area around the wound was aseptically prepared by clipping, shaving, scrubbing and washing with water and Savlon® (cetrimide 3% and Chlorhexidine gluconate 0.5% solution).

Animal control and anesthesia: The ram was tightening both hind and forelimb on the patient table to adequately restrain it in the lateral recumbent position. Besides, the lumbosacral epidural nerve block was done with 2% lidocaine (Lidocaine hydrochloride 2%, Veto Inc. Saint Joseph Missouri, USA) at a dose rate of 1ml/6 kg body weight and local infiltration 2% lidocaine during intra-operation.

Surgical correction and treatment: Before incision a sterile surgical drape was fixed on site and the base of the tail was tourniquet. A linear skin incision was made at the dorsal aspect of the tail and followed by a ventral at the same distance caudal to the joint space at the proposed site. Incisions deepened to reach the vertebrae and the connecting ligaments, muscle, and associated fat. After ligating the lateral caudal and medial caudal arteries cranial to the amputation site using chromic catgut 3-0, the coccygeal muscles were transected and the coccygeal vertebrae disarticulated both dorsally and ventrally. The dorsal and ventral skin flaps were pulled cranially to provide a tension-free closure using a scalpel blade (Figure 16B). Disarticulation was done at the level of the apex of the incision and the necrotized tail was removed (Figure 16C). The subcutaneous tissue along with the fat sutured using a simple continuous suture pattern by chromic catgut 2-0. The skin was sutured with simple interrupted mattress silk size 2.0 (Figure 16D). The tourniquet was removed and the surgery site was evaluated for bleeding. Lastly, the area was properly cleaned and dressed with a 1% povidone-iodine solution and the animal awake from surgery (Figure 16E) and admitted home. Finally, the skin suture was removed 21th day of the operation.


A
B
C
D
E
F

Figure 16: Case presentation with dog bites, surgical treatments and its outcome

(A) The ram presented with tail injury; (B) Surgical procedure in progress; (C) Necrotized tail complicated with Myiasis; (D) Skin suture with simple interrupted mattress; (E) The ram awake from surgery; (F) Outcome after two months.

Postoperative care and outcome: post-operatively, an antibiotic named procaine penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) was administered IM for five days. Besides, Diclofenac Sodium phosphate was administered @2.5mg/kg for three days IM to reduce pain. In addition, the suture line was dressed daily for a certain days. The healing process was also clinically evaluated and the surgical wound was almost healed and suture material was removed after 21th day of operation. Finally, the ram was completely recovered without any scar at the site and fortunately, increased in body weight (Figure 16F).

Discussion

In this case, due to its severe injury, it was managed through amputation of the tail. This finding is in line with Olatunji-Akioye *et al.* (2010) who have been reported that tail amputation is used mainly as therapeutic for various injuries in animals. Besides, this finding is also supported by Ural *et al.* (2007) who employed amputation in severely affected cattle tails. Amputation of the tail has been recommended in cattle due to tail necrosis to prevent further progression of the disease to the spinal cord which leads to ultimate death of the animal. Thus, treatment with antibiotic and anti-inflammatory agents is essential to cause relief of the pain and assist in healing after the amputation of the tail (Aruna and Sudhakar, 2021). Similarly in current case at hand after successful amputation of the tail the animal was kept on systemic antibiotics and anti-inflammatory agents followed by continuous wound dressing. Tail amputation is the most common surgical procedure performed for various treatments such as traumatic skin loss, ischemia, or denervation (Salib and Farghali, 2016). It should only be performed on those animals whose tail or associated structures have been irreparably injured (Mills *et al*., 2016). In the present case report, a successful therapeutic tail amputation followed by antibiotics in a ram

was observed. Thus, the report should strongly recommend that tail amputation under aseptic manner followed by antibiotics and ant-inflammatory agents along with wound dressing are effective in animals with irreparable tail injury.

3.6.2. Surgical amputation of tail in bull

Abstract

Due to the normal anatomy and physiology, tails of animals, particularly cattle and buffaloes are prone to various surgical affections like necrosis, gangrene, and wounds and occasionally this may result in death if protracted to treat early. Most of these affections do not respond to routine conservative treatments and demand amputation of the tail. This case report describes surgical amputation of tail on a seven-years-old local breed of an ox that was brought to VTH, CVMA of the Addis Ababa University following tail necrosis at the tip. Upon clinical examination, the tail was necrotized to the point that routine wound management appeared to be of no value and it was fully soiled with dirt and faces. Finally, tail amputation was performed after aseptic preparation of the surgical site on standing animals with sedation followed by epidural anesthesia. At the end of the surgical intervention, the wound was successfully managed and followed by antibiotic treatment and wound dressing. Finally, a case was recovered without any complications.

Keywords: *Amputation, Ox, Tail necrosis, V-shape incision*

Introduction

There are numerous functions of tail in animals primarily aid in their comfort; keeping ectoparasites nesting on it and as a locomotion and important signaling device (Tucker *et al*., 2001; Alam *et al*., 2010). However, due to their normal anatomy and physiology, they are prone to a variety of affections such as necrosis, gangrene, and wounds (Nuss and Fiest, 2011). Tail necrosis and gangrene are the most common problems in cattle housed on slatted floors and mouldy roughages containing mycotoxins (Khamis *et al*., 2002; Fowler, 2010; Dandapat *et al*.,

2011). It has been also reported that metabolic disturbances which occur in the dermis and epidermis of the tails are the predisposing factors for necrosis of the last vertebrae of the tail (Dhillon *et al*., 2006).

Other causes of tail necrosis may include *Corynebacterium bovis* the infected organisms may colonize the wound and result in local or systemic infection of the tail. It requires the early treatments due to spreading of the disease to the spinal cord, and consequently decreases meat and milk production and occasionally, causes the death of the animal (Aruna and Sudhakar, 2021). The recommended treatment for tail tip necrosis in cattle is injection of systemic antimicrobial therapy and banding of the tail proximal to the necrotic area to amputate irreparably affected part (Ural *et al.,* 2007). This case report describes the surgical procedure of tail amputation in an ox.

Case history and clinical examination: A seven-years-old local breed ox was presented to the VTH, CVMA of the Addis Ababa University, with a complaint of tail injury due to unknown origin. History showed as the tip of the tail was initially swollen and was followed by signs of inflammation in about a month. Upon clinical presentation, the tail was necrotized and the injury was complicated severely to the degree that the routine wound management appeared to be of no value and the tail was fully soiled with dirt and faces (Figure 17A). Physical examination was performed by taking the body parameters including heart rate, and respiration rate and the temperature and accordingly 48beat/minute, 20breath/minute and 38·6°C were within normal physiological limits. Finally, the case was diagnosed as tail necrosis and decided for surgical amputation of the tail above the level of necrosis.

Preoperative and surgical site preparation: The area around the wound was aseptically prepared by clipping, shaving, scrubbing, and washing with water, and Savlon® (cetrimide 3% and chlorhexidine gluconate 0.5% solution) (Figure 17B).

Anesthesia and animal control: Before surgery, the ox was sedated with the Xylazine Hydrochloride (@0.05mg /KgB. wt.) followed by an epidural block using 6ml of 2%lignocaine Hydrochloride because zylazine helped to handle the animal for injection of the epidural

anesthesia for desensitization of tail and subsequent amputation procedures. After the injection site was clipped and aseptically prepared using a disinfectant solution and then an 18 G hypodermic needle was introduced at an angle of 45° to the depth of about 0.5 to 1 inch to enter the vertebral canal. The correct position of the needle was checked by the hanging drop technique, which was performed by placing a few drops of lidocaine into the needle hub. Thence, after detection of the correct position of the needle insertion into epidural space 6ml of 2% lignocaine hydrochloride was administered slowly to achieve caudal desensitization of the tail. The desensitization of the animal was tested by poking various parts of the tail with a needle after the injection of epidural anesthesia. Then the ox was managed in a standing position assisted by bull holder.

Surgery procedure and treatment: After aseptic preparation and stabilization of the animals the tail amputation procedure was performed on a standing animal by locating the intercoccygeal space with the tip of a finger while the tail was manipulated up and down, with the other hand moving the tail in a pump–like a manner. A tourniquet was applied proximal to the part of necrosis. A V-shaped skin incision was performed to create dorsal and ventral skin flaps by blunt dissection (Figure 17C). The skin incision was made just distal to the desired intervertebral space. The lateral and middle coccygeal arteries are ligated using chromic catgut No. 3 during operation. The hemorrhage was checked by releasing tourniquet & bleeding points and accordingly were ligated or crushed with hemostatic forceps. Then the tail was disarticulated at the proposed site (Figure 17D). The excessive skin was trimmed for perfect apposition of the skin edges.

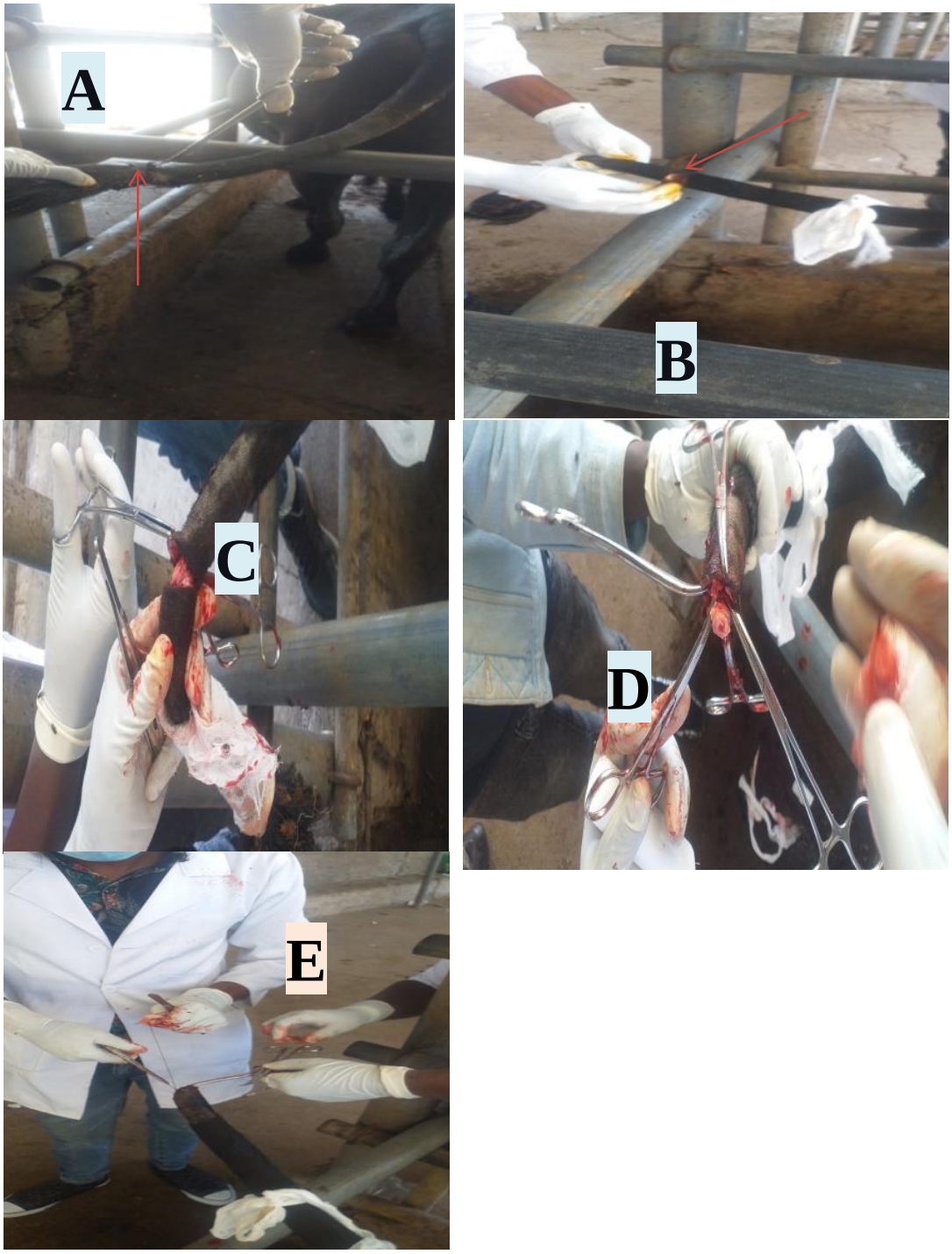


Figure 17: Surgical procedure of the tail amputation in ox

(A) Clinical presentation of the ox; (B) Surgical site preparation; (C) Dissection in progress; (D): Disarticulation of the tail at proposed site; (E) Apposition of the skin.

Postoperative care and outcome: Post-operatively, an antibiotic procaine penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) was administered intramuscularly for three days. Besides, the suture line was dressed for two days. The healing process was also clinically evaluated and the surgical wound was almost healed after 21th day of operation.

Discussion

Diseases of the tail are common in cattle. Among these, tail tip infection or necrosis is the major problem which results in tail paralysis (Watson and Penny, 2003). It has long been recognized as a problem in all slatted floor feedlots (Botha *et al*., 2004). This disease can be treated conservatively or through amputation. If a disease of the tail does not respond to conservative treatment, it demands amputation of the tail proximal to the injury. However, occasionally, it can be cured with medical treatment as Dillon and Singh, (2003) using a powder containing zinc oxide, kaolin, and boric acid. Amputation of the tail in cattle is a very controversial issue because, in some countries, it is carried out prophylactically for management reasons without any medical indication (Aubry, 2005, Schreiner and Ruegg, 2002).

Amputation of the tail has been recommended in cattle due to tail necrosis to prevent further progression of the disease to the spinal cord which leads to ultimate death of the animal. Thus, treatment with antibiotic and anti-inflammatory agents is essential to cause relief of the pain and assist in healing after the amputation of the tail (Aruna and Sudhakar, 2021). Compatible with this, the case report at hand was managed through amputation proximal to the site of necrosis followed by treatments with antibiotics and anti-inflammatory agents. Since most of these affections do not respond to routine medical treatment and it demands amputation of the tail (Ural *et al.,* 2007). Several authors such as Olatunji-Akioye *et al*., (2010) and Nuss and Feist, (2011) treated through amputation proximal to the affected area followed by administration of antibiotics and topical antibacterial applications. This report should strongly recommend that tail amputation under an aseptic manner followed by antibiotics and ant-inflammatory agents are effective in animals with irreparable tail injury.

3.7. Rumenotomy in Ewe

Abstract

Roaming and scavenging for feed expose the sheep to many health problems including ingestion and accumulation of indigestible foreign materials in the rumen and reticulum, especially under the traditional smallholder production systems. The present case report describes exploratory rumenotomy on a six-years-old local breed multiparous ewe that was brought to VTH, CVMA of the Addis Ababa University with a history of complete anorexia and intermittent straining after giving birth of a live lamb one day before. Upon clinical examination, a hard mass on the left side of the abdomen was detected through palpation. Based on history and clinical examination the ewe was tentatively diagnosed as a rumen foreign body. Exploratory rumenotomy was performed through left upper flank approach using an inverted "L" fashion infiltration of 2% lidocaine. After incisions of skin and layers of the abdominal wall the rumen was fixed in appropriate position by assistant to easy procedure and prevents contamination from the surgical field and followed by a vertical incision on the avascular part of the rumen. After removal of the 6kg weighted plastic bags and other foreign materials, all the layers of the incision were closed routinely. Post operatively the animal was kept on systemic antibiotic procaine penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) intramuscularly for three days. However, after a week of surgery, the ewe died due to cease of feeding.

Keywords*: Ewe, Foreign Body, Roaming, Rumenotomy*

Introduction

Sheep have a lot of important functions in food security, reduction of poverty, improving soil fertility for crop cultivation, and overall improvement of livelihoods in resource-poor communities, particularly in developing countries (Lebbie, 2004). Healthy status is a major constraint to small ruminant production under the traditional smallholder production systems, in which the animals mainly roam and seek their feed (Devendra, 1999). Among these constraints,

environmental pollution is one of the major problems of grazing animals due to the lack of recycling industries and environmental cleaning practices. The improper disposal of plastic bags is an important environmental pollutant, which in turn leads to ingestion by freely scavenging animals, particularly around urban areas (Ramprapbhu *et al.*, 2002).

Roaming and scavenging for feed predispose the animals to many health problems including ingestion and accumulation of indigestible foreign materials in the rumen (Remi-Adewunmi; Gyang and Osunowd, 2004). The ingestion of foreign bodies can be associated with a phenomenon known as pica, a disorder characterized by craving and appetite for non-edible substances particularly for trace elements, such as salt, cobalt, or phosphorus which is occasionally noticed due to the nutritional deficiency (Pugh and Baird, 2012). In Ethiopia, small ruminants that are kept under an extensive management system are more affected by ingestion of indigestible garbage from various sources because of the environmental contamination with plastic bags, and absence of policy to protect the environment, and the frequent occurrence of drought that predispose animals to nutritional deficiency and pica (Abebe and Nuru, 2011).

The typical foreign bodies frequently ingested by ruminants were rope, plastic, cloth, leather, and a metallic object, such as a piece of wire or a nail. Once it ingested, it directly disturb normal physiology of the GIT in ruminants. But, its severity may depend on the duration ingestion, location, and the level of obstruction. Thus, impaction of foreign bodies in the fore stomach of ruminants affects the absorption of volatile fatty acids, reduced feed intake, reduced production, internal injury, and consequently death following blockage of the intestinal tract. In addition, rumenitis, traumatic pericarditis, and traumatic reticulo-peritonitis are other problems associated with it (Omidi *et al*., 2012). These cause great production loss and hinder reproductive performance (Ramaswamy and Sharma, 2011).

Cattle are more susceptible to foreign bodies than small ruminants because cattle (Mc Curin and Basser, 2006). Among the surgical interventions, performed on ruminants, rumenotomy is one of the most common surgery, and in some regions where goat rearing is practiced, it represents as much as 94% of all surgeries on goats (Hayder 2004). It has been widely described surgical procedure in cattle nevertheless of very similar procedure for small and large ruminants (Callan

and Applegate, 2017; Martinez *et al.*, 2019). The location of the rumen against the left abdominal wall provides a convenient way to access the reticulum, the reticulo-omasal orifice, and the rumen (Niehaus, 2008). Indications for rumenotomy include traumatic reticuloperitonitis, esophageal obstruction, foreign body ingestion, and bloat (Asrat and Melkamu, 2015). The exploratory rumenotomy was described.

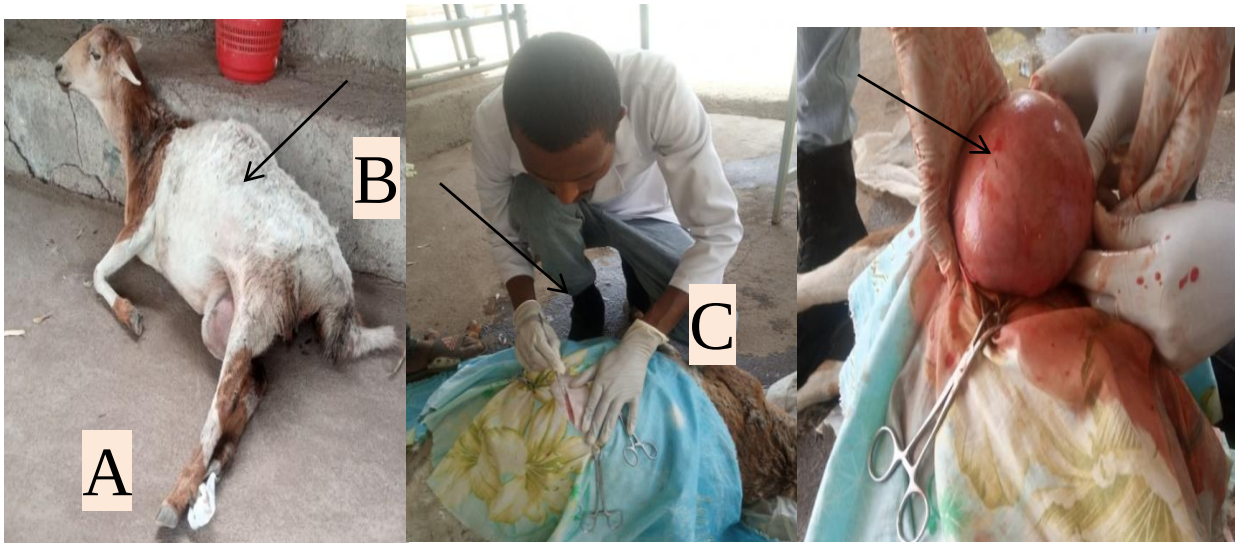
Case history and clinical examination: A multiparous six-year-old local breed ewe was brought to VTH, CVMA of the Addis Ababa University with a complaint of complete anorexia and intermittent straining at frequent intervals after giving birth a day before (Figure 19A). The history stipulated as a ewe gave birth to a live lamb one day before and it started lying down and strain intermittently. Upon presentation, she felt to stand and left in recumbent position with a distended abdomen. External palpation of the abdomen revealed a hard mass on the left side of the abdomen and disturbed ruminal motility was detected because of the continuous straining and bleating. There was bruxism (teeth grinding) and salivation. The body temperature (37.9°C), heart (80beats/minute) and respiratory rate (30breath/minute) were within little variation from the normal range. Based on history and clinical examination the ewe was tentatively diagnosed as foreign rumen body and decided to undergo.

Preoperative and surgical site preparation*:* Since the case was diagnosed as an emergency no time to fast the animal and immediately the hair around the upper-left paralumbar area was aseptically prepared. At the end, a sterile drape was placed and fixed by towel clamps on the proposed surgical site as shown (Figure 19B).

Anesthesia and animal control: Local anesthesia was achieved with an inverted "L" block technique using 2% lidocaine hydrochloride (2% lidocaine hydrochloride jeil pharma. co.Ltd., Korea) with a dosage rate of 10mg/kg approximately 1ml/1cm distance and placed on the right lateral position.

Surgical procedure and treatment: In this case report, the operation was performed outside of the surgical room (VTH) due to a lack of access to the room since the case was presented on weekend (on Sunday). Thus, the attempt was taken to save the life of the animal as the case was

presented as an emergency. After aseptically preparing the surgical sites, the vertical skin incision around 15cm was made on the flank of the paralumbar fossa. Then the three muscular layers of the abdominal wall (external oblique, internal oblique and the transverse abdominal) and peritoneum were incised accordingly. The impacted rumen full of foreign body was held by gloved assistant to prevent contamination to the surgical field (Figure 18C). Then rumen wall was incised about 14cm longitudinally in the vertical direction on the dorsal compartment away from the blood vessels area; so that rumen was explored and large-sized foreign bodies (plastic material) were removed (Figure 18D) majorly from the rumen which weighing about 6kg and fortunately all the content was dry material even no soft ingest was found in the rumen (Figure 18E). Then, the rumen and surrounding area were rinsed copiously with sterile isotonic saline solution and is closed by double lambert suture using sterile absorbable polyglycolic acid of size 1-0 (Shandong Sinorgmed Int'l Co., Ltd, China) and replaced in the abdomen (Figure 18F).



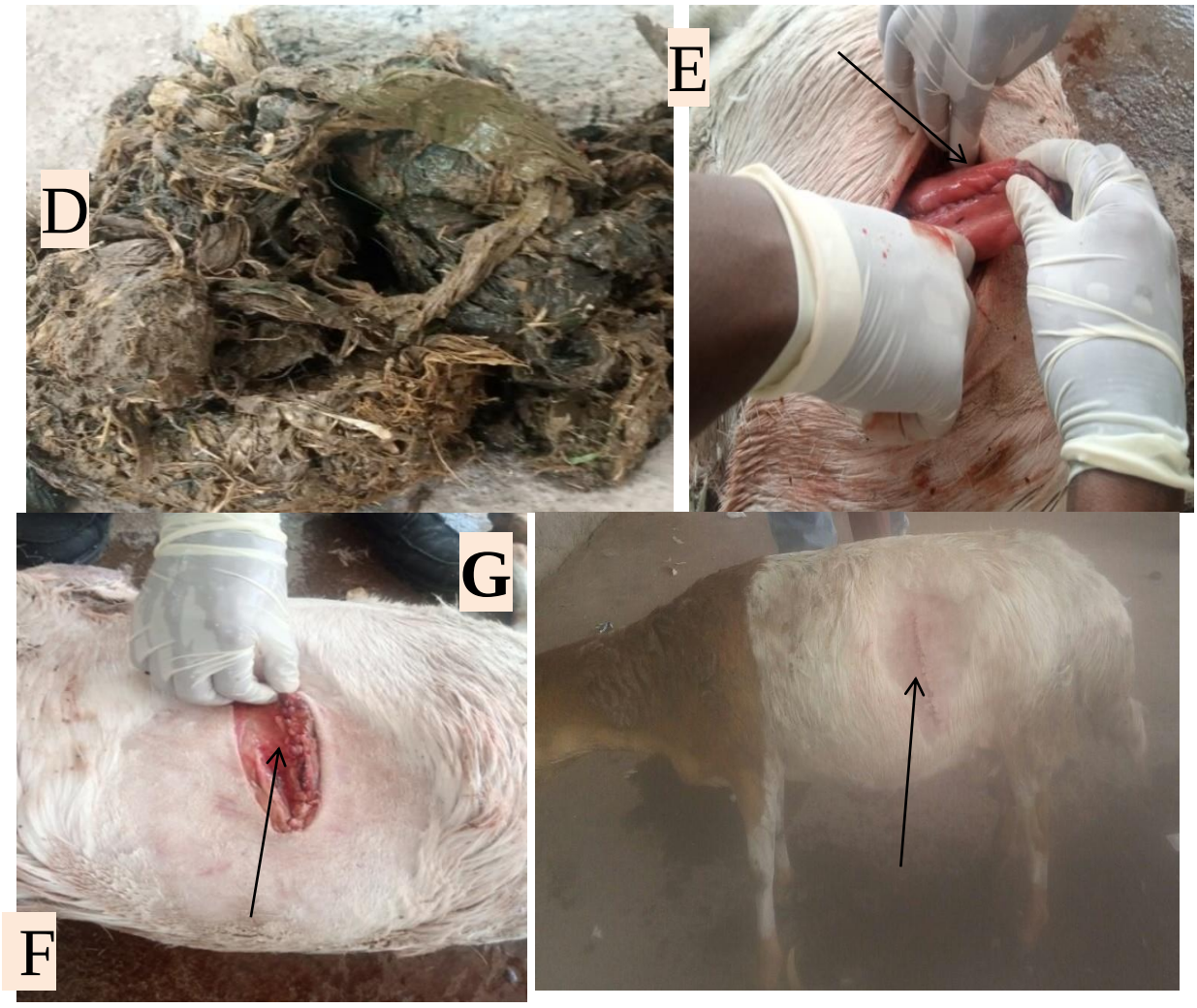


Figure 18: Surgical progression of exploratory laparotomy in ewe

(A) Surgical site preparation and animal management; (B) Entering in to abdominal cavity on progress; (C) Large and dry plastic materials removed from rumen; (D) Closure of rumen on and abdominal muscles in progress; (E) after closure of abdominal wall.

After closing the rumen wall, the hand was gloved with other surgical glove. Then peritoneum and transverse muscle was sutured with simple continuous pattern using chromic cut gut 2-0 size and the two oblique muscles and subcutaneous tissues were sutured with vicryl 1-0 in simple

interrupted pattern. Finally, skin incision was closed with simple interrupted pattern by using silk 2-0 size and the animal awake immediately at the end of the procedure (Figure 18G).

Postoperative care and outcome: post-operatively, an antibiotic named procaine penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) and Dexamethasone Sodium Phosphate injection BP at a dose rate of @2mg/kg for three days was administered IM. Besides, the owner was advised to decrease feed supplementation in quantity for first weeks and gradually increased. Moreover, advised to report promptly the case if any discomfort observed and to clear off polythene materials and iron sheets by burying in to the ground and supplement the diet of the flock with salt lick as a source of mineral supplement. Despite of the effort that made to save, the ewe died after a week of post-operation due to failure to ingest feed.

Discussion

The accumulation of indigestible foreign body leads to the generation of a hard mass in the rumen (Geehan *et al*., 2006), which can cause impaction (Kumar and Sangwan, 2017; Singh *et al.,* 2019), the accumulation of gas (Das and Behera, 2011) and even death of the animals (Hailat *et al*., 1998). Impaction of the rumen is one of the common causes of GIT disorders in sheep (Radostitis *et al*., 2009). This compromises ruminal space and result in many complications which mainly depends on the nature of the ingested materials (Calfee & Manning, 2002). A number of factors have been implicated as risk factors for ingestion and accumulation of indigestible foreign materials in sheep. These include starvation during long periods of feed scarcity (Igbokwe *et al.,* 2003), mineral and nutritional deficiencies, depraved appetite (Radostitis *et al*., 2009), and increments in environmental pollution with non-biodegradable materials, which prevail in the developing world (Ghurashi *et al*., 2009).

Rumen foreign body is prevalent in ruminants in urban areas where pieces of metallic materials from old fences, construction of buildings and also materials used for rolling and packaging of commodities are left irresponsibly. Thus, animals in from such areas have more chance of acquiring foreign bodies than rural (Desiye and Mersha, 2012). Moreover, industrial

improvement and modernization had contributed the main role in increasing the incidence of foreign bodies in animals dwelling around urban and peri-urban (Misk *et al.*, 1999). Free grazing and rearing system of livestock is primary cause of rumen impaction with foreign body particularly in urban and peri urban due to environmental pollutions with plastics, ropes, cloth, leather, wire, nail and inadequate availability of feed especially during long dry (Rahel, 2011; Abebe and Nuru, 2011).

Rumenotomy is viable surgical procedure of removing metallic and plastic foreign bodies from the rumen and reticulum of large and small ruminants. It is a clean-contaminated surgery since a hollow viscous is penetrated (Anteneh and Ramswamy, 2015). Postoperative complications including wound dehiscence, hemorrhage, and fever; edema, wound infection (peritonitis), death, intestinal obstruction/adhesion, and physiological bloat are usually associated with rumenotomy. These complications can be minimized through postoperative administration of antibiotics and analgesics (Fubini and Ducharme, 2016). This was consistent with the present case report in terms of case management, treatment, and post-operative complication (death). However, this finding is inconsistent with an experimental study conducted by Ghurashi *et al*. (2009) who concluded that the surgical removal of the foreign body did improve the health of the animals by increasing the feed intake, weight gain, and productivity following removal of the foreign body.

The left paralumbar fossa approach during rumenotomy helps to easily asses the rumen and the procedure can be performed by making a vertical skin incision just behind the last rib, and about three centimeters from the transverse process of lumbar vertebrae and above the dorsal sac of the rumen (Lozier and Niehaus, 2016; Dharmaceelan *et al*., 2017). The primary objective is to exteriorize the dorsal sac and secure the rumen wall to the skin, in order to prevent contamination of the abdominal cavity and muscle layers. A rumenotomy is performed immediately after an exploratory laparotomy (Abdel-hady *et al*., 2015).

3.8. Surgical Drainage of Abscess in Cattle

Abstract

An abscess is an accumulation of pus in a confined tissue spaces and is often accompanied by swelling usually due to an infection. Numerous treatment methods have been used including; administration of systemic antibiotics and surgical drainage. The present case report describes case of subcutaneous abscesses and its surgical procedure in two bulls of different ages, breeds, and management system presented to VTH, CVMA of the Addis Ababa University with a varying degree swellings on different anatomic locations. Thorough clinical examination, the swellings were found to be firm, red, and swollen masses in consistency but painful to touch in Case 1. Confirmative diagnosis through aspiration with the sterile needle of 16.0 gauges was poked into dependent side and revealed thick, yellowish and creamy pus that came out through a needle. Finally, the cases were diagnosed as subcutaneous abscesses and surgically drained by applying small incisions on the dependent part and were flushed with gauze soaked with antiseptics. The bulls were treated by regular drainage of pus along with a daily antiseptic dressing of tincture iodine, parenteral administration of antibiotics (24mg/kg), and dihydrostreptomycin sulfate (30mg/kg) (PenStrep® Norbrook UK) I.M for three consecutive days in both cases. At the end, the bulls were successfully recovered upon regular follow-up for two weeks.

Keywords: *Abscess; Bulls; Flushing, Surgical drainage*

Introduction

An abscess is an accumulation of pus in confined tissue spaces and is often accompanied by swelling usually due to an infection (Alharbi and Mahmoud, 2012). It can be caused by bacteria such as (*Staphylococcus aureus, Streptococcus pyogenes, Klebsiella pneumoniae, Vibrio vulnificus, and Salmonella spp), parasites (Schistosoma mansoni and Toxocara Canis*) or foreign substances of which bacterial infection is the most common (Cox and Jeffrey, 2007). Bacteria especially, Staphylococcus species is the most common bacterial cause of skin abscesses and

occur when the bacteria enter the body through a hair follicle or injury that has punctured or broken the skin. In rare cases, an abscess may be caused by a virus, fungi, or parasites (Hassan *et al.*, 2019). Most subcutaneous abscesses are the result of traumatic skin penetration with resulting infection (Abdel *et al.*, 2015). When bacteria enter the body, the white blood cells attack it and some nearby tissue dies creating a hole that then fills with pus to form an abscess (Kobayashi *et al.*, 2015).

Pus is the result of a war established between the invading pyogenic microorganisms and living tissues and cells (Abouelnasr *et al*., 2016). It is consisting of dead and living polymorph nuclear leukocytes, cellular debris, pyogenic microorganisms, lymph, and serum (Misk *et al*., 2019). Abscesses can develop at any location in the body. A skin abscess is one of the common types of abscess that appears externally as a swollen, pus-filled lump under the surface of the skin and internal abscesses develop inside the body, in an organ, or in the spaces between organs (Fontaine and Baird, 2008). The symptoms and signs of cutaneous and subcutaneous abscesses are pain, heat, swelling, tenderness, and redness, and these findings are reported (Stephen and Edward, 2010). Similarly, for deep abscesses, local pain, tenderness, and systemic symptoms, especially fever, anorexia, and weight loss, are common findings (Thorat *et al.*, 2008).

Diagnosis of cutaneous and subcutaneous abscesses is through physical examination. However, a deep abscess often requires Ultrasonographic examination (Radostitis, 2007). Abscesses can be treated in several ways, depending on the type of abscess. The main treatment methods include antibiotics, a drainage procedure, and surgery followed through aseptic procedures to reduce infection and to improve better outcome (Kofler *et al.*, 2004). A small skin abscess may drain naturally, or simply shrink, dry up and disappear without any treatment. However, large superficial abscesses may need to be treated with antibiotics to clear the infection, and the pus may need to be drained through an incision. This will usually be done by creating a ventral drainage hole and thoroughly flush with clean water under moderate pressure from a hose or syringe using a gloved finger to gently aid the removal of pus (Hassan *et al.*, 2019). The present case report describes cases of subcutaneous abscesses and their surgical managements in different anatomic locations of the two bulls.

Case1

Case history and clinical examination: A four-year-old exotic breed bull was brought to VTH, CVMA of the Addis Ababa University, with a complaint of large swelling at the dorsal aspect of upper part of the hind limb from the right side (Figure 20A (Case 1)). The history stipulated that the swelling was progressively increased in size within one month. The rigorous clinical examination of the swelling revealed the appearance of firm, red and swollen masses in consistency. All physical parameters were in the normal physiological range. To differentiate it from other types of lesions causing swelling like a tumor, hematoma, hernia and cysts aspiration of the content from the swollen mass was performed using a 16-gauge sterile needle that revealed thick, yellowish, creamy pus came out through a needle. Based on history and clinical findings the case was diagnosed as subcutaneous abscess. Finally, surgical drainage of the pus was decided.

Case 2

A five-year-old local breed bull was brought to VTH, CVMA of the Addis Ababa University with a complaint of a large swelling in ventral abdomen. The history stipulated that the swelling was progressively increased in size after the horn thrust of the bull within two months. On clinical examination, the bull exhibited normal body parameters such as heart rate, respiratory rate, and temperature. Differential diagnosis was performed to differentiate it from other types of lesions causing swelling like a tumor, hematoma, hernia and cysts through aspiration using a 16-gauge sterile needle that revealed thick, yellowish, creamy pus came out through a needle. Based on history and clinical findings the case was diagnosed as a subcutaneous abscess. Finally, surgical drainage of the pus was decided.

Preoperative and surgical site preparation: After controlling of the animals in appropriate positions, the swollen area and hair in its surrounding were aseptically prepared by cleaning, clipping, shaving, and scrubbing with water and diluted chlorhexidine solution thoroughly (Figure 19A (Case 1) & 20A(Case 2)).

Anesthesia and animal control: Both animals, Case 1 and Case 2 were controlled in left and right lateral recumbency respectively through rope assisted by personnel.

Surgical correction and treatment: Following proper controlling and aseptic preparation of the surgical sites, surgical evacuations of the pus were performed in both cases (Figure 19B (Case 1) & 20B (Case 2)) through incisions with disposable sterile scalpels around the tip of the abscesses on the dependent parts and the pus were drained as well as flushed thoroughly with antiseptic (weak iodine solution) after soaking it with gauze held with forceps in the form of iodine-soaked cling. The cavity was then filled with packed with gauze soaked in tincture iodine (5%) with a set on protruding out of the incision to allow pus drainage (Figure 19C (Case 1) & 20C Case 2)). Finally, the animals were admitted to home. Thence the wound was left open for drainage of pus and to limit its accumulations (Figure 19D (Case 1).

Figure 19: Surgical drainage of large subcutaneous abscess in an exotic bull

(A) Preoperative preparation of the area; (B) Surgical evacuation of the pus; (C) Packing the cavity with gauze; (D) At the end of the procedure; (E) After fifteen days of post operation.

Figure 20: Surgical evacuation of the subcutaneous abscess in a local breed bull

(A) Preoperative preparation of the area; (B & C) Surgical evacuation of the pus; (D) Packing the cavity with gauze.

Postoperative care and outcome: Postoperatively the animals were administered with penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) for three consecutive days. In addition, the surgical sites were regularly dressed. At 21th day of operation, the bull (Case 1) was successfully healed by leaving small scar on the surgical site (Figure 19E) and surprisingly increased in body weight and similarly Case 2 was successfully healed as the phone call from the owner.

Discussion

An abscess is a circumscribed inflammatory lesion consisting purulent exudates. Causes of abscess formation are variable and include a breach on the surface of the skin and the entrance of pyogenic microorganisms through it (Williamson, 2001). Accumulation of pus at the injury site and necrosis of the tissues form the large abscess (Blood *et al.*, 2000). Sometimes it may be confused with a cyst, hematoma, tumor, inflammation, or hernia (Tyagi and Singh, 2012). Usually, solitary abscesses are common in cattle and buffaloes (Thorat *et al*., 2008). Different types of abscesses are commonly named according to their anatomic location like pharyngeal, submandibular, retroperitoneal, hepatic, splenic, pulmonary, cerebral, and subcutaneous abscesses (Constable *et al*., 2017). In the current case report, the abscess swelling was subcutaneously located in both bulls. This result was in agreement with that reported by Misk *et al*. (2008) who stated that the predilection sites of abscesses in different animals depend mainly on the way of entrance of the infection.

The size, consistency, nature, and color of the contents play a considerable role in the diagnosis and treatment of abscess. A thorough examination of the abscess cavity was essential to extract any migrating foreign bodies; otherwise, the abscesses will continue to discharge pus after its opening. Treatment of large abscesses was performed by evacuation of pus from the abscess

cavity along with antibacterial therapy. A similar line of treatment was followed by (Sahoo and Ganguly, 2015). Drainage performed by making a simple dependent stab incision is important to relieve from this condition (Pavletic, 2006). The clinical presentation of abscess may encompass swelling, pain and redness (Stephen and Edward, 2010). Similarly the same clinical sign was observed in Case 1. The subcutaneous abscesses require daily dressing followed by parenteral treatment with antimicrobial drugs (Tiwari and Kashyap, 2011). In conclusion this finding should strongly recommend that successful management of subcutaneous abscess in cattle can be achieved by regular drainage of the pus followed by antiseptic gauze packing to allow complete drainage of pus so that the parental administration of antibiotics is effective.

3.9. External Coaptation in Puppy

Abstract

External coaptation is an alternative treatment for the stable tibial fractures and fortunately, is amenable to the closed reduction in skeletally immature animals. The case report describes management of tibial fracture through external coaptation using bamboo splint followed by casting with Plaster of Paris on a three-month-old local breed puppy presented to VTH, CVMA of the Addis Ababa University with a complaint of tibial fracture due to the car accident since four hours ago. Upon presentation, the puppy was in a sternal recumbent position because it felt to stand and walk. Clinical examination revealed non-weight bearing and lay on sternal recumbency and the affected limb was indicated by dark red skin and the area at the site of the fracture was swollen. Moreover, the puppy felt severe pain when the affected leg (tibial and fibular area) was palpated. Manipulation of the tibial and fibular area revealed abnormal movement with crepitus sound. The puppy was diagnosed with different clinical parameters like heart rate (120beats/minute), respiratory rate (40breath/minute), and the temperature (38.9°C), where apparently within normal physiological limits. Finally, the case was tentatively diagnosed as a mid-shaft tibia fracture. Due to lack of access to diagnostic imaging machines such as an X-ray it was only tentatively diagnosed. Finally, the case was managed easily with available materials (Bamboo splint, casted with plaster of paris, cotton, and cling gauze) under general anesthesia and followed by administration of an antibiotic named procaine penicillin (24mg/kg)

and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) and Dexamethasone Sodium Phosphate injection @2mg/kg for three days to reduce the swelling. After fifteen days, good result was recorded and this method was found to be effective.

Keywords: *Bamboo splint, External coaptation, Plaster of Paris, Puppy*

Introduction

Bone is a vital system in the body and has various essential functions such as providing a framework for muscular tissue attachment and surrounding vital organs and protecting them. In addition, it's essential for the hematopoietic and immune systems (Denny and Butterworth, 2008). Bone fractures constitute a major problem in small animal practice, especially in dogs (Gadallah *et al*., 2009). Violent trauma with vehicular accidents or minimal trauma with pathological conditions such as neoplasia is usually the common cause of fractures (Ozsoy and Altunatmaz, 2005, Fossum *et al*., 2013). But, fractures of the long bone can be also caused by ballistic missiles, fights, and falls (Simpson, 2004; Kumar *et al*., 2007). The most encountering fracture of the long bone in small animals is the femur and tibia (Harasen, 2003).

Knowledge of the types and frequency of fractures in domestic animals and the professionals in the area of orthopedics and veterinary physiotherapy can direct their potential to the improvement of fixation techniques, correction, and stabilization of fractures with higher incidence, thus improving the efficiency in the treatment and repair of it (Vidane *et al*., 2014). The objective in treatment of fracture is to achieve the physiological function of the affected limb (Déjardin, 2020). Thus, intrinsic and extrinsic forces generated on the fractured limb must be immobilized by appropriate techniques (Harasen, 2003). Bone fractures in dogs are amenable to a variety of surgical and non-surgical interventions ranging from external coaptation to internal fixation, casting, cage (box) rest, and limb amputation (Lewis *et al*., 2001). The selection of appropriate treatment depends on various factors such as; the type of fracture, availability of materials, and directives of the client (Farese *et al*., 2002).

However, after immobilization healing can be influenced by many factors such as biomechanical factors (postoperative fragment instability), bone physiology (metabolic factors, importance of fracture hematoma), and anatomical factors (the type of fracture and deficient vascularization with possible vascular variations) (Pan *et al*., 2019). External coaptation is an option for stable tibial fractures and is amenable to the closed reduction in skeletally immature animals. Although this has also been suggested for similar fractures in adult dogs and cats, rigid fixation via external fixator or internal fixation is preferable (Jeffrey *et al*., 2004). All fractures are not amenable to external coaptation; thus, it is often useful to consider several criteria. For instance, articular fractures and growth plate fractures are best managed with open reduction and internal fixation than external coaptation. In contrast to that, fractures distal to the elbow and stifle are most suitable for external coaptation (Grierson, 2009). The current case report was aimed to describe and document management of the tibial fracture by using external coaptation in a puppy.

Case history and clinical examination: A three-months-old local breed male puppy was brought to the VTH, CVMA of Addis Ababa University with a complaint of tibial fracture of the right hind limb following a car accident since four hours on admission. Upon presentation, the puppy was in a sternal recumbency because it felt to stand. Clinical examination revealed non-weight bearing (Figure 21A) and the affected limb was indicated by dark red skin and the area at the site of the fracture was swollen. Moreover, the puppy felt severe pain when the affected leg (tibial and fibular area) was palpated. Manipulation of the tibial and fibular area revealed abnormal movement with crepitus sound. The puppy was diagnosed with different clinical parameters like heart rate (120beats/minute) and respiration rate (40breath/minute) and the temperature (38.9°C), where apparently within normal physiological limits. Due to lack of radiographic examination, it was tentatively diagnosed as a mid-shaft fracture of the tibia and decided to be managed by external coaptation.

Preoperative and surgical site preparation: All the required materials such as sterile cotton, gauze bandage, Plaster of Paris, and bamboo splint were prepared from available areas. Dexamethasone Sodium Phosphate injection @2mg/kg and procaine penicillin (24mg/kg) and

dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) was administered IM before commencing the procedure to reduce swelling and infection respectively.

***Anesthesia and animal control*:** The dog was given the general anesthesia by using a combination of ketamine and diazepam @5mg/kg and @0.3mg respectively through IM. Then it was positioned in left lateral recumbency on the patient table elevating fractured limb by assistant on upward position.

Surgical procedure and treatment: Following restraining, the end of the fractures (proximal and distal shaft of the tibia) was manually reduced and immobilized with the cotton that was applied beginning at the toes and rolling proximally along the limb. Once it was applied to an appropriate thickness, cling gauze was placed over it and rolled. Then bamboo splint was evenly distributed over the cling gauze and an additional layer of cling is placed over the splint to hold it in place (Figure 21B). The final outer layer was applied to help protect the first 2 layers in a place and immobilize the limb using Plaster of Paris after immersed it in hot water (Figure 21C). In overall procedure, care was taken to avoid excessive tension on soft tissue. The cast padding layer wasn't too bulky because of the risk of motion (Figure 21D).

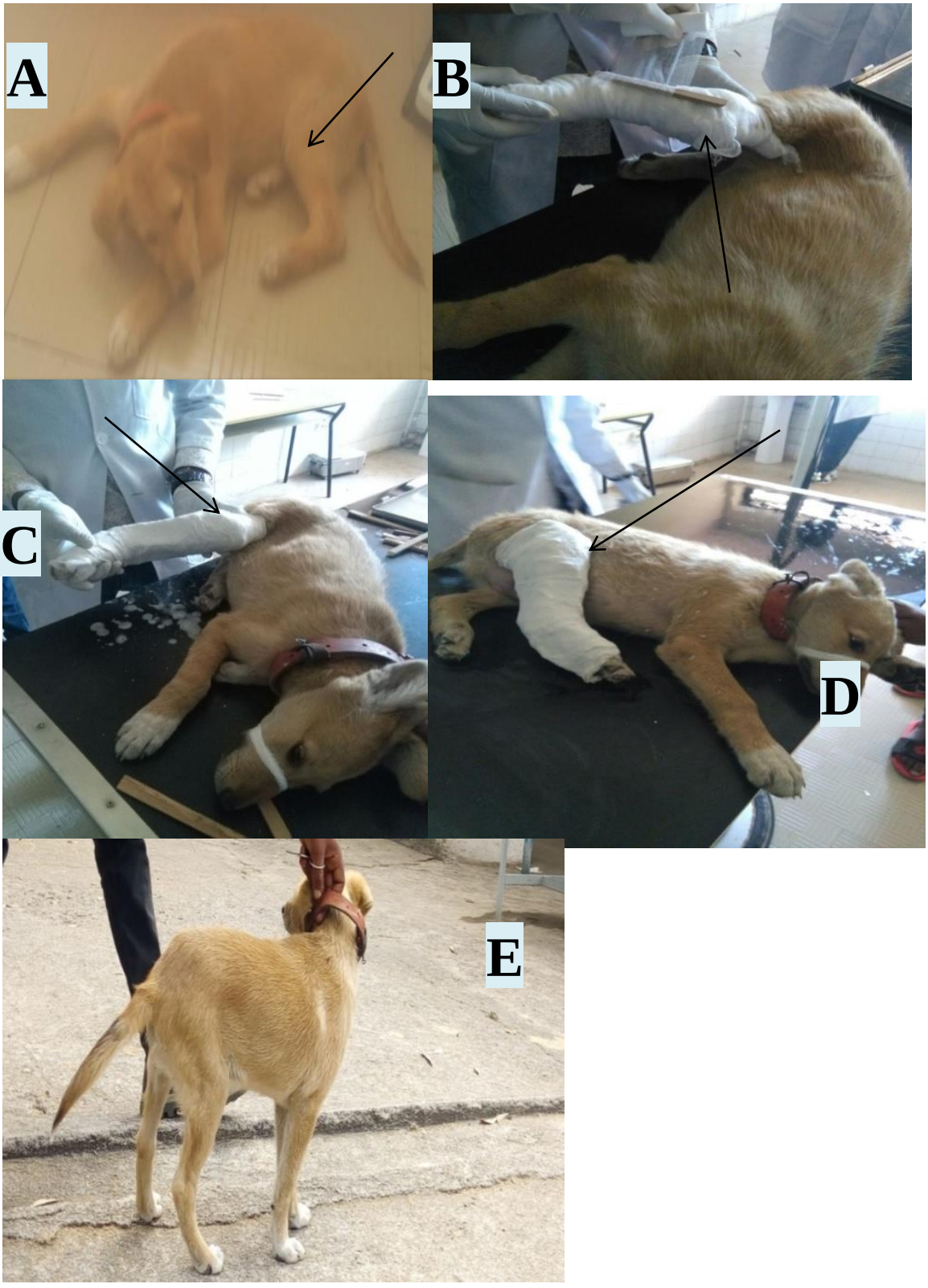

A
B
C
D
E

Figure 21: Management of the tibial fracture and its outcome in puppy

(A) A puppy presented with a tibial fracture; (B) 2nd layer gauze padding over the splint; (C) 3rd layer casted with plaster of paris; (D) At the end of the procedure; (E) Outcome after fifteen days of the procedure

Postoperative care and outcome: post-operatively, an antibiotic named procaine penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) and Dexamethasone Sodium Phosphate injection @2mg/kg for three days was administered IM. In addition, the owner of the animal was advised to keep a balanced ration and prevent further movements. Finally, the puppy was closely managed for any discomfort and completely repaired after fifteen days and all of the casting materials and splints were removed (Figure 21E).

Discussion

Bone fractures constitute a major problem in small animal practice (Gadallah *et al*., 2009). Currently, the incidence of fractures is increasing in dogs and cats. This might be due to the awareness of owners to available veterinary services and their interest to rear dogs and cats (Abd-El Raouf *et al.*, 2017). The femur, tibia, and fibula are the most frequently affected long bones of the hind limbs in small animals (Beale, 2004). This result agrees with the current case report of the tibial fracture in a puppy due to a car accident. This is also similar to the finding of the Guiot *et al*. (2012) that traffic accident is the most common cause of fractures in small animal. Car accident is not the only cause of fractures but also shot injuries and bone disorders, mostly due to primary or metastatic tumors with a consequent pathological fracture are also predisposing factors (Abd El Raouf *et al.*, 2017). Fractures of the tibia and fibula are the second in their incidence among long-bone fractures and represent 21% of fractures and 11.7% of appendicular skeleton fractures (Unger *et al*., 1990). Young animals are more susceptible to tibial and fibular fractures due to their tendency for vehicular trauma Johnson *et al*. (1994) supports this finding where tibial fractures occurred in young dog below one year of age. This might be attributed to the fact that the bone of younger animals is more fragile than mature ones (Tercanliogu and Sarierler, 2009).

To maximize the chance for complete healing, both the patient and fracture should be assessed before applying such a device. It is an acceptable technique of fracture repair for animals that are younger than 1 year of age. This is because younger animals generally heal at a faster rate (Oakley, 1999). Compatible with this finding, in current case, the age (3 months) of the puppy was adequately enough to apply this method, and the prognosis of healing was fast along with appropriate feeding and antibiotics and anti-pain administration. Although it can be a very useful technique to immobilize a fracture, using external coaptation, there are numerous complications. These complications usually occur because of improper case selection or application of the device. The most common complication associated with cast placement is non-union. It is extremely important to remember that the cast and splint must immobilize both the joint above and below the fracture (Tomlinson, 1991).

Plaster of Paris bandage is still the most common material used for immobilization of injured limbs. It is inexpensive and can be used with ease to produce a smooth, conforming, and safe cast (Merck, 2006). Generally, the case at hand was managed by external coaptation using locally available materials such as bamboo splint and cotton, gauze, and Plaster of Paris bandage under general anesthesia along with systemic antibiotic treatment and ant-pain injection. This was found to be effective and the puppy was completely healed after fifteen days.

3.10. Ingrown horn in cow

Abstract

An ingrown horn occurs when the tip or the side of the horn pierces, aggravates, or causes abrasion and injuring the animal's head region. For cattle, this can happen when their curled horns grow and press against the side of their face or begin to penetrate the skin, eyes, cheeks, or skull. Wounds from ingrown horns can become infected and swollen and cause significant pain to the animal. In addition to that, ingrown horns in cattle can predispose the animals to sudden horn fracture and avulsions. To overcome this tipping or trimming the curled part of the horn without penetrating the core is the best treatment option. This case report described curled horn

tipping on seven-year-old healthy crossbreed cow that was brought to VTH, CVMA of Addis Ababa University, with a history of ingrown horns in frontal areas of the cow. Upon presentation, small punctured wounds on the frontal areas were seen and the horn touches the skin bilaterally. Finally trimming procedure was commenced by using dehorning wire on a standing position after the animal was immobilized in an appropriate position through physical and chemical means. Postoperatively the cow was administered with systemic antibiotic by using penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) administered for two days.

Keywords: *Cow, Ingrown horn, trimming of horn*

Introduction

The horns of a cow are permanent and continue to grow during a cow's entire life (Knierim *et al*., 2015). It begins as buds within the skin of the poll. At approximately 2-months of age, the horn buds become attached to the periosteum of the frontal bone overlying the frontal sinus. As the horns grow, the cornual diverticulum of the caudal portion of the frontal sinus extends into the most proximal portion of the horn (FAW, 2018). The cornual nerve, a branch of the trigeminal nerve (cranial nerve V), provides sensation to the skin of the horn/horn bud region. Injection of a local anesthetic around the cornual nerve as it traverses the frontal crest and desensitizes the area (Hoffsis, 1995, Fish *et al.*, 2011). Even though the horns are tough and bonelike structures of the cattle they may be susceptible to extraordinary injuries and diseases like fracture, avulsion, cancers, overgrowth, and Suppurative Sinusitis which requires surgical treatments such as dehorning and disbudding, depending on the nature of the injury and age of the animals (Dugassa and Fromsa, 2019). Most of these affections do not respond to routine medical management and demand surgical manipulations of the horn (Sreenu and Kumar, 2006).

The overgrown/ ingrown horns were noted to cause varying degrees of damage ranging from simple discomfort to severe degree punctured wounds on the frontal, occipital, or cervical regions based on the shape of the horn and angle of curvature, and duration of contact. In some cases suppuration was also recorded as a complication of soft tissue damage due to the

overgrown horns (Rao *et al.*, 2016). This growth also can be toward the skull or eye. The growth of the horn toward the skull can lead to the penetration of the horn through the skull to the brain thereby causing a fracture to the skull and damage to the brain which can be detrimental to the health of the animal. On other hand, if the horns grow toward the eye, it can traumatize the eye (Sogebi *et al*., 2016). Dehorning or disbudding is the technique of removing or preventing the growth of the horns and horn producing tissues after the horns have formed from the bud by using different methods that could suit the size of the horn and the age of the animal for optimum effectiveness (Dugassa and Fromsa, 2019).

Dehorning involves the removal of the horn and horn-producing tissue in genetically horned breeds of cattle may be for safe handling, to reduce injury to other cattle, and to reduce subsequent carcass bruising that reduces meat quality (Espinoza *et al.,* 2013). Few studies also suggest that all three techniques of dehorning which include cautery, the use of caustic substances, and amputation, causes acute and chronic pain (Knierim *et al*., 2009). It is certainly one of the main zoo technical procedures inside the beef and dairy farm animals (Gottardo *et al*., 2011; Kupczyński *et al*., 2014). Therefore this case report describes surgical management of the ingrown horn in the mixed breed of the cow by using dehorning wire.

Case history and clinical examination: A seven-year-old healthy mixed breed cow was presented to VTH, CVMA of the Addis Ababa University, with a history of the ingrown horn in frontal areas of the cow. Upon presentation, small punctured wounds on the frontal areas were seen (Figure 22A) and the horn touches the skin bilaterally. Clinical examination was performed by taking all the body parameters including temperature, heart rate, and respiratory rate and all were within physiological limits. Following this, the tip of the horn decided to be managed by trimming using dehorning wire.

Anesthesia and animal control: The cow was properly restrained with a combination of physical and chemical methods. Physically, the cow was handled with a cow handle assisted by personnel and kept in the well-built crush which adequately restrains the cow. Chemically, the cow was regionally anesthetized with two percent lidocaine (2% lidocaine hydrochloride, jeil pharm. co. Ltd., Korea), loaded in a syringe with 18 gauge, 1-1.5 inch needle, 6 ml/side is injected halfway

between the lateral canthus of the orbit on upper third and base of the horn just under the shaft of the frontal crest to block the cornual nerve. The trimming procedure was performed on a standing position (Figure 22B).

Figure 22: Trimming of the ingrown horn in cow using dehorning wire

(A) Case presentation; (B) While cutting with dehorning wire (C) At the end of the procedure

Postoperative care and outcome: After procedure was a successfully finished, systemic antibiotic by using penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) administered for two days.

Discussion

Horn affections are very common in bovines because horns are their weapons and are used in defensive situations and competitive encounters at the feed bunk, hay bale, shade tree, water trough, over breeding privileges or dominance, and against man in offensive or protective situations (Hamdi *et al.,* 2013). In-growing horn can be defined as the inward growth of the horn toward the body (Graham, 2013). The diagnosis of this condition is by physical examination of the horn and detection of the horn's growth toward the skull or eye. It can be managed by dehorning through the use of embryotomy wire, dehorning knife, saw, and electric bone cutter (Sogebi *et al*., 2016).

According to a study conducted by Mahida *et al.* (2009), the highest overgrown horns/ ingrown horns are prone to avulsion of the horn and fracture. Trimming of overgrown/ ingrown horns was done at a point just above the junction of the upper and middle third using a hack saw without reaching the core. This was followed by treatment of the damaged soft tissues with routine antiseptic dressing using povidone-iodine (Rao *et al.*, 2016). In agreement with this study, the case at hand was managed at a point just above the junction upper and middle third using dehorning wire without reaching the core. This was also early described by Sreenu and Kumar, (2006) suggested sawing the curved portion of the horn without touching the corium is an effective treatment option. However, the problem with horn tipping/trimming is its recurrence due to the regrowth of the horn tip.

3.11. Surgical Sterilization and Its Outcome in Bitch

Abstract

Surgical sterilization is one of the most routine procedure of removing both the ovaries and uterus or ovaries alone in small animals. This case report describes surgical procedure of ovariohysterectomy on one-year-old intact local breed bitch that was presented to VTH, CVMA of the Addis Ababa University for surgical sterilization. The owner requested to permanently sterilize the bitch since he didn't want any more puppies. Before commencing the surgical procedure, the bitch was clinically evaluated and the owner was asked for any sign of estrus. Fortunately, the vital body parameters were within the normal physiologic limit. Thence surgical site was aseptically prepared by clipping, shaving the hair from the surgical site, and cleaning the surgical field with a chlorhexidine surgical scrub solution starting (ventral abdomen starting from xiphoid to the pubis). A caudal midline incision was used to access and exteriorize the reproductive tracts. Finally, after ovariohysterectomy, the abdominal wall was closed layer by layer using appropriate suture materials and patterns. As a postoperative care, the Elizabethan collar was applied and postoperative systemic antibiotics using penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) and Diclofenac Sodium @2.5mg/kg IM followed by wound dressing resulted in fast wound healing without apparent complications.

Keywords: *Bitch, Caudal Midline, Estrus, Ovariohysterectomy*

Introduction

Elective surgical sterilization is one of the most common and routine procedure performed in veterinary surgical practice particularly in small animals. However, it requires surgical skills, experience, and the use of appropriate anesthetic drugs (Bedoor *et al.*, 2014). It entails surgical removal of the reproductive organs. In females, there are two ovaries and uterus that has to be removed, and the procedure is called an ovariohysterectomy (Bender, 2012). The potential benefit of surgical sterilization is to control stray dog populations as free-ranging dogs and rabies

transmission are integrally linked, and large, unmanaged dog populations can be daunting to rabies control programs (Airikkala *et al*., 2018). This is because; surgically sterilized animals cannot able to pass through heat cycles (White, 2012). In addition to this, it prevent reproductive disorders such as pyometra, mammary gland tumors, and ovarian cancer and pregnancy toxemia, metabolic disease, and dystocia (Kustritz, 2007; McKenzie, 2010; Belanger *et al.*, 2017). Besides, numerous studies have been evaluated the correlation of behavior with ovariohysterectomy and have shown reduced aggression, roaming, and urine marking (Casey *et al.*, 2014). Moreover, ovariohysterectomized dogs have been shown to have a lifespan increased by 26.3% compared to intact bitches (Hoffman *et al.*, 2013).

Complications associated with ovariohysterectomy in healthy dogs and cats have been reported to range from 6.2% to 20.6%, but it depends on factors like the experience of the surgeon (Pollari *et al*., 1996; Burrow *et al*., 2005). Most complications are mild and generally consist of incisional inflammation or gastrointestinal tract upset. Incisional complications are more common in larger animals and animals with longer surgery and anesthesia times (Burrow *et al.*, 2005). Ovariohysterectomy in dogs can be performed using either ventral midline or flank approaches (Taylor *et al*., 2017). Ovariectomy is also an effective surgical technique for elective sterilization of female dogs without recognized disadvantages (Goethem *et al*., 2005). Procedures, ovariohysterectomy and ovariectomy may involve similar surgical techniques, except that the skin and fascia incisions are considerably smaller and located more cranially with latter, compared with the former one (Peeters and Kirpensteijn, 2011). Therefore, current case report describes surgical procedure of ovariohysterectomy and its outcome in bitch.

Case history and clinical examination: A 19kg, one-year-old intact local breed bitch was brought to VTH, CVMA of the Addis Ababa University for surgical sterilization. The owner wanted no more puppies from the bitch and decided to permanently sterilize it. Before performing surgical sterilization, the animal was evaluated for disorders if any. Consequently, the owner was subjectively asked for any sign of the heat and claimed that it wasn't showing any sign. Accordingly, all physical parameters such as respiratory rate, heart rate, and pulse rate were within normal physiological limits. In addition, the body temperature and mucous membrane

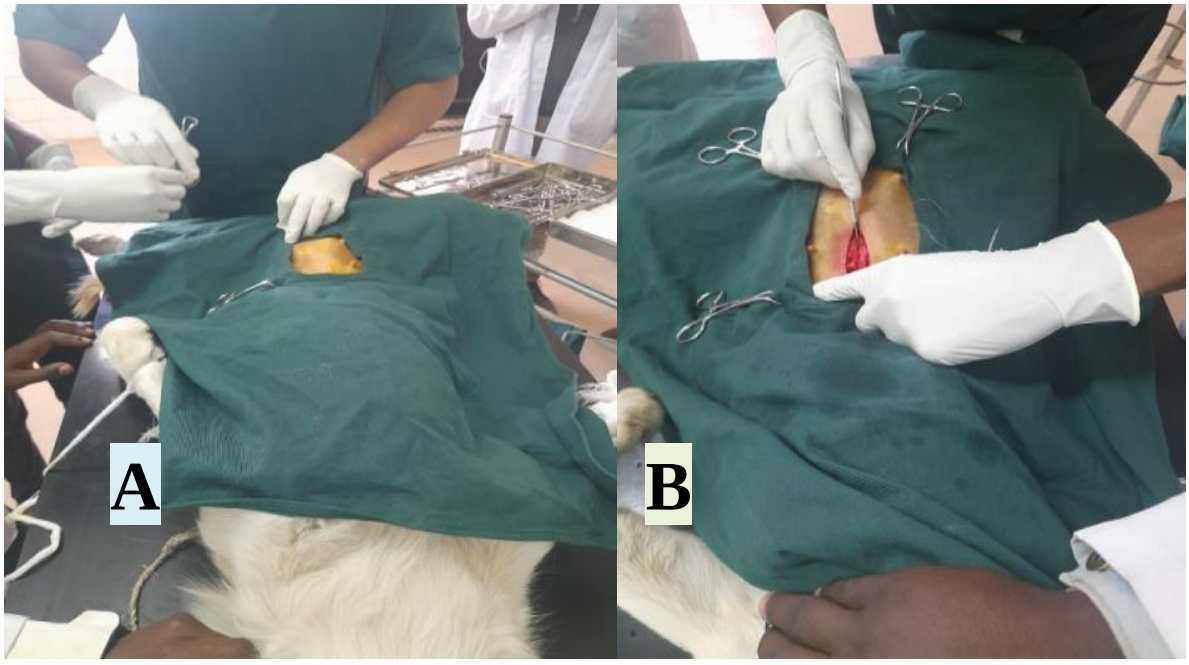
examined; were normal and the dog was found apparently healthy enough to undergo ovariohysterectomy.

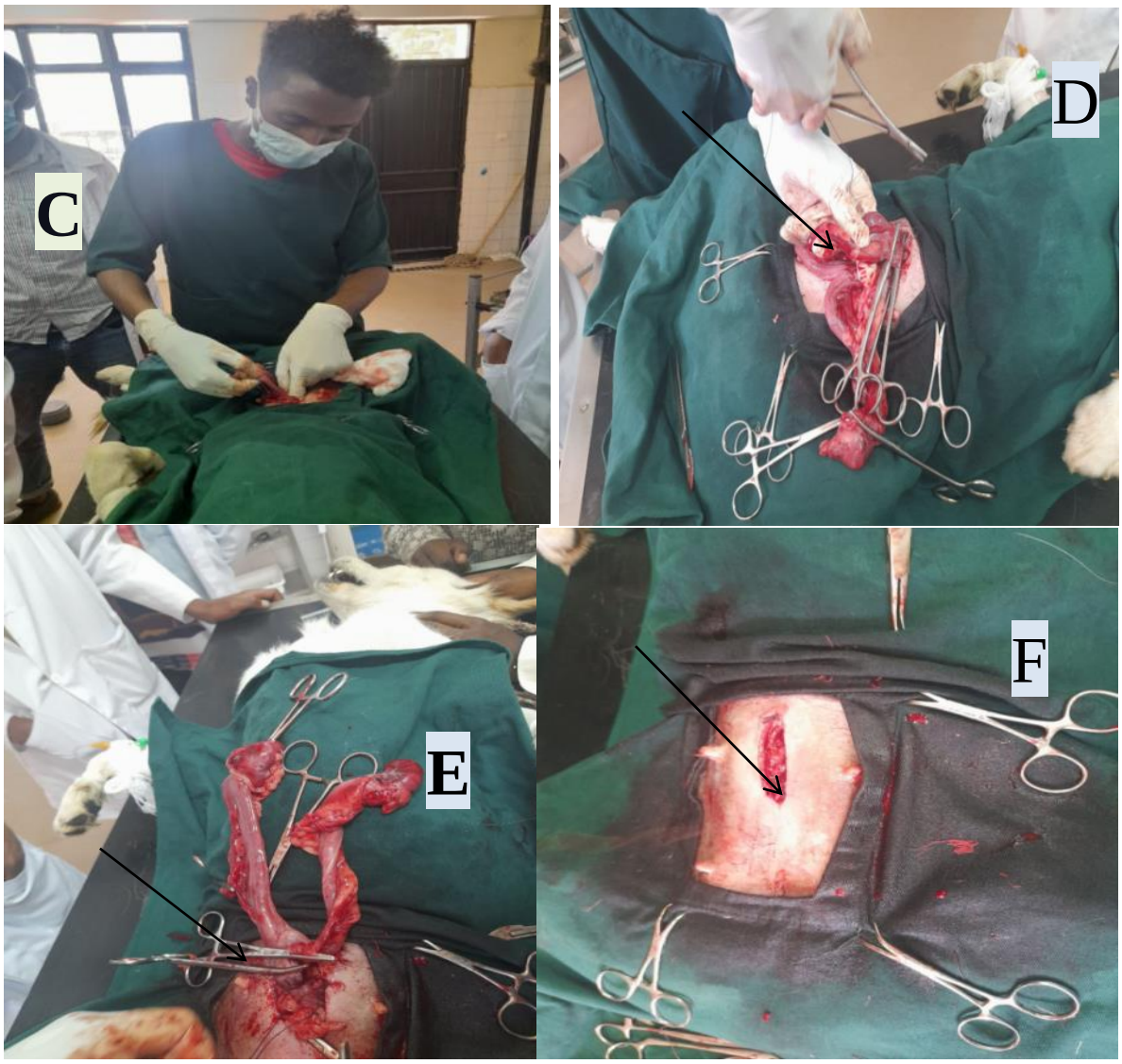
Preoperative and surgical site preparation: Before surgery, the bitch was withheld from feed and water for 12 and 6hrs respectively based on appointment. Then after sedating and inducing, the bitch was prepared for surgery by clipping, shaving the hair from the surgical site, and cleaning the surgical field with a chlorhexidine surgical scrub solution. Thence, a sterile drape was fixed with towel clamps and sterile surgical gloves were worn and the standard aseptic principle was followed in all surgical steps, including surgical scrubbing of hands with an iodine-based scrub solution and aseptic handling of instruments (Figure 23A).

Anesthesia and animal control: Before commencing the procedure the bitch was administered premedication and induction agents with appropriate anesthetic drugs. As a premedication, ketamine (Ketamine Hydrochloride manufactured by Germany) @5mg/kg IM and Tramadol (Tramadol hydrochloride manufactured by Sakar Health care Pvt. Ltd, Gujarat, India) @ 2 mg/kg IV) was administered based on an estimated weight. Following sedation, an intravenous catheter was placed. Intravenous fluids (0.9% lactated ringers solution) was administered at @10 ml/ kg/hr throughout the surgery. Thence the bitch was induced with a combination of ketamine @2.5mg/kg and diazepam @ 3 mg/kg IV. Thence, the bitch was taken onto the patient table and kept in dorsal recumbence by stabilizing and tying each limb. Maintenance of the anesthesia throughout the procedure was achieved with a propofol (Aulife health care Pvt.ltd, Gujarat India) bolus @4mg/kg IV every 6–10 min to effect.

Surgical procedure and treatment: *A* sterile drape with central fenestration was put and fixed to the surgical site by towel claps after positioning, stabilizing, and aseptically preparing the incision site. The midline incision was made in the cranial third of the caudal midline (Figure 24B), for easy exteriorization of the ovaries. Then incision was made through the three layers (skin, linea alba, and peritoneum) using a surgical blade to expose the abdominal contents. After incising skin and fascia, the subcutaneous fat was removed to visualize the line alba on the ventral midline and to put the incision over it. After picking up the loose fascia and fat that covers the external rectus sheath with brown Adison forceps and extended with Metzenbaum

scissor, linea alba was exposed. This was grasped with rat-toothed forceps and tented up and a stab incision was made on it using a scalpel blade with the sharp edge facing up to avoid any possible trauma to the underlying abdominal organs. Then the incision was lengthened using mayo scissors with the jaws of a curved haemostatic forceps inserted through the stab incision to keep the linea alba tented up and the stab incision remains open to facilitate lengthening of the incision. After around a 6-8 cm long incision was made on the caudal ventral abdominal midline, the uterine horn was located by means of an index finger from the left part first. After exteriorizing the left uterine horn, on haemostatic clamp was applied to the proper ligament and the ovary was held between the fingers to retract it while the suspensor ligament is stretched with an index finger or broken held between the index finger and the thumb (Figure 23C). After the ovary was sufficiently exteriorized to the abdominal incision, a window was made in the mesovarium caudal to the ovarian vessels and three haemostatic clamps were applied on the ovarian pedicle (Figure 23D).




C
D
E
F

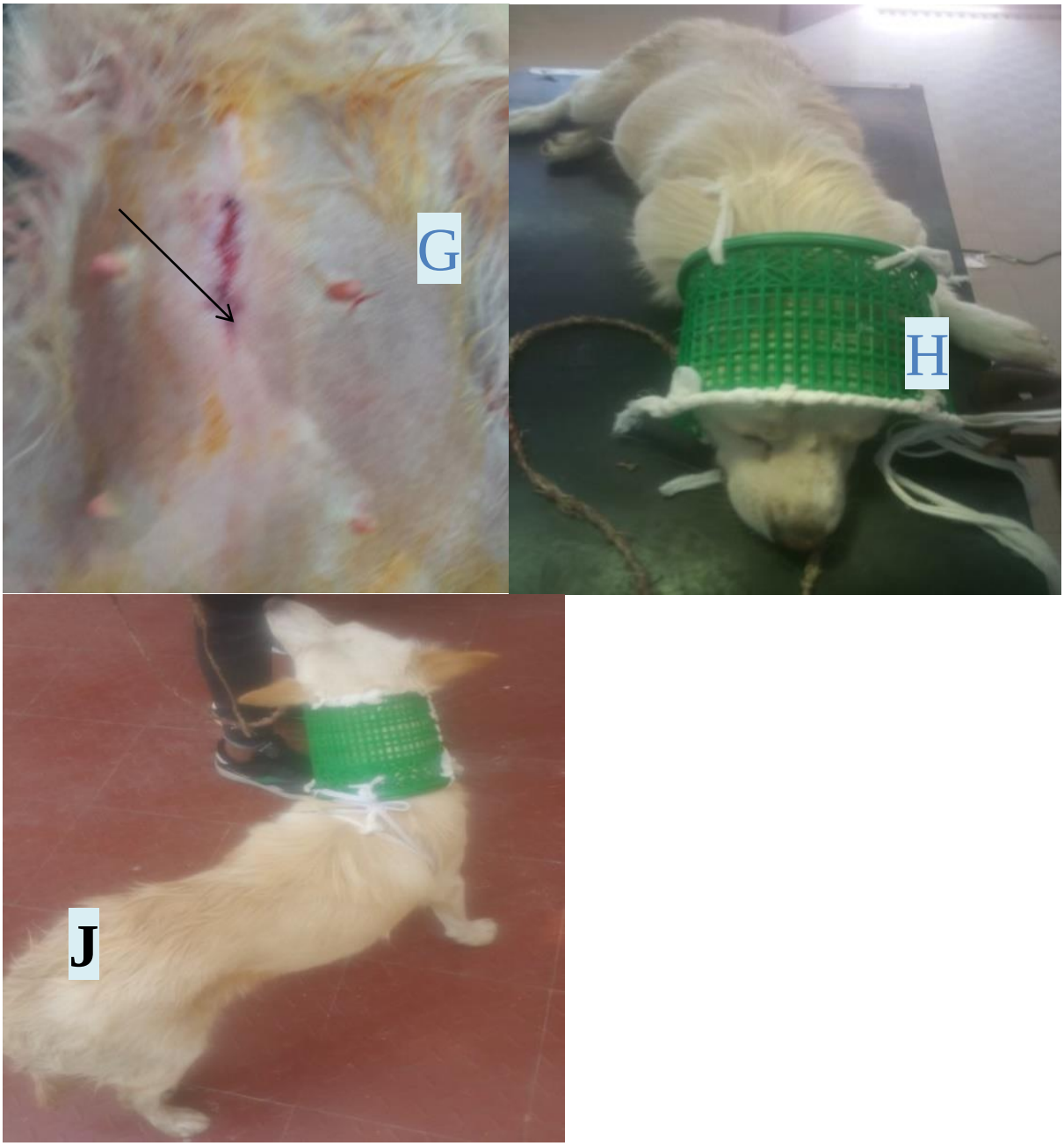


Figure 23: Surgical preparation and its progression in ovariohysterectomy of bitch

(A) Preparation of incision site; (B) Incision in progress; (C,D,E) Exteriorization of ovarian bursa and putting clamps; (F) Closure of subcutaneous in progress (G) Scrubbing of the

incision site after closure; (H) Putting the Elizabethan collar as postoperative care; (J) At 10^{th} day of post operation

Then circumferential ligature was made distal to the third haemostat farthest away from the ovary and the jaws of the middle haemostatic forceps was opened and a second trans-fixation ligature was placed in the place where the hemostat crushed the pedicle and the jaws of middle clamp closed again. Then the pedicle was cut between the clamp closest to the ovary and the middle clamp. The clamp applied distally from the ovary, and removed as to place the ligature on the groove of pedicle. The pedicle was ligated by vicryl size 2-0. After the ovarian pedicle was carefully evaluated for bleeding, it was gently replaced back into the abdomen. The same procedure was repeated on the opposite ovarian pedicle. After both ovarian pedicles are ligated, the broad ligament was torn to allow uterine exteriorization. Similarly, three clamps were placed on the uterine body just cranial to the cervix before ligation (Figure 23E).

The uterine arteries located in each side of the uterine body were individually ligated caudal to the most caudal clamp before severing the uterine body. Thence, the middle clamp was removed and the uterus was ligated in the groove that remains. The uterine body was severed between the proximal and middle clamps. Then inspected for bleeding and gently replaced into the abdomen. During closure at the end of both surgeries the abdominal incision was stitched up routinely in three layers. Peritoneum and body wall was sutured as first layer from the bottom with simple interrupted pattern by using the Vicryl 1-0 (Figure 23F). In the second layer the subcutaneous tissues was sutured with simple continuous by using the vicryl 2-0. Finally the skin was sutured with subcuticular suture pattern by using vicryl 2.0 and finally the area was scrubbed with diluted iodine solution before the patient was raised from surgical table (Figure 2FG).

Postoperative care and outcome: After surgery was successfully completed, systemic antibiotic was given using penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) and was continued for three more days. After preparing Elizabethan collar from locally available materials it was immediately applied at the end of the procedure. In addition, lavaging of the wound once daily with saline solution and mild antiseptics was performed for three consecutive days. The owner was also advised to subjectively assess pain,

inflammation at the surgical site, defecation and urination behaviors and to restrict more exercise. Finally, incision wound was successfully healed without apparent complications (Figure 23J) at 10^{th} day of post operation.

Discussion

Ovariohysterectomy is the method of choice for sterilization in the bitch (Jason, 2009; David, 2010). It can be performed both as an elective and therapeutic surgical procedure to prevent breeding and treat a number of female reproductive disorders respectively (Kim *et al.,* 2008; Kristiansen *et al.,* 2013). It is considered as a routine abdominal surgery and the best age for bitch is before puberty (Bedoor *et al.,* 2014). The two approaches that mainly used for the procedure are the flank and caudal midline. The latter approach was the main route selected for ovariohysterectomy over former by some authors and supported and used as best techniques (Hedlund 2002; Stone, 2003; Devitt *et al.,* 2005). The flank approach is less preferred because of difficulty to exteriorize the entire uterine body, a dropped ovarian pedicle that may pose difficulty to recover, and that it may be difficult to expose the opposite ovary and uterine bifurcation. However, it depends on various factors including the experience of the surgeon have on the procedure. Although, this procedure cannot provide sufficient evidence to prefer caudal midline approach as better technique over the flank technique, it is logically sound to assert that caudal midline approach is better to get access to both ovaries for ease of removal. Thus, caudal midline approach is recommended first choice especially for surgeons with less experience (Djemil *et al.,* 2010).

Numerous advantages of the spaying of the female dogs has been known including; prevention of mammary cancer, unwanted kittens which are euthanized in shelters, and prevention of sexually transmitted diseases, pregnancy toxaemia, metabolic disease, dystocia, and noisy heat cycles (Kustritz, 2007; McKenzie, 2010; Omeran *et al.,* 2014). In spite of the benefits of ovariohysterectomy in dogs, it has been reported to increase the risk of occurrence of tumours such as transitional cell carcinoma, osteosarcoma and hemangiosarcoma Kustritz, (2007) as well as increase the risk of occurrence of orthopaedic disorders such as hip dysplasia and cranial cruciate ligament rupture (Hart *et al.,* 2014). Other complications of ovariohysterectomy include

obesity, urinary tract disorders, diabetes mellitus and hypothyroidism (Angioletti *et al.,* 2004; Lund *et al.,* 2006).

The current case was performed after puberty but during anoestrus period. This surgical procedure was performed using injectable anaesthetic protocol with premedication, induction and maintenance for general anesthesia similar with surgical procedures done in small animals under general anesthesia (Spain, *et al.,* 2004). In this case report, the removal of the ovaries and uterus was performed through caudal midline incision and three points of attachment of the uterus and ovaries were double ligated and transected, whereas, the abdomen is typically closed in 3 layers as performed by (Djemil *et al.,* 2010). While entering to the abdominal cavity, rat-tooth forceps was used to grasp the linealba in the middle and tented up before being incised with a pair of scissors. The peritoneum was then punctured using a cannula that is slid towards the umbilicus to enable incision of the linealba without damaging the abdominal contents, with the cutting edge of the blade turned uppermost. The same procedure is then performed in the opposite direction towards the pubis. To locate the genital apparatus with ease, the bladder was retracted laterally so that cranial to the bladder, the body of the uterus and bifurcations of the horns were easily accessed. One of the horns is then followed cranially up to the ovary, which is hidden in the fat-filled ovarian bursa. These surgical techniques were again used by many authors such as (Devitt *et al.,* 2005; Fontbonne, *et al.,* 2007). In conclusion this surgical case report strongly recommends the caudal midline incision under general anesthesia and aseptic procedure for well recovery and positive outcome of the surgical activity.

3.12. Surgical Management of Dystocia in Animals

3.12.1. Caesarean section in the queen

Abstract

Uterine inertia is lack of uterine wall contraction during labor due to various factors. A case of uterine inertia with a dead fetus in the uterus was presented to VTH, CVMA of the Addis Ababa University following delayed in labor for about one day. On clinical examination a queen exhibited 142beats/minute, 42breaths/minute, and 37.8°C body parameters such as heart rate, respiratory rate and temperature respectively with little variation from the normal. Per-vaginal palpation of the fetus revealed the presence of an emphysematous dead fetus. For having a dead emphysematous fetus that requires manual assistance after it was tried, an emergency caesarean section was performed under general anesthesia. Thus, after aseptically preparing the caudal midline, an incision was made to exteriorize the fetus. After removal of the dead fetuses the uterus and all abdominal layers were closed routinely with appropriate suture patterns and materials. However, postoperative information wasn't taken due to lack of phone calls from the owner.

***Keywords**: Cesarean Section, Dystocia, Queen, Uterine inertia*

Introduction

Dystocia is difficulty in the expelling of the fetus through the birth canal at the time (6-12 hours) of labor (Dar *et al*., 2015). The cause of dystocia may be maternal or fetal and occasionally, combination between them (Stedile *et al*., 2011). The major factor related to the dam is manifested by uterine inertia and this can be classified as either primary or secondary; which means a condition in which the uterine muscles do not contract, or are fatigued during labor from tenacious straining beside an obstruction within the birth canal respectively (Talukder *et al*., 2021). The other dam-related cause may be partial or incomplete dilation of the cervix (Jakson,

2004). On the other hand, fetal factors include fetal monsters, oversized fetuses about the maternal pelvis, malposition or malposture, and fetal death (Li *et al*., 2021).

In queen, the average gestation period is (63 to 65) days (Root, 2006). During parturition, the first stage of labor is characterized by clear vulvovaginal discharge, vocalization, tachypnea, pacing in circles, rearranging of bedding, and washing constantly. The second stage involves lying by side as contractions become more vigorous, lowering of hindquarters in a semi- squatting position, standing on phalanges with the calcaneus bones pointed almost straight up and wide apart; the entry of the fetus into the pelvic canal is signaled with groaning or crying of the queen (Stedile *et al*., 2011). The first kitten should appear within 60 minutes of the onset of the second stage. Queening is usually completed in 2 to 6 hours. However, it may take 10 to 12 hours in older queen (Von and Cariou, 2009). The incidence of dystocia in bitch and queen are relatively low but it may constitute life-threatening level if encountered (Rothman, 2012).

Dystocia should be effectively diagnosed and treated depending on accurate history from client and clinical findings (Linde-Forsberg, 2005; Trass 2008). Medically it may be treated using oxytocin and calcium with manual manipulation (Pretzer, 2008). The cesarean section must be performed as soon as feasible as another way of treating dystocia fails to manage it (Olivira, 2016). In the present case report, surgical management of dystocia due to primary uterine inertia in a local breed queen was described.

Case history and clinical examination: A one-year-old local breed queen was brought to VTH, CVMA of the Addis Ababa University with a history of lack of ability to deliver the left fetuses vaginally. On clinical examination a queen exhibited 142beats/minute, 42breaths/minute, and 37.8°C body parameters such as heart rate, respiratory rate and temperature respectively with little variation from normal. On per vaginal examination, the birth canal was found moist with a bad odor and discharge. The patient was in sternal recumbence with no sign of labor. Besides, external palpation of the abdomen revealed a hard mass presenting in the abdomen. Finally, based on history and clinical findings the case was diagnosed as dystocia as a result of uterine inertia. The emergency surgery through cesarean section was decided to be performed under general anesthesia with taking utmost care not to spare the life of the dam.

Preoperative and surgical site preparation: Before the queen had undergone surgery, Penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) was administered IM. The ventral abdomen was aseptically prepared through hair clipping, shaving, and scrubbing using sterile gauze, and diluted antiseptics after sedation. Shaving of the hair was done gently, parallel to the skin, and then the skin was scrubbed with diluted chlorhexidine solution. Finally, the incision area was scrubbed again with iodine solution (Figure 24A).

Anesthesia and animal control: Atropine sulphate @ 0.04mg/kg was administered intramuscularly as premedicant and, general anesthesia was achieved by intravenous administration of a mixture of Diazepam (manufactured by Intas pharmaceutical Ltd., India) @0.15mg/kg and ketamine (Ketamine Hydrochloride manufactured in Germany) @5mg/kg I.V respectively. Then the patient was kept in dorsal recumbence with the limbs tied to patient table to help stabilization.

Surgical procedure and treatment: Caudal ventral midline incision was made and the skin, subcutaneous tissue, and linealba were incised one by one caudal to the umbilicus to exteriorize the uterus. The abdominal cavity was cautiously entered, the gravid uterus was exteriorized and the remaining abdominal organs were packed of with sterile gauze to prevent peritoneal contamination (Figure 24B). A stab incision was made on the uterus with scalpel blade on the ventral midline of uterine body on avascular area (Figure 24C) and the incision was extended with metzenbam scissors to sufficient length for easy removal of dead fetus. Then the dead fetus was moved to incision site by gently pushing and squeezing the uterine horn. Then the placenta was removed by gently pulling from the endometrium. The dead neonate was removed from the surgical field. Before closing the incised uterus, the uterine content was checked to level of ovary for left fetus if any. Then the uterus was sutured with chromic cat gut 3-0 size using Cushing fashion in two layers of inversion.

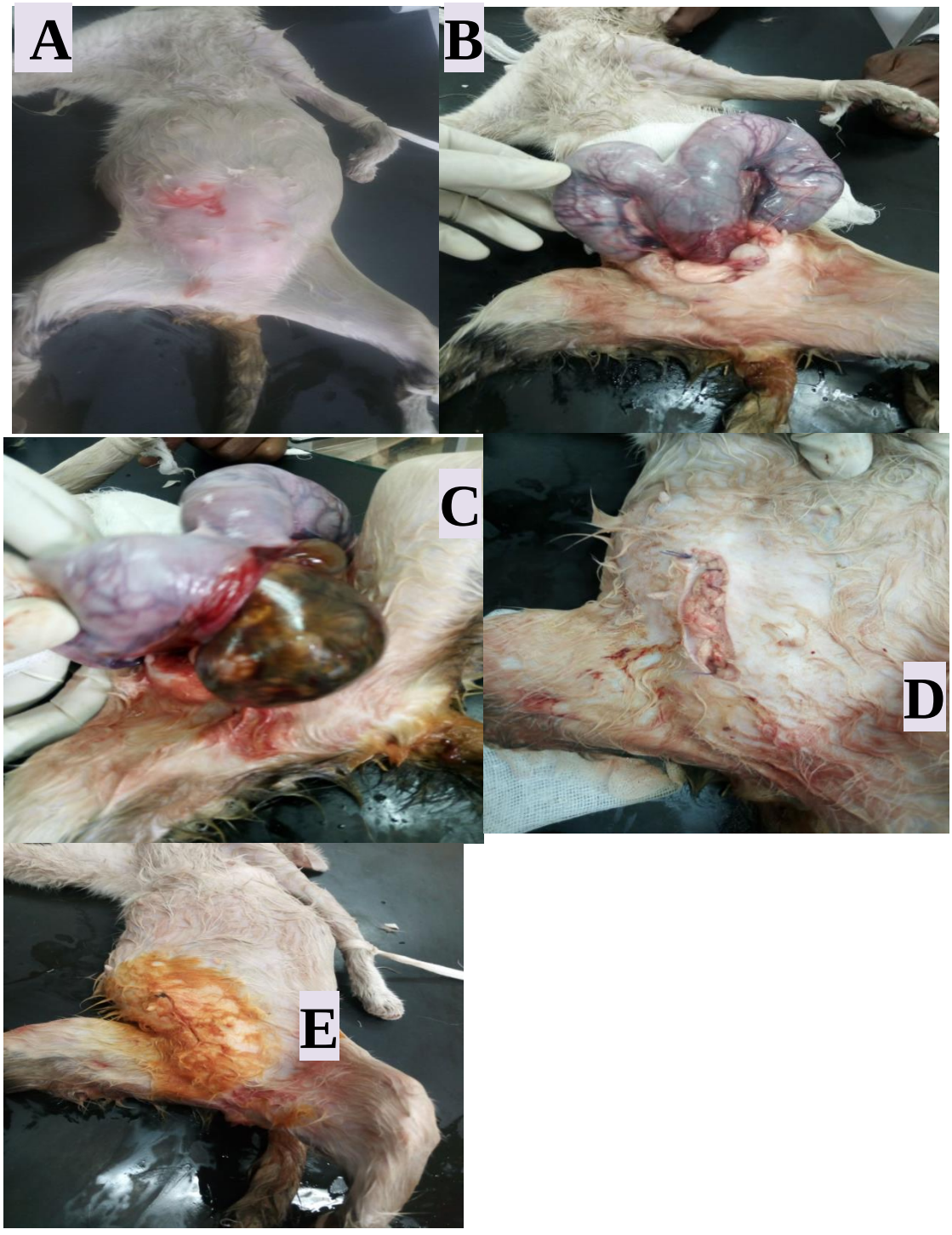


Figure 24: Caesarean section on progression in queen

A) Preparation of surgical site; B) Intra-operative image of exteriorized gravid uterine horn; C) Incising the gravid uterus at the ventral midline of uterine body on avascular area; D) Closure of abdominal wall on progress; E) Skin closure with subcuticular suture pattern.

Then uterus was checked for bleeding and lavaged with warm normal saline solution prior returning it to the abdominal cavity. The laparotomy site was closed routinely in three layers. As a first layer linealba and peritoneal fascia were sutured together with simple interrupted pattern by using polyglycolic acid 910 (vicryl) 2-0 sizes. The subcutaneous tissue was sutured in simple continuous (Figure 24D) and skin was sutured using subcuticular pattern by using polyglycolic acid 910 (vicryl) 2-0 (Figure 24E). After the complete closure, the incision site was scrubbed with diluted iodine solution.

Postoperative care and outcome: As a postoperative care, Penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) and Diclofenac sodium @2mg/kg IM was administered for one day. The owner was also advised to keep Elizabethan collar and follow the animal for any complication as well as sign of discomfort. However due to inconvenience of the owner to brought or gave further information and lack of response to phone call, a patient status wasn't traced.

Discussion

Dystocia should be suspected if a fetus is lodged in the birth canal with prolonged gestation (>70 days) and the animal's body temperature dropped to <37·8°C without evidence of labor (German, 2006). Another clinical sign may include observation of a green vaginal discharge, strong and persistent contractions fail to deliver within 30 minutes or weak and infrequent contractions fail to produce a fetus within four hours. The animal appears to be in severe discomfort (Heimendahl and Cariou, 2009). Both the maternal and fetal causes of dystocia have been described; however, the maternal causes appear to be more common. From them, uterine inertia constitutes the biggest maternal cause of dystocia in cats and dogs while mal-presentations are the most common fetal causes (Holst *et al*., 2017). During the case management, the queen was premedicated with atropine sulfate to reduce bronchial secretion and

GIT motility. This is also similar to the principle and anesthetic protocol, stated by (Kennedy and Miller, 2007) in which it is normally recommended to decrease maternal stress and anxiety in addition to decreasing the doses of induction and maintenance of anesthetic agents. In the present case, the dead fetus was expelled from the uterus through emergency caesarean section. The main reason for the lack of expulsion of dead fetuses in the present case may be due to primary uterine inertia which is common in canine and feline species (Romagnoly *et al.*, 2004). Even though the case was managed successfully, the status of patient wasn't traced through follow-up due to inconvenience of the owner to bring or lack of response to phone call.

3.12.2. Cesarean section in doe

Abstract

Cesarean section is a life-saving surgical procedure usually undertaken in small ruminants that fail to deliver vaginally. This case report describes management of the dystocia through cesarean section in a four-years-old local breed doe that was presented to the VTH, CVMA of the Addis Ababa University following fail to deliver vaginally. The history stipulated that the doe had given two more birth and no history of dystocia had been encountered before. Upon presentation, the doe was laid to the ground and continuously straining but failed to expel the fetus and recumbent soon later for hours. On clinical examination, body parameters were in normal physiological limit but rectal temperature was dropped to 37.5°C. Based on the history and rigorous clinical findings, the case was diagnosed as dystocia due to the fetal-maternal disproportion. Finally an emergency surgical manipulation by a cesarean section was performed using left paralumbar laparotomy under inverted L-block local anesthesia and resuscitative measures. The procedure was strictly aseptic and care was taken not to spare the life of the dam and fetus. Finally, the two live fetuses were delivered through incision. Then uterus and all layers of abdominal muscles were closed routinely layer by layer with appropriate suture and pattern. As postoperative care systemic antibiotics and ant-pain was given along with regular wound dressing. Despite the effort made to save a life, the doe died, after a week of surgery. It might be due to extreme myopathy and other complications such as surgical stress combined with the

failure of ingestion of feed. Besides, the owner informed as the doe noticed clinical signs of diarrhea.

Keywords: *Cesarean section, Doe, Dystocia, Labor*

Introduction

Parturition may involve three main stages including cervical dilation, the expulsion of the fetus and fetal membranes. These stages are synergized with one stage successively progressing into the next. The time-lapse between two successive stages and associated parturient events are the two major factors transforming eutochia into dystocia (Noakes *et al*., 2009). Dystocia is one of the most contributory factors in peri-natal death of dam and fetus in small ruminants and result in economic loss to farmers (Ali, 2011). The cause of the dystocia may be either maternal or fetal origin but sometimes both contributed together (Bhattacharyya *et al*., 2015). The maternal factors include immature heifers, pelvic deformities, failure of cervical dilation, uterine torsion, uterine tear, hydrops, and prepartum paralysis (Asrat and Melkamu, 2015). On the other hand, fetal factors include normal and pathologic conditions. The former conditions may include absolute fetal-oversize and mal-positions while the latter including fetal anasarca, schistosomus reflexus, hydrocephalus, conjoined twins, emphysematous, mummification, and prolonged gestation (Newman, 2008).

In sheep and goat dystocia encounter due to fetal-maternal disproportion, multiple fetuses within the pelvic canal, fetal mal-positioning, and incomplete dilation of the cervix, and uterine inertia (Reddy *et al*., 2016; Dalal and Gyan, 2017). Prolonged duration of dystocia may spare the life of a dam or calf. Emergency cesarean section may save the life of both the dam and calf (Wilson *et al.*, 2006). The dam survival rate may vary from 36% to 100% has been recorded following cesarean section in dystocia-affected cows. However, it depends on duration and the performance of the surgeon and these are essential determinants of the outcome. Thus, dam survival rates may be high from 64.7% to 100.0% when the operation is performed within 24-36hrs of dystocia onset whereas survivability may decrease to 25%-33.0% when the operation was performed after 72hrs (Purohit *et al*., 2013).

Cesarean section is also called laparohysterotomy, meaning the manipulation of the fetus or foeti from the dam, through a surgical opening in abdominal wall and the uterus (Schultz *et al.*, 2008). Numerous surgical approaches are available and practiced in bovine dystocia including; recumbent or standing left paralumbar laparotomy, recumbent or standing right paralumbar laparotomy, recumbent ventral midline laparotomy; recumbent ventral paramedian laparotomy, ventrolateral laparotomy, and the recumbant left oblique laparotomy. Each of these approaches varies greatly and has its advantages and disadvantages (Sood *et al*., 2011). Choice of an appropriate approach for cesarean section depends on the species of animals, the skill of the surgeon, and other factors such as the type of dystocia, the animal's condition, the environmental conditions and the availability of assistance during surgery (Dhindsa *et al.*, 2010). Thus, it is worthwhile to select a suitable site for operation and most often the left paralumbar fossa approach is favored by most veterinarians (Vermunt, 2008). In this case report dystocia in the doe was managed through cesarean section by using the left paralumbar fossa approach under inverted L-block anesthesia.

Case history and clinical examination: A four-years-old local breed doe was presented to the VTH, CVMA of the Addis Ababa University following fail to deliver vaginally since 16hrs of the labor. The history stipulated that the doe had given two more birth and no history of dystocia had been encountered before. Upon presentation, the doe was laid to the ground and continuously straining but failed to expel the fetus and recumbent soon later for hours. On clinical examination, all body parameters were in normal physiological limit except rectal temperature dropped to 37.5°C. Close observation of the patient revealed the presence of the vaginal discharge without expulsion of part of the fetus. Based on the history and clinical examination the case was diagnosis as dystocia due to fetal-maternal disproportion. Finally, it was decided to be managed by emergency cesarean section through left paralumbar laparotomy under inverted L-block fashion.

***Preoperative and surgical site preparation*:** The doe was restrained adequately and the skin surface on the left paralumbar fossa was prepared aseptically by washing with water, soap, and Salvon® (Cetrimide 3% and Chlorhexidine gluconate 0.5% solution). Then the hair was first clipped with sharp scissors and shaved with a blade and cleaned thoroughly with a standard

solution of Savlon®. Finally, the area was scrubbed three times with tincture iodine 2% solution to decrease the microbial load in the area and left dried till readying for cesarean section (Figure 25A). The sterile surgical drape was fixed with multiple towel clamps before incision of the skin.

Anesthesia and animal control: The doe was properly restrained with the combination of physical and chemical methods. The doe was tightening both hind and forelimb on the patient table to adequately restrain it in the right lateral recumbent position. Then an inverted-L block local anesthesia (total of around 30 mL 2% lidocaine hydrochloride) was used.

Surgical procedure and treatment: After aseptic preparation and control of the animal in an appropriate position a skin incision, approximately 15 cm in length and running vertically was made in the mid paralumbar fossa using a sterile surgical blade followed by opening of the abdominal wall layer by layer in a critical manner. Then after opening the abdominal wall the gravid horn was exteriorized using fetal extremities (Figure 25B). Care was taken to prevent uterine wall rupture and spillage of contaminated fetal fluid into the abdominal cavity. The uterine wall was incised along the greater curvature of a pregnant horn, avoiding placentomes. The fetuses were gently pulled out of the uterus by grabbing the hind legs with intact umbilical cord as recommended by (Hussain and Zaid, 2010) (Figure 25C). In addition, bleeding during the procedure was managed by applying sterile gauze and using different straight and curved hemostatic forceps. The two live fetuses were detached from the umbilical cord and nostrils were cleared from the fluid to facilitate proper respiration (Figure 25D). The uterus is then flushed copiously using sterile saline solution to remove all blood clots to prevent adhesion formation. The incision uterine was closed with a continuous, inverting pattern Lembert; using vicryl 3.0 in a double layer (Figure 25E). Then the abdominal wall was closed into three separate but intimate layers with appropriate suture material and suture patterns in ascending order. During these procedures, the individual layer was sutured separately and antibiotic procaine penicillin powder was scattered over the suture line to reduce bacterial contamination and promote healing in early conditions. As a first layer, the peritoneum and transversus abdominis muscle was apposed with a simple interrupted suture pattern by using polyglycolic acid 910 (vicryl) 2-0 sizes. Then as a second layer the subcutaneous fascia and two oblique muscles were sutured together by using former suture material but simple continuous suture pattern (Figure 25F). The skin incision was

closed with horizontal mattress sutures using silk size 1.0 (Figure 25G). Finally, the suture line was scrubbed with povidone-iodine solution as shown (Figure 25H).

Figure 25: Cesarean section in due

(A) Surgical site shaved and aseptically prepared; (B) exteriorizing the uterus; (C)exteriorizing fetus; (D) closing of the uterus; (E) closure of the abdominal muscles layer by layer; (F) skin sutures; (G) scrubbing after surgery; (I) visiting of the doe with her fetuses at third days of the operation.

Postoperative care and outcome: Postoperatively the animal was kept on Penicillin (24mg/kg) and dihydrostreptomycin sulphate (30mg/kg) (Pen &Strep® Norbrook UK) IM was administered for three days and analgesic called tramadol hydrochloride (2% Tramadol hydrochloride Sakar Health care PVt.Ltd, Gujarat, India) @ 2mg/kg IM B.I.D was also administered for two days post operation. The owner reported decrement in appetite for a week. At the end case wasn't recovered successfully even though she was seen doing well at third day of post operation (Figure 26A). After a week the owner informed that as she was died, that may be due to extreme myopathy and other complications such as surgical stress combined with failure of ingestion of feed

.

Figure 26: Postoperative outcome in doe after caesarean section

(A) Owner`s home visit at fifth day of post operation

Discussion

Dystocia can be defined as abnormal or difficulty in parturition to the point of demanding human intervention (Youngquist *et al*., 2007; Blood *et al*., 2011). In a small ruminant farming practices, dystocia contributes to significant economic loss in terms of loss of perinatal death of dams and fetus, uterine infections, more retained placentas, and longer lambing and kidding intervals (Brounts and Serbina, 2004). Cesarean section is the only method to handle fetal-maternal disproportion during difficulty in giving birth followed by systemic administration of antibiotics and non-steroidal anti-inflammatory drugs. But, it is less required in sheep and goats than in cattle, because of the lower frequency of fetal-maternal disproportion as the cause of dystocia. Thus, only 1 out of 5 in small ruminants as compared with 1 out of 2 in cattle (Bhattacharyya *et al*., 2015). Dystocia in small ruminants is considered of low incidence worldwide (<5%). Amongst all domestic animals, cattle, and buffalo are considered the species in which the incidence of dystocia appears to be highest (Noakes *et al.,* 2018).

Dystocia in animals should be suspected when there is onset of labor without delivery of the fetus and/or fetal membranes and later regression of parturition signs. The animal may show signs of mild to severe discomfort and the animal may adopt a rocking horse stance and show mild colic pain (Fesseha and Ayele, 2020; Fossum *et al*., 2007). Partial anorexia, dullness, and depression may be evident clinical signs. One or both lips of the vulva may be pulled in due to the torsion of the birth canal. When the cervix is fully dilated it is not palpable as a separate structure and is continuous with the vagina. The incompletely dilated cervix is palpable through per rectum examination (Purohit *et al.,* 2011).

In the present case report, a left paralumbar laparotomy approach was used for C- section in doe on right lateral recumbent position by using inverted L-block (2% lidocaine hydrochloride). This isn't in agreement with a report conducted by Loren *et al.,* (2008) who performed C- section on a cow to deliver a calf under caudal epidural analgesia by using lidocaine hydrochloride in a standing condition. Due to the mixed-breed herding practice with various sizes of small ruminants at the same place, the fetal-maternal disproportion may be common during birth which can be successfully managed by cesarean section followed by using Broad-spectrum antibiotic

i.e. from group Tetracycline and non-steroidal anti-inflammatory drug i.e. Flunixine Meglumine therapy (Ahmed, 2017). Compatible with this, in the current case report, the case was presented with dystocia that was later diagnosed as fetal-maternal disproportion and successfully managed by cesarean section followed by administration of Pen &Strep and Dexamethasone Sodium Phosphate as broad-spectrum antibiotic and non-steroidal anti-inflammatory drug respectively. Separate herding practice of the same size breed at an individual place can reduce the occurrence of the fetal-maternal disproportion (Iqbal *et al*., 2020). Several workers reported that caesarean section becomes necessary in goats to relieve dystocia due to fetal-maternal disproportion when manual obstetrical operations are difficult for vaginal delivery (Tibary, 2004; Hussain and Zaid, 2010). Dystocia should be early managed, unless it will be fatal for the life of the dam and fetus. Moreover, prolonged dystocia result in death of the fetus and ultimately mummification and maceration steep toward the low body condition score of an animal resulting in death of goat by systemic infection same as told by (Ismail, 2017; Gupta, 2020).

The caesarean section is mainly aimed to preserve life of dam, fetuses, and the future reproductive performance of the dam. However, the outcome of the operation may be affected by several variables such as; case selection which is the most crucial and often overlooked variable. In addition, Patient and surgeon preparation, surgical technique, calf viability at the time of surgery, and exteriorizing of the uterus can affect outcomes. Moreover, a good surgical technique such as gentle tissue handling, selection of appropriate suture materials and patterns, and adequate in-folding of the uterine incision to prevent leakage, combined with antibiotics and anti-inflammatory medication when indicated, can help to minimize detrimental adhesions that may adversely affect the future reproductive efficiency of the dam (Newman, 2008; Fubini and Ducharme, 2016). This is in agreement with the current case management in terms of surgical management and the care that was taken in the overall procedure to save the life of the doe and kids and to preserve future reproductive efficiency of doe. Uterus incision was sutured with inverting suture pattern by using Czerny lambert, in muscles apposition suture pattern e.g. simple continuous and interrupted mattress and in skin everted pattern e.g. horizontal mattress suture was applied which is compatible with the case report of (Schultz *et al.,* 2008). In conclusion, caesarean section is normally a life-saving surgical procedure. Therefore, it should have to be

performed as early as possible for the saving life of the dam and or calf under aseptic conditions through preferable technique and procedure.

4. SUMMARY OF COMPILED SURGICAL CASE REPORTS

The present case report encompassed compiled surgical procedure, techniques and outcomes of surgical intervention on 22 different animal species, breeds, ages and sexes. The number of animals that undergone various surgical managements were presented in table 1 below.

Table 1: Number of domestic animals in which operations were performed at study area

S/no.	Anima Groups	Place		Sex		Age (Years)		Outcome	
1	SA	VTH		M	F	<5	>5	Dead	Live
	Cat	1		0	1	1	-	-	1
	Dog	4		2	2	2	2	-	4
	Total (%)	5(23%)		2(9%)	3(13%)	3(13%)	2(9%)	-	5(23%)
2	Large Anim	VTH	DSVC	M	F	<5	>5	Died	Live
	Cattle	10	-	7	3	2	7	-	10
	Donkey	-	1	1	-	-	1	1	-
	Horse	-	1	1	-	1	-	-	1
	Sheep	2	-	1	1	1	-	1	1
	Goat	3	-	1	2	3	-	1	2
	Total (%)	15(68%)	2(9%)	11(50%)	6(27%)	7(32%)	8(36%)	3(13%)	14(64%)

(Note: S.A= Small Animal, DSVC=Donkey Sanctuary Veterinary Clinic, VTH=Veterinary Teaching Hospital, M=Male, F=Female).

Body systems of animals affected with various surgical ailments due different causes and surgical interventions was performed. Among these the reproductive, integumentary, and musculoskeletal system predominates and presented in table 2 below.

Table 2: Affected body parts and surgical interventions performed on domestic animals

S/no.	System involved	Animal species	Specific surgical cases	Total (%)
1	Reproductive	Dog	Ovariohysterectomy	1(4.5%)
			Castration	1(4.5%)
		Ox	Paraphimosis	1(4.5%)
			Penile Amputation	1(4.5%)
		Bull	Penile Amputation	1(4.5%)
		Cat	Caesarean Section	1(4.5%)
		Goat	Caesarean Section	1(4.5%)
2	Integumentary and Musculoskeletal	Dog	Lipoma	1(4.5%)
			External Coaptation	1(4.5%)
		Sheep	Tail Amputation	1(4.5%)
		Ox	Tail Amputation	1(4.5%)
		Cow	Ingrown horn trimming	1(4.5%)
		Donkeys	Hyena bite	1(4.5%)
		Horse	laceration	1(4.5%)
		Goat	Lipoma	1(4.5%)
		Ox	Eye enucleation	1(4.5%)
		Bull	Abscess drainage	2 (9%)
3	Digestive	Sheep	Ventrolateral herniorraphy	1(4.5%)
		Cow	Ventrolateral herniorraphy	1(4.5%)
		Calf	Umbilical herniorraphy	1(4.5%)
		Dog	Perineal herniorraphy	1(4.5%)
		Goat	Rumenotomy	1(4.5%)

5. CONCLUSION AND RECOMMENDATIONS

Livestock are one of the important sector improves the livelihood of Ethiopia specially the pastoral community. However, they can be affected by various congenital and acquired disorders deeming different forms of veterinary services treatment and correction beside other ailments. The present study was conducted at CVMA on different surgical patients. During case handling, different forms of surgical treatments were performed. Among these; Caesarean section, excision of lipoma, tail amputations, herniorraphy, eye enucleation, rumenotomy, penile amputation, horn trimming, surgical draining of the abscesses in small and large ruminants, ovariohysterectomy, modified radical mastectomy, and external coaptation, in small animals. Even though these procedures were managed and almost satisfactory in the study area, there were no ideal place particularly with regards to operation theatre, basic surgical equipment, instruments and availability of anaesthetic drugs. Therefore, based on the above conclusion the following recommendations were forwarded.

- All surgical materials should have to be fulfilled in CVMA to create better operation theatre for aseptic surgery.
- There should be ambulatory service for emergency surgical patients.
- The government should have to take special consideration on coverage of veterinary services with different animal hospital and clinics at grass root level.
- The CVMA should have to supply anesthetics drugs, surgical facilities and other relevant antiseptics to Veterinary Clinics and Veterinary Hospitals for effective and efficient services.

6. REFERANCE

Abd El R, M. Mekkawy N,H.M and AbdEl-Aal, A.M (2017): Femur fractures and treatment options in 20 dogs admitted to our clinic from January 2013 to December 2015. *Iraqi Journal of Veterinary Science*; **31**(2):117-122.

Abdel-Hady A, Sadan M, Abdel-Kawy H. (2015): The common surgical affections in sheep and goats at Qena governorate, Egypt. *Research Opinions in Animal and Veterinary Sciences;* **5**(2): 84-93.

Abdin-Bey, M. Ramadan, R. (2001): Retrospective study of hernias in goats. *Scientific Journal of King Faisal University (Basic and Applied Sciences);* **2**(1): 77-88.

Abebe, F. and Nuru, M. (2011): Prevalence of indigestible foreign body in small ruminants slaughtered at Luna export Abattior, East Shoa, Ethiopian; *Journals of Animal and Veterinary Sciences* **10**(12):1544-1611.

Abouelnasr, K.; El-Shafaey, E.; Mosbah, E. and ElKhodery, S. (2016): Utility of ultrasonography for diagnosis of superficial swellings in buffalo (Bubalus bubalis). *Journal of veterinary medical science;* **78**(8): 1303-1309.

Adam SB, Fessler JF. (2000): Umbilical herniorrhaphy, In: Adams S, Fessler JF, eds. Atlas of Equine Surgery. Philadelphia, USA: WB. Saunders.

Addis, A. B. and Tesfaye, M. (2017): Retro respective studies of hyena bite in Ethiopian donkeys , Eastern Shoa , central Ethiopia. *International Journal of Engineering Development and Research*; **5(**1**)**: 2321-9939.

Adeola, B.S. and Enobong, H. (2016): Surgical management of paraphimosis in dog: a case report, *Global Veternaria;* **16**(1):49-51.

Agajie, T., Tamirat, D., Pearson. A. & Temesgen, T. (2000): Socio-economic circumstances of donkeys use and management in the rural and urban areas of central parts of Ethiopia. Proceedings of the Workshop on Promoting the Peri-Urban Livelihood through Better Donkey Welfare. Debre-Zeit, Ethiopia. 16- 28.

Ahmed A (2017)**:** Incidence and Causes of Dystocia in Small Ruminants in Sokoto Metropolis, Northwestern, Nigeria. *Scholars Journal of Agriculture and Veterinary Science* **4**(3): 114-118.

Airikkala-Otter I, Gamble L, Mazeri S, Handel IG, Bronsvoort BC, Mellanby RJ, et al. (2018): Investigation of short-term surgical complications in a low-resource, high-volume dog sterilisation clinic in India. *BMC Veterinary Research;* **14**(1):56-14.

Al Salihi KA, Dahkal M H, Hassan H M (2017): Incidence of dog bite in Al Muthanna governorate including injuries and its clinical healing in the human. *Mirror of Research in Veterinary Science and Animals*; **6**(3): 13-24.

Alam M. R., Gregory N. G., Uddin M. S., Jabbar, M. A., Chodary, Sand Debnath N.C. (2010): Frequency of nose and tail injuries in cattle and water buffalo at Livestock markets in Bangladesh. Animal Welfare; **19**(3):295-300.

Alharbi, K. B. and Mahmoud, O. M. (2012): Abscess disease of sheep and goats: A disease of major concern in Saudi Arabia that urges production of an effective vaccine. *Journal of Agriculture and Veterinary Science*; 5**.**

Ali M R, Ibrahim M Ibrahim, Hala R Ali, Salah A Selim, Mostafa A El Sayed (2016): Treatment of natural mammary gland tumors in canines and felines using gold nanorods-assisted plasmonic photothermal therapy to induce tumor apoptosis. *International journal of Nanomedicine* **11**: 4849-4863.

Ali R, Davoud K. (2011): Paraphimosis in a Mixed Breed Sheepdog Following Copulation and Sexual Activity. *Advances in Environmental Biology*; **5**(8):2459- 2461.

Ali, A.M.H. (2011). Cause and management of dystocia in small ruminants in Saudi Arabia. *Journal of Agriculture and Veterinary Science;* **4**(2): 95-108.

Alimi, O. Bello, Muhammed Bashir, Baraya, Yushau Shuaibu, RAJI, Abdullahi, BASHIR, Saidu, (2018): Obstructive Urolithiasis in Ouda-Yankasa Ram : Case Report; *Animal Research International Journal*; **15**(2): 2989–2993.

Alkan Z, Bumin A, Öztürk S (2001): Perineal hernili 3 köpekte divertikulum rekti olgusunun klinik, radyografik tanlsl ve şirurjikal sağaltlml. *Journal of Translational Vision Science and Technology*; **7**(4): 51-54.

Al-Sobayil FA, Ahmed AF (2007): Surgical treatment for different forms of hernias in sheep and goats. *Journal of Veterinary Science;* **8**(2): 185-191.

Al-Sobayil, F.A. and Ahmed, A.F. (2007): Surgical treatment for different forms of hernias in sheep and goats. *Journal of Veterinary Science***; 8**: 185–191.

Amante, M., Hunde, A., Endebu, B., Hirpa, E. & Mamo, B. (2014): Health and Welfare Assessment of Working Equine in and Around Nekemte Town, East Wollega Zone, Ethiopia. *American-Eurasian Journal of Scientific Research;* **9**(6): 163-174.

Amresh, K., (2009): Surgery of Abdomen and Organs of Digestive System. In: Veterinary Surgical Technique, Ch.14, pp 310- 312.

Anderson, D. E. (2004): Surgical diseases of the neonate. Paper presented at: Proceedings of the WBC Congress; Québec, Canada.

Anderson, D. E. and Miesner, M. D. (2008). Rectal Prolapse, *Veterinary Clinics of North America - Food Animal Practice*; **24**(2): 403–408.

Andrews, K., Chaddock, M., & Osburn, B. I. (2013): Baseline survey of progress by veterinary medical colleges in implementing recommendations from the North American Veterinary Medical Education Consortium. *Journal of the American Veterinary Medical Association*; **243**(6): 826–832.

Angesom, H.D. (2015): Major Constraints of Veterinary Services Delivery System and Its Solution in Pastoral Areas of Ethiopia. *International Journal of African and Asian Studies, International Peer-reviewed Journal;* **12**: 1-9.

Angioletti A, De Francesco I, Vergottini M & Battocchio ML (2004): Urinary incontinence after spaying in the bitch: incidence and oestrogen-therapy. *Veterinary Research Communication;* **28**(1): 153-155.

Anteneh M, Ramswamy V. (2015): Hardware disease in bovine. *Academic Journal of Animal Diseases*; **4**(3): 146-159.

Appleby DL, Bradshaw JWS, Casey RA (2002): Relationship between aggressive and avoidance behavior by dogs and their experience in the first six months of life. *The Veterinary Record;* **150**(14): 434-438.

Aronson, L.R., (2012): Rectum, anus and perineum. In: Tobias KM, Johnston SA, editors. Veterinary Small Animal Surgery, (4th edn.) Philadelphia, PA, USA: Saunders; Pp. 1564-1600.

Aruna Maramulla, S. R. D. and Sudhakar Deeti, S. G. (2021): 'Management of Tail Affections in Cows and Buffaloes', *International Journal of Current Microbiology and Applied Sciences*; **10**(6): 458–466.

Asfaw, R., Ameni, G. and Pal, M. (2012): Prevalence of Epizootic Lymphangitis in Cart Horses in Southwest Shewa of Oromia Region, Ethiopia. *International Journal of Livest Research*; **2**(3): 146-151.

Asrat, M. and Melkamu, S. (2015): Current Advances in surgical Management of Ruminal Disorders of Bovine. *Journal of Animal Research*; **5**(4): 683-693.

Atiba, A., Ghazy, A., Gomaa, N., Kamal, T. and Shukry, M. (2015): Evaluation of analgesic effect of caudal epidural tramadol, tramadol-lidocaine, and lidocaine in water buffalo calves (Bubalus bubalis). *Veterinary Medicine International;* 2015: 1-6

Atiyeh BS, Hayek SN, Gunn SW (2005): New technologies for burn wound closure and healing-*Review of the Literature*; **31**(8): 944-956.

Attinger, CE; Bulan, E., Blume, PA (2000): Surgical debridement. The key to successful wound healing and reconstruction. *Clin. Pod. Med. Surg;* **17**(4): 599-630.

Aubry P. (2005): Routine surgical procedures in dairy cattle under field conditions: abomasal surgery, dehorning, and tail docking. Vet Clin North Am Food Anim Pract; **21**(1): 55–72.

AWVT, (2001): A review of the scientific aspects and veterinary opinions relating to tail docking in dogs. Food and Rural Affairs.

Ayele S, Assegid W, Jabbar MA, Ahmed MM, Belachew H (2002): Livestock marketing in Ethiopia. A review of structure, performance and development initiatives, Socio economics and Policy Research Working Paper 52, ILRI, Nairobi, Kenya.

Azari, O., Molaei, M.M. and Ehsani, A.H. (2014): Caudal epidural analgesia using lidocaine alone or in combination with ketamine in dromedary camels Camelus dromedarius. *Journal of South African Veterinary association;* **85**(1):1-4.

Babalola, S. A and Henshaw, E. (2016): Surgical Management of Paraphimosis in Dog: A Case Report; *Global Veterinaria;* **16**(1): 49-51.

Baez, J.L., Hendrick, M.J., Shofer, F.S., Goldcamp, C. and Sorenmo, K.U. (2004): Liposarcomas in dogs: 56 cases (1989-2000). *Journal of American Veterinary Medical Association*; **224**(6): 887- 891.

Bangs, E. (2000): Gray wolf restoration in the northwestern United States. Pages 39-45 in Predator Management in Montana: Symposium Proceedings. January 2000, Billings,

MT. Conducted by Montana Outfitters and Guides Assoc. and Montana Fish, Wildlife and Parks.

Baniadam A., Navid M. and Babak, M. (2010): Nasal squamous cell carcinoma in a cow. *Turkish Journal of Veterinary and Animal Science;* **34**(3): 303-305.

Barber S. (2008): Management of Wounds of the Neck and Body. In: Stashak TS, Theoret CL, editors. Equine Wound Management. Black-Wiley, Ames, IA; 375–462.

Baxter GM (2004): Hernias/umbilicus in Farm animal surgery. In Fubini SL, Ducharme NM (Eds.) Saunders. pp. 477-483.

Beale B. (2004): Orhtopedic clinical techniques femur fracture repair. *Clin Tech Small Anim Pract;* **19**(3):134 –150.

Bedoor, M., Omeran, Ramadan, E., Abdel-Wahed, Mahmoud H. *et al.*, (2014): Ovariectomy versus Ovariohysterectomy for Elective Sterilization of Female Cats. *Alexandria Journal of Veterinary Sciences*; **43**(1): 73-8.

Behnke, R. and Metaferia, F. (2011): The Contribution of Livestock to the Ethiopian Economy - Part II. IGAD LPI Working Paper No. 02-11. 43.

Bekele, G., Lamaro, M., Berhe, G., & Berhe, A. (2017): Production potential and preservation methods of hide and skin in three selected districts of Gambella region, south west Ethiopia. *International journal of research Granthaalayah*; **5**(2): 142-150.

Belanger JM, Bellumori, TP, Bannasch DL, Famula RT & Oberbauer AM (2017): Correlation of neuter status and expression of heritable disorders. *Canine Genetics and Epidemiology*; **4**(1).

Bellavance, A., Bonneville-Hebert, A., Desrochers, A., Fecteau, G. (2010): Surgical correction of a diaphragmatic hernia in a newborn calf. *Canadian Veterinary Journal;* **51**(7):767-769.

Bellenger CR, Canfield RB (2003): Perineal hernia in SLATTER D. Textbook of small animal surgery (3rd edn). W B Saunders Co Ltd, Philadelphia, USA.

Bender, W. M., (2012): Ovariectomy versus ovariohysterectomy. *Journal of American Veterinary Medicine Assoc*iation; **240**(6): 659-660.

Bennett, R. and Ljpelar, J. (2005): "Updated Estimate of the cost Associated with thirty four Endemic Livestock Diseases in Great Britain: A note". *Journal of Agricultural Economics;* **56**: 135-144.

Bhattacharyya, Hiranya K., Fayaz A. Bhat, Bashir A. Buchoo (2015): Prevalence of dystocia in sheep and goats: a study of 70 cases. *Journal of Advanced Veterinary Research;* **5(1)**: 14-20.

Biffa, D. & Woldemeskel, M. (2006): Causes and Factors Associated with Occurrence of External Injuries in Working Equines in Ethiopia. *The International Journal of Applied Research in Veterinary Medicine*, **4**:1-7.

Bildfell, R. J. Valentine, B. A. and Whitney, K. M. (2002): "Cutaneous vasoproliferative lesions in goats," *Veterinary Pathology*; **39**(2): 273–277.

Blood D.C., Studdert V.P., Gay C.C. (2011): Saunders Comprehensive Veterinary Dictionary (4th Edition). London: Saunders.

Bongartz A, Carofiglio F, Balligand M. (2005): Use of autogenous fascia lata graft for perineal herniorrhaphy in dogs. Veterinary Surgery; **34**(4):405–413.

Boothe, H.W. (2003): Testes and epididymides. In: Slatter D, editor. Textbook of small animal surgery. USA: Elsevier Science; Pp. 1527–9.

Botha CJ, Naudé TW, Moroe ML, Rottinghaus GE (2004): Gangrenous ergotism in cattle grazing fescue (Festuca elatior L.) in South Africa. *Journal of South African Veterinary Association*; **75** (1): 45- 48.

Brissot, H.N., Dupre, G.P., Bouvy, B.M. (2004): Use of laparotomy in a staged approach for resolution of bilateral or complicated perineal hernia in 41 dogs. *Veterinary Surgery*; **33:** 412-421.

Brounts, Sabrina H (2004). Outcome and subsequent fertility of sheep and goats undergoing cesarean section because of dystocia: 110 cases. *Journal American Veterinary Medicine Association;* **224**(2):275-281.

Burden F, Thiemann A. (2015): Donkeys are different. *Journal of Equine Veterinary Science*; **35(5):** 376-382.

Burrow, R., Batchelor, D. Cripps, P., (2005): Complications observed during and after ovariohysterectomy of 142 bitches at a veterinary teaching hospital. *Veterinary Research* **157**: 829–833.

Byron, J.K. (2015): Micturition disorders. Veterinary Clinics of North America - *Small Animal Practice;* **45**(2): 769– 782.

Calfee, T & Manning, T. O. (2002): Non –healing subcutaneous wound in the cats and proposed in the surgical management techniques. Clinical Techniques. *Small Animal Practice;* 17(4): 167-167.

Callan, R. J., Applegate T. J. (2017): Temporary Rumenotomy for the treatment of fore stomach diseases and enteral nutrition. *Veterinary Clinics of North America – Food Animal Practice*; **33**(3):525–537.

Canadas Sousa A, Marta Santos, Bárbara Leal, Rui Medeiros, Patrícia Dias Pereira (2019): Estrogen receptors genotypes and canine mammary neoplasia. *BMC veterinary research* **15**(1): 325-.

Carlson GP. (1997): Clinical chemistry tests, in Smith B (edn): *Large Animal Internal Medicine,* ed 2. St. Louis, Mosby-Year Book, Inc, pp 441-469.

Case, J.B., MacPhail, C.M, Withrow, S.J. (2012): Anatomic distribution and clinical findings of intramuscular lipomas in 17 dogs (2005–2010). *Journal of the American Animal Hospital Association*; **48**(4): 245–249.

Casey, R. A., Loftus, B., Bolster, C., Richards, G. J., & Blackwell, E. J. (2014): Human directed aggression in domestic dogs (Canis familiaris): Occurrence in different contexts and risk factors. *Applied Animal Behavior Science;* **152:** 52-63.

Central Statistical Agency (CSA), (2012): Report of Agricultural sample survey, 2011/12 volume II on livestock and livestock characteristics (private peasant holdings). Statistical Bulletin 532, CSA, Federal Democratic Republic of Ethiopia, Addis Ababa.

Central Statistical Agency (CSA), (2020): Agricultural Sample Survey 2019/20 (2012 E.C.) Volume II report on livestock and livestock characteristics (private peasant holdings). Central Statistical Agency (CSA): Addis Ababa, Ethiopia.

Chavez J, Demoor A. (2012): Surgical treatment of umbilical infection in calves. *Veterinary Record.***77**: 771-774.

Choucair MM, Phillips TG (1997): What is new in clinical research in wound healing. Clin Dermatol, **15**:45-54.

Coit, V.A., Gibson, I.F., Evans, N.P., Dowell, F.J. (2008): Neutering affects urinary bladder function by different mechanisms in male and female dogs. *European Journal of Pharmacology*; **584**(1): 153–158.

Constable, P.D., Hinchcliff, K.W., Done, S.H and Grunberg, W. 2017: Veterinary Medicine: A textbook of the diseases of Cattle, Horses, Sheep, Pigs and Goats, 11th ed., St. Louis, Missouri, Elsevier, 76-77.

Cordy, D.R., (1990): In: *Tumors in domestic animals* (ed. J.C. Moulton), 3rd ed., University of California Press, California, pp. 654-660.

Cowell RL, Tyler RD, Meinkoth JH, DeNicola DB. (2007): Diagnostic cytology and hematology of the dog and cat. 2nd Edn, Elsevier Health Sciences, 20-51.

Cox CT & Jeffrey SD (2007): Medical Illustrations, Birck. In: The Encyclopedia of Skin and Skin Disorders (third edition). New York, facts on file, 1.

DACA (Drug Administration and control Authority) (2006): Standard treatment Guideline for veterinary practice of Ethiopia; Pp: 209- 211.

Dalal, J, Gyan S (2017): "Dystocia due to emphysematous fetuses in a non-descript goat." *Indian Veterinary Journal*; **93**(10): 40-42.

Dandapat P, P K Nanda, P K Bandyopadhyay, S Kaushal and A Sikdar. (2011): Prevalence of Deg Nala disease in eastern India and its reproduction in buffaloes by feeding *Fusarium oxysporum* infested rice straw. *Asian Pacific Journal of Tropical Medicine*; **4**(1): 54-57.

Dantas Cassali G, Angélica Cavalheiro Bertagnolli, Enio Ferreira, Karine Araújo Damasceno, Conrado de Oliveira Gamba (2012): Canine mammary mixed tumours: a review. *Veterinary medicine international*; **2012** 1-7.

Dar, K.H., Ansari, M.M., Qadri S.A., Baba, M.A., and Kumar, M., (2015): Dystocia and its surgical management in Siamese queen. *The blue cross book;* **31**: 40-41.

Das B (2012): Successful management of ventral abdominal hernia in goat: a case report. *International Journal of Natural Sciences;* **2**(2): 60-62.

Das J, Behera SS. (2011): Acute bloat in a goat and its surgical management by rumenotomy. *Intas Polivet*; **12**(2):322–324.

David, D. (2010): Spaying (Ovariohystrectomy) in dogs. www.peteducation.com.

Davidson A, (2010): Management of reproduction: Small animals**.** Merck Manual Veterinary Manual (10th Edition.). Merck Sharp & Dohme Corp, NJ, USA. 1287-1288.

Davidson, A. P. (2016): Reproductive diseases of the male small animal. The Merck Veterinary Manual, 11th Edition, Kenilworth, NJ, USA: Merck & Co., Inc.

Déjardin LM, Perry KL, von Pfeil DJF and Guiot LP (2020): Interlocking nails and minimally invasive osteosynthesis. Veterinary Clinics of North America: *Small Animal Practice*; **50** (1):67-100.

Demirkiran, A.E., Ozgun, H, Balkaya, M, Cevikel, H, Culhaci, N and Gurel, M. (2003): Strangulated ventral hernia model in rats, *Journal of Investigative Surgery*, **16**(2): 93-97.

Denny, H.R. and Butterworth, S. (2008): A guide to canine and feline orthopaedic surgery. Oxford: Blackwell sci. 4th ed. 3– 152.

Desiye, T. and C. Mersha, (2012): Study on Rumen and Reticulum Foreign Bodies in Cattle Slaughtered at Jimma Municipal Abattoir, South West Ethiopia. *American-Eurasian Journal of Scientific Research;* **7**(4): 162-169.

Devendra, C. (1999) Goats: Challenges for increased productivity and improved livelihoods *Outlook on Agriculture;* **28**(4): 215-226.

Devitt, C.M., Cox, R.E., Hailey, J.J. (2005): Duration, complications, stress, and pain of open ovariohysterectomy versus a simple method of laparoscopic-assisted ovariohysterectomy in dogs. *Journal American Veterinary Medicine Association*; **227**(6): 921–927.

Dey T, Sutradhar BC, Das BC, Poddar S (2018): Surgical Management of Large Abdominal Hernia in a Male Goat. *Journal of Veterinary Medicine and Research*; **5**(3): 1128.

DFID (Department for International Development), (2006): DFID Ethiopia Country Assistance Plan, 2006-2010. Consultation Draft, [www.dfid.gov.uk].

Dharmaceelan S, Kumaresan A, Kanjana D. (2017): Surgical management of Ruminal Impaction in a goat. *Intas Polivet;* **18**:329–330.

Dhillon, K and Singh, J. (2003): Treatment of gangrene of tail in buffaloes. *Punjab veterinary Journal*; **3**:19-20.

Dhillon, K. S., Singh, J., Kumar, H., Bal, M. S., Sandhu, K. S., & Singh, B. B. (2006). Treatment of tail gangrene in buffaloes. *Veterinary Record;* **158**(5): 176–176.

Dhindsa, S.S., G.S., Dhaliwal and Ghuman SPS., (2010): Factors influencing the dam survival rate in bovines subjected to caesarean section. *Indian Journal of Animal Reproduction;* **31**: 49-51.

Dinka H, Shelima B, Abalti A, Geleta T, Mume T (2006): Socio-economic importance and management of carthorses in the mid rift valley of Ethiopia. Proceedings of the 5th International Colloquium on Working Equines.

Djemil, B., Lamia, A., Annabelle, G. and Daniel, T. (2010): Ovariohysterectomy in the bitch. *Obstetrics and Gynecology International*; 1–7.

Dr. Sandhya Rani Dasari and Dr. Aruna Maramulla, (2021): Therapeutic management of uterine prolapse in buffalo. *The Pharma Innovation Journal;* **10**(5): 706-708.

Dubey A, Pratap K, Amarpal, Aithal HP, Kinjavdekar P, Singh T, Sharma MC (2006): Tube Cystotomy and chemical dissolution of urethral calculi in goats. *Indian Journal Veterinary Surgery*, **27**(2): 98-103.

Dugassa, J. and Fromsa, A. (2019): 'Unilateral Surgical Amputation of Horn Due to Suppurative Sinusitis in Cow'. *Veterinary Medicine – Open Journal*; **4**(2): 45–48.

Dyce KM, Sack WO, Wensing CJG (2002): The ventrolateral wall of the abdomen, in Textbook of veterinary anatomy. Saunders, Philadelphia, USA.

Edmondson MA. (2008): Local and regional anesthesia in cattle. *Veterinary Clinical North American food animal practice;* **24**(2):211-226.

Elisa M. Ermilio, Mary C. Smith (2011): Treatment of Emergency Conditions in Sheep and Goats. *Veterinary Clinics of North America: Food Animal Practice*; **27**(1): 33-

Espinoza, C., S. Lomax, and P. Windsor, (2013): The effect of a topical anesthetic on the sensitivity of calf dehorning wounds. *Journal of Dairy Sci*ence; **96**(5):2894–2902.

Esther C, Sarah Horing RN, Suzanne M. Shepherd, Judd E. Hollander (2007): Primary Closure of Mammalian Bites. *Academic Emergency Medicine;* **7**(2): 157-161.

Ewoldt JM, Anderson DE, Miesner MD, Saville WJ (2006): Short- and long-term outcome and factors predicting survival after surgical tube cystotomy for treatment of obstructive urolithiasis in small ruminants. *Veterinary Surgery*; **35**(5): 417-422.

Farese J. P, Lewis D. D, Cross A. R, Collins K. E, Anderson G. M. and K. B. Halling, (2002): Use of IMEX SK- circular external fixator hybrid constructs for fracture stabilization in dogs and cats, *Journal of the American Animal Hospital Association;* **38**(3): 279- 289.

Farman RH, SH Al-Husseiny, ANA Al-Ameer (2018): Surgical treatment of hernia in cattle: A review. *Al-Qadisiyah Journal of Veterinary Medicine Sciences;* **17**(2): 61-68.

FAW (Farm Animal Welfare Council) (2018): Disbudding and dehorning. Web site,

http://www.fawc.org.uk/reports/dairycow/ dcowr069.htm.

Fazili, M.R., B.A. Buchoo, M.M. Darzi and S.S. Hussain. (2001): Ocular squamous cell carcinoma in a cow. *Indian Journal of Veterinary Surgery;* **22**: 132.

Fernandez, R., Griffiths, R. (2015): Water for wound cleansing." Cochrane database of systematic reviews. CD003861. PMID 22336796.

Fesseha H. (2020a): Mammary Tumours in Dogs and its Treatment Option- A Review. *Biomed Journal of Scientific & Technical Research;* **30**(4): 23552-23561.

Fesseha H. (2020b): Acute Paraphimosis in Bull and its Surgical Management. *Prac Clin Invest* **3**(2): 68-71.

Fesseha H. (2020c): Umbilical hernia in cross Holstein Friesian calf and its surgical management: A case report. *Veterinary Medicine Open J*ournal; **5**(2): 39-42.

Fesseha, H., Ayele, A. (2020): Recurrent Prepartum Cervico-Vaginal Prolapse in a Crossbred Holstein Friesian Dairy Cow. *Veterinary Medicine Open Journal*; ***4***: 107-109.

Fish R, Danneman PJ, Brown M, Karas A. (2011): *Anesthesia and Analgesia in Laboratory Animals*. 2nd ed. Massachusetts, USA: Academic Press, 108.

Fletcher, C. D. M., (2001): *Diagnostic Histopathology of Tumors*, vol. 1 and 2, Churchill Livingstone, 2nd edition.

Fontaine M, Baird G (2008): Caseous lymphadenitis. *Small Ruminant Research;* **76**(1): 42-48.

Fontbonne, A., ´evy, X. L., Fontaine, E. and Gilson, C. (2007): Guide Pratique de Reproduction Clinique Canine et feline, Editions Med'com, Paris, France; 6: 281– 284.

Fossum TW. (2002): Surgery of the male reproductive tract, In: Text book of small animal surgery, 2nd Edition, Philadelphia. 666-674.

Fossum, T., Hedlund, C., & Hulse, D. (2007): Surgery of the reproductive and genital systems. *Small animal surgery;* **3:** 702-740.

Fossum, T.W. (2013): Small animal surgery, 4th ed., Elsevier Health Sciences. Philadelphia, USA, pp. 1775.

Fowler M E, (2010): Medicine and Surgery of Camelids. Third Edition, Blackwell Publishing, pp: 576.

Fubini SL, Ducharme N. (2016): Farm Animal Surgery-E-Book. Amsterdam, Netherland: Elsevier Health Sciences.

Gabli, Z. , Beddar, L., Djerrou, Z., Gomez-Reyes, E., (2017): Prevalence and histopathologic

analyses of mammary tumors in female dogs in the Northeast of Algeria, *OnLine Journal of Biological Sciences*; **17**(3): 166–177.

Gadallah S, Marzok M, El-Husseiny I. (2009): Fractures repairs in Dogs. *Kafrelsheikh Veterinary Medicine Journal*; **7**(1):314-336.

Garden O, S W Volk, N J Mason, J A Perry (2018): Companion animals in comparative oncology: One Medicine in action. *The Veterinary Journal*, **240**: 6-13.

Gebreegziabher, B. (2009): An Overview of the Veterinary Services in Ethiopia: Relation to Public-Private Partnership (PPP) Regulatory Framework. Proceedings of the 23th Annual Conference of the Ethiopian Veterinary Association (EVA) held in Addis Ababa, July 22 and 23, 2009, Ethiopia, Pp1-10.

Gebrewold, A., Tegegn, A. and Yami, A., (2004): Research needs of donkey utilization in Ethiopia. In: D. Fielding and P. Starkey (Eds.). Donkeys, People and Development. A resource book of the Animal Traction Network for Eastern and Southern Africa (ATNESA). ACP-EU Technical Centre for Agricultural and Rural Cooperation (CTA), Wageningen, the Netherlands. pp 77-81.

Geehan AM, Amel OB, Shnain H. (2006): Comparative Study of Two rumenotomy techniques in goats. *Surgery Journal*; **1**:9–13.

Gemeinhardt KD, Molnar JA. (2005): Vacuum-assisted closure for management of a traumatic neck wound in a horse. *Equine Veterinary Education;* **17**(1): 27–33.

German, A.J. (2006): The Growing Problem of Obesity in Dogs and Cats. *Journal of Nutrition;***136**: 1940–1946.

Ghurashi, M.A H., Seri, H I., Bakheit, A.H & Ashwag, E.A.M. (2009): Effect of surgical removal of foreign body from goat's rumen with special reference to the prevalence of foreign body in goats in Southern Darfur. *Australian Journal of Basic and Applied Science* **3(2):** 664-668.

Gilger B. (2011): Diseases and surgery of the globe and orbit. In: Gilger B, editor. Equine Ophthalmology. (2nd edn*)* Maryland Heights, MO: Elsevier Saunders; 93–132

Gill, Sukhjit Singh; Barstad, Robert D. (2018): A Review of the Surgical Management of Perineal Hernias in Dogs. *Journal of the American Animal Hospital Association*, **54**(4): 179–187.

Gilley, R.S., Caywood, D.D., Lulich, J.P., Bowersox, T.S. (2003): Treatment with a combined cystopexy-colopexy for dysuria and rectal prolapse after bilateral perineal herniorrhaphy in a dog. *Journal of the American Animal Hospital Association*, **222**(12): 1717-172.

Gizachew, A., Schuster, R. K., Joseph, S., Wernery, R. and Georgy, N. S. (2013): Piroplasmosis in Donkeys -A Hematological and Serological Study in Central Ethiopia. *Journal Equine Veterinary Science*; **33**(1): 18-21.

Goethem B, Schaefers-Okkens A, Kirpensteijn J. (2006): Making a rational choice between Ovariectomy and ovariohysterectomy in the dog: a discussion of the benefits of either technique. *Veterinary Surgery;* **35**(2):136–43.

Goldschmidt M, L Peña, R Rasotto, V Zappulli (2011): Classification and grading of canine mammary tumors. *Veterinary pathology*; **48**(1): 117- 131.

Goldschmidt, M.H., Hendrick, M.J., (2002): Tumors of the skin and soft tissues. In: Meuten, D.J. (Ed.), Tumors in domestic animals, fourth ed. Iowa State Press, A Blackwell Publishing Co, pp. 45–118.

Gomez, J. (2008): Bandaging and casting techniques for wound management. In: Stashak TS, Theoret C, editors. Equine wound management. (2nd edn). Ames (IA): WileyBlackwell; Pp. 623–58.

Gottardo F., E. Nalon, B. Contiero, S. Normando, P. Dalvit and G. Cozzi. (2011): The dehorning of dairy calves: Practices and opinions opinions of 639 farmers. *Journal of Dairy Science;* **94**(11):5724–5734.

Graham, R.D. (2013). Farm Animal Medicine and Surgery, MPG Print group Ltd. U.K., pp 140-141.

Grierson, J. (2009). External coaptation in small animal practice. *In Practice*; **31**(5): 218–225.

Griffiths DA, Simpson RA, Shorey BA, Speller DC, Williams NB (2003): Single-dose peroperative antibiotic prophylaxis in gastrointestinal surgery. *Lancet*; **2**(7981):325–328.

Grindlay, D.J.C., Brennan, M.L. and Dean, R.S. (2012): Searching the veterinary literature: A comparison of the coverage of veterinary journals by nine bibliographic databases. *Journal of Veterinary Medical Education;* **39**(4): 404–412.

Gugjoo MB, Zama MMS, Amarpal, Mohsina A, Saxena AC, Sarode IP (2013): Obstructive urolithiasis in buffalo calves and goats: incidence and management. *Journal of Advanced Veterinary Research;* **3:** 109-113.

Guiot, LP Demianiuk., RM and Déjardin LM. (2012): Fractures of the Femur. In: Tobias KM, Johnston SA, editors. Veterinary Surgery Small Animal. 1st ed. St. Louis: Saunders Elsevier, pp. 865-905.

Gupta C (2020): A retrospective study on dystocia and its management in goats." *Indian Journal of Small Ruminant;* **26**(1):75-78.

Hailat N, Al-Darraji A, Lafi S, Barakat SA, Al-Ani F, El-Magrhaby H, Al-Qudah K, Gharaibeh S, Rousan M, Al-Smadi M. (1998): Pathology of the rumen in goats caused by plastic foreign bodies with reference to its prevalence in Jordan. *Small Ruminant Research*; **30**(2):77–83.

Haile Y, Velappa R, Asrat M. (2017): A study on the prevalence of umbilical hernia in calves in and around Gondar Town, North Gondar, North West Ethiopia. *International Journal of Veterinary Sciences and Animal Husbandry*; **2**(2): 11-15.

Hamdi NM, Darej C, Bouraoui R. Animal welfare issues concerning procedures of calves dehorning. *Applied Science Reports;* **4**(3):234-240.

Hammer E.J., K. Chope, T.D. Lemire and V.B. Reef. (2005): A lipoma of the extensor tendon sheaths in a horse. *Veterinary Radiology and Ultrasound*; **43**(1): 63-65.

Hanson RR. (2005): Management of burn injury in the horse. Vet Clin North Am Equine Pract; **21**(1): 105–23.

Harasen G. (2003): Common long bone fractures in small animal practice-Part 1. *Canadian Veterinary Journal;* **44**(4): 333-334.

Hart BL, Hart LA, Thigpen AP & Willits NH (2014): Long-term health effects of neutering dogs: Comparison of Labrador Retrievers with Golden Retrievers. *PLoS ONE*, **9**(7): e102241.

Haskell SRR. (2008): Blackwell's five- minute veterinary consult: ruminant. Wiley – Blackwell, USA, 902-905.

Hassan N, Parrah J, Hamadani H, Ganie A, Dar R, et al. (2019): Management of large subcutaneous abscess in a dairy cow. *Journal of Pharmacognosy and Phytochemistry* **8**(1): 1652 1653.

Hassel, D.M. (2007): Thoracic trauma in horses. *Vet. Clin. North Am. Equine Pract.* **23**(1): 67-80.

Head, L.L., Francis, D.A. (2002): Mineralized paraprostatic cyst as a potential contributing factor in the development of perineal hernias in a dog. *Journal of the American Animal Hospital Association;* **221**(4): 533-535.

Hedlund CS. (2007): Surgery of the reproductive and genital systems. In: Small Animal Surgery (3rd Edition.), Ed., Fossum, T.W., Mosby, St. Louis, 517-574.

Hedlund, C. S. (2002): Surgery of the reproductive and genital systems. In Small Animal Surgery. 2nd edn. Ed T. W. Fossum. St Louis, Mosby. Pp. 610-674.

Hendrix SM, Baxter GM. (2005): Management of complicated wounds. *Veterinary Clinics; Equine practice*; **21**(1):217–230.

Henry, C.J., (2014). Mammary Cancer. In: Current Veterinary Therapy XV, Bonagura, J.D. and D.C. Twedt (Eds.), Saunders Elsevier, St. Louis, Missouri, USA, 375-380.

Herrmann R, Utz J, Rosenberger E, Doll K, Distil O. (2001): Risk factor for congenital umbilical hernia. *German Fleckvieh Veterinary Journal*; **162**(3):233-40.

Hoffman JM, Creevy KE & Promislow DL (2013): Reproductive capability is associated with lifespan and cause of death in companion dogs. *PLoS ONE;* **8**(4): 1-7.

Holcombe SJ, Laverty S. (1999): Thoracic trauma. In: Auer JA, Stick JA, editors. Equine surgery. 2nd edition. Philadelphia: WB Saunders; 382–385.

Holst, B.S., Axnér, E., Öhlund, M., Möller, L. and Egenvall, A. (2017): Dystocia in the cat evaluated using an insurance database. *Journal of Feline Medicine and Surgery;* **19(**1): 42–47.

Hopper R M (2016): Management of male reproductive tract injuries and disease. *Veterinary Clinics: Food Animal Practice*; **32(**2): 497-510.

Howe, L.M., Slater, M.R., Boothe, H.W. (2000): Long-term outcome of gonadectomy performed at an early age or traditional age in cats. *Journal of the American Animal Hospital Association*; **217**(11):1661–1665.

Hussain SO, NW Zaid (2010): Dystocia in goats, causes and treatment. *Al-Qadisiyah Journal of Veterinary Medicine and Science;* **9**(1): 63-68.

Igbokwe, I.O., Kolo, M.Y., & EGWU, G.O. (2003): Rumen impaction in sheep with indigestible foreign body in the semi-arid region of Nigeria. *Small Ruminant Research*; **49**: 141-147.

Iqbal N, Aslam S, Hussain N, Luqman Z, Jawad H (2020): Dystocia handling by cesarean section in beetal goat in pakistan: a surgical approach. *Journal of Animal Health Production;* **8**(3): 134-137.

Irby, N.L. (2004): Surgical Diseases of the Eye in Farm Animals. In: Farm Animal Surgery," Saunders, St. Louis, USA, Pp 429- 459.

Ismail ZB (2017): "Dystocia in sheep and goats: Outcome and fertility following surgical and non-surgical management*." Macedonian Vet. Rev.* **40**(1): 91-96.

Jahromi AR, Nazhvan SD, Gandmani MJ, Mehrshad S. (2009): Concurrent bilateral inguinal and umbilical hernias in bitch- a case report. *Veterinarski Arhiv*; **79**(1): 517-522.

Jakson, PG. (2004): Handbook of veterinary obstetrics. Elsevier Limited. 2nd ed. PP: 141-166.

Janke JJ, Osterstock JB, Washburn KE, (2009): Use of Walpole's solution for treatment of goats with urolithiasis; Surgery of Obstructive Urolithiasis in Ruminants 25 cases [2001-2006]. *Journal of the American Animal Hospital Association*; **234**:249–252.

Jason, S. (2009): Ovariohysterectomy in dogs and cats. www.acvs.Org/AnimalOwners/ DiplomateDirector.

Jeffrey A. Seaman; Amelia M. Simpson (2004): Tibial fractures. *Clinical Techniques in Small Animal Practice;* **19**(3): 0–167.

Jennifer M. Ewoldt; Meredyth L. Jones; Matt D. Miesner (2008): Surgery of Obstructive Urolithiasis in Ruminants; *Vet Clin North Am Food Anim Pract;* **24**(3): 0–465.

Jettennavar PS, Kalmath GP, Anilkumar MC (2010). Ventral abdominal hernia in a goat. *Veterinary World*; **3**(2): 93.

Johnson CA. (2003): Reproductive system disorders. In: Small Animal Internal Medicine (3rd Edn.), Eds., Nelson, R.W. and C.G. Couto, Mosby, St. Louis, 847-945.

Johnson, J.A.; Austin, C. and Bruer, G.J. (1994): Incidence of canine appendicular musculoskeletal disorders in 16 veterinary teaching hospitals from 1980 through 1989. *Vet Comp Orthop Trauma*; **7**(2): 56- 69.

Julie, B., Raghavan, K.S., Jayesh, V., Swapna, S.A., Pradeep, M.A. and Sajitha, I. (2013): Surgical Management of Liposarcoma in a dog. *Indian Veterinary Journal*; **90:** 97-99.

Kaeser, M.A., Smith, L.W. and Kettner, N.W. (2010): A case report of an intermuscular lipoma: presentation, pathophysiology, differential diagnosis. *Journal of Chiropractic Medicine*. **9(3):** 127-131.

Kahn, C. M. and Line, S. (2010): The Merck Veterinary Manual. 10th Edition, Merck and Company Incorporated, Whitehouse Station, New Jersey, USA.

Kalim MO, Zaman R, Tiwari SK. (2011): Surgical management of obstructive urolithiasis in a male cow calf. Veterinary World; **4**(5):213.

Kamus, L., Rameau, M. and Theoret, C. (2019): Feasibility of a disposable canister-free negative-pressure wound therapy (NPWT) device for treating open wounds in horses', *BMC Veterinary Research*, **15**(1): 1–10.

Kennedy, P.C. and Miller, RB. (2007): The Female Genital System, in: Kennedy KVF, Palmer PC (editors), Pathology of Domestic Animals, San Diego: *Academic Press*, **4**: 349-454.

Kerem Ural, Alic D, Karakurum MC, Aktas MS, Hydardedeoglu AE, Cingri CC. (2007): Tail tip necrosis in beef and dairy cattle: A report of seven cases in Ankara Kafkas. *Universitesi Veteriner Fakultesi Dergis;* **13**(2**)**:203-207.

Khamis Y, H A Hammad, G Hosni, R Salem and G Gamil, (2002): Mycotoxicosis as a cause of tail-tip necrosis in cattle. XXII World Buiatrics Congress Hannover, pp: 18-23.

Kim BS, Kim HS, Kim KC, Park CH, Oh KS & Son CH (2008): Vaginal prolapse by ovarian follicular cysts in a female Jin-do dog. *Korean Journal of Veterinary Research* **48**(2): 223-225.

Kim, HJ. Chang, HS. Choi, CB. (2005): Infiltrative lipoma in cervical bones in a dog. *Journal of Veterinary Medicine Science;* **67**(10):1043–1046.

Kirpensteijn, J., Ter Haar, G. (2013): Reconstructive surgery and wound management of the dog and cat. *Journal of canine practice;* **6**(1): 53-55.

Kirsch, J.A., Hauptman, J.G., Walshaw, R. (2002): A urethropexy technique for surgical treatment of urethral prolapse in the male dog. *Journal of American Hospital Association;* **38:** 381-384.

Kitessa, J. D., Merga, A. F., & Afata, A. W. (2021): A case report on ventrolateral herniorrhaphy in sheep: The novel way of using vest-over-pants closure technique. *Veterinary Medicine and Science*; 1–5.

Klopfleisch, R. H., Von Euler, G Sarli, S Pinho, F Gärtner. (2010): Molecular Carcinogenesis of Canine Mammary Tumors: News From an Old Disease. *Veterinary Pathology;* **48**(1): 98-116.

Knierim U., N. Irrgang; B. Roth and T. Gorniak. (2009): Report on the assessment of dehorning and the keeping of horned dairy and beef cattle. University of Kassel, Germany, pp. 1–37.

Knierim, U., Irrgang, N., & Roth, B., A. (2015): To be or not to be horned—Consequences in cattle. *Livestock Science. Elsevier*; **179**(2): 29-37.

Kobayashi SD, Malachowa N, DeLeo FR (2015): Pathogenesis of Staphylococcus aureus Abscesses. *American Journal of Pathology*; **185**(6): 1518-27.

Kofler J, Martnek B, Reinöhl-DeSouza C (2004): Treatment of infected wounds and abscesses in bovine limbs with Ligasano-polyurethane-soft foam dressing material. *Berliner und Munchener terarztliche Wochenschrif;* **117**(9): 428-438.

Kristiansen VM, Nodtvedt A, Breen AM, Langeland M, Teige J, Goldschmidt M, Jonasdottir TJ, Grotmol T & Sørenmo K (2013): Effect of ovariohysterectomy at the time of tumor removal in dogs with benign mammary tumors and hyperplastic lesions: A randomized controlled clinical trial. *Journal Veterinary Internal Medicine*; **27**(4): 935-942.

Krzyzewski, W (2004): About Instruments Using in the Treatment of Animals: Bloodletting Fleam [O Narz ˛edziach Stosowanych w Lecznictwie Weterynaryjnym. Puszczadło do Krwi]. In Proceedings of the Lecture delivered during XII Congress of Polish Society of Veterinary Sciences, Warsaw, Poland, 15–17.

Kumar A, Mohindroo J, Sangwan V, Mahajan SK, Singh K, Anand A. (2014): Ultrasonographic evaluation of massive abdominal wall swellings in cattle and buffaloes. *Turk J Vet Anim Sci*.; **38**(1): 100-103.

Kumar A, Sangwan V. (2017): 'Dry rumenotomy' technique for the retrieval of sharp metallic objects in bovine. *Indian Veterinary Journal;* **94**(9):72–74.

Kumar V, Kumar N, Gangwar A, Saxena A. (2013): Using acellular aortic matrix to repair umbilical hernias of calves. *Australian Veterinary Journal;* **91**(6): 251-253.

Kumar, D., Kumar, G., Gautam, Singh, K., Pandey, R.P. and Kumar, S. (2011): Surgical management of lipoma at neck region in a buffalo. *Indian Journal of Veterinary Surgery*; **32**(2): 153.

Kumar, K.R.A, G.V.S. Rao and C. Balachandran, (2011): Incidence, cytology, gross pathology and histopathology of mammary tumors in dogs of Chennai. *International Journal of Pharm and Bio Sci*ence **12**: 399-405.

Kumar, N., Singh, P. and Kumar S. (2006): Physical, x-ray diffraction and scanning microscopic studies of uroliths. *Indian Journal of Biochemistry and Biophysics*, **43**(4): 226 – 232.

Kumaresan, A., Prakash, S. and Selvaraju, M. (2014): Congenital paraphimosis in a pup- a case report, *Shanlax International Journal of Veterinary Science;* **1**(3):39-40.

Kupczyński, R., Anna Budny, A., Śpitalniak, K. Tracz, E. (2014): Dehorning of calves – methods of pain and stress alleviation – a review. *Annals of Animal Science;* **14**(2): 231–243.

Kushwaha RB. (2007): Evolution of tube cystostomy, urethrotomy and medical dissolution of urinary calculi for the management of obstructive urolithiasis in buffalo calves. *Indian Journal of Veterinary Surgery*; **28**(2):56-58.

Kustritz MV (2007). Determining of the optimal age for gonadectomy of dogs and cats. *Journal of American Veterinary Medical Association;* **23**(11): 1665-1675.

Lamagna, B., Grec, A., Guardascione, A., Navas, L., Ragozzino, M., Paciello, O., Brunetti, A. and Meomartino L. (2012): Canine lipomas treated with steroid injections: clinical findings. *PlosOne*; **7**(11): 1-5.

Lebbie, S.H.B. (2004): Goats under household conditions. *Small Ruminant Research;* **51**: 131-136.

Lee AJ, Chung WH, Kim DH. (2012): Use of canine small intestinal submucosa allograft for treating perineal hernias in two dogs. *Journal of Veterinary Science;* **13**(3):327–30.

Lewis D. D, Cross A. R, Carmichael S, and Anderson M. A. (2001): Recent advances in external skeletal fixation, *Journal of Small Animal Practice* **29**(5): 1097-1117.

Li, P., Wang, L, Qian X., Morse, A., Grafild, RE., and Liu, H., (2021**):** A study of uterine inertia on spontaneous of labor using uterine electromyography. *Taiwanese j. Obstetrics and Gynecology*; **60**(3): 449-453.

Linde-Forsberg, C. (2005): "Abnormalities in pregnancy, parturition, and the periparturient period". In: Ettinger S.J., *et al.* (Eds.) Textbook of Veterinary Internal Medicine. Philadelphia: W.B. Saunders.1655-1667.

Lloyd, K.C., Peterson, P.R., Wheat, J.D. Ryan, A.E. and Clark, J.H. (1988): Keratomas in horses: Seven cases (1975-1986). *Journal of the American Animal Hospital Association*; **193**(8): 967-970.

Lohr, C. V., (2013):"One hundred two tumors in 100 goats (1987–2011)," ¨ *Veterinary Pathology*, **50**(4): 668–675.

Loren, G.S., Tyler, J.W., Moll, H.D. (2008): Surgical approaches for cesarean section in cattle. *Can Vet J*. **49**(6): 565- 568.

Lott-Crumpler; D.A, Chaudhry H.R. (2001): Optimal patterns for suturing wounds of complex shapes to foster healing. *Journal of Biomechanics;* **34**(1): 51–58.

Lozier JW, Niehaus AJ. (2016): Surgery of the forestomach. *Vet Clin North Am - Food Anim Pract;* **32**(3):617–628.

Lugo J. (2006): Thoracic Disorders. In: Auer JA, Stick JA, editors. Equine Surgery. Philadelphia: Saunders; 560–564.

Lund EM, Armstrong PJ, Kirk CA & Klausner JS (2006): Prevalence and Risk factors for Obesity in Adult Dogs from Private US Veterinary Practices. *International Journal of Applied Research in Veterinary Medicine;* **4**(2): 177- 186.

Machado, D. B., SATO, I. M., Silva, F. R. O., Salvador, V. L. R., Marumo, J. T. and Schor, N. (2014): Elemental composition and microstructure analysis of a rabbit urolith. *Journal of Radioanalytical and Nuclear Chemistry:* **302**: 97 – 102.

Mahesh, R., Rambabu, K., Prasad, V. D. and Kamalkar, G. (2016): Treatment of paraphimosis in a goat. *Journal of Livestock Science*, **7**: 303-305.

Mahida, H.K., P. Tank, M.A. Dhami, D.O. Joshi, A.S. Karle and H.S. Vedapathak. (2009): Epidemiological status of surgical affections of the buffalo horn at hospital population and ambulatory villages. *Indian Journal of Veterinary Surgery*; **30**(2): 192-193.

Makhdoomi, D. M. and Gazi, M. A. (2013): Obstructive Urolithiasis in Ruminants – A Review. *Veterinary World*; **6**(4): 233 – 238.

Mallesh P, Ravi K, Venumadhav N, Reddy, NVK. (2017): Surgical management of paraphimosis in bullock: A case report. *The Pharma Innovation Journal*; **6**(**7**):335- 336.

Marina M, Palmer J (2007). Dog bites. *British Medical Journal*; **334**(7590**):** 413–417.

Martinez MM, Cardona JA, Pérez DM. (2019): Cirugías De Rutina En Rumiantes Domésticos. Montería- Córdoba: Fondo Editorial Universidad de Córdoba (Spain).

Maxie, G.M., (2007): Jubb, Kennedy and Palmer's Pathology of Domestic Animals, vol. 1, fifth ed. Elsevier.

Mc Curin, D.M. and J.M. Basser, (2006): Clinical text book for veterinary technicians (6th edn.) Elsever, the Saunders, pp: 224-244.

McKenzie B (2010). Evaluating the benefits and risks of neutering dogs and cats. *Perspectives in American Veterinary Medical Association,* **23**(11): 1665-1675.

Mekuria, S., Matusala M. and Rahameto, A. (2013): Management practices and welfare problems encountered on working equids in Hawassa town, Southern Ethiopia; *Journal of Veterinary Medicine and Animal Health*; **5**(9): 243-250.

Mengistu, A. (2003): The genetic resources perspective of equines in Ethiopia and their contribution to the rural livelihoods. Proceedings of the 11th Annual Conference of the Ethiopian Society of Animal Production (ESAP). Addis Ababa, Ethiopia, 81- 85.

Mavangira, V., Hughes, J. M., Middleton, J. R., Mitchell, W. J., & Kim, D. Y. (2008): Malignant Melanoma of the Horn Base in a Pygora Goat. *Journal of Veterinary Diagnostic Investigation;* **20**(1): 104–107.

Merck, (2006): In: Merck's Veterinary Manual, 8th edn. Merck and Inc.,White House Station, New Jersy, USA.

Michael, M.P. (2005): The Management of Canine Paraphimosis, Director of Surgical Services Angell Animal Medical Centre Boston, Massachusetts, report on Diseases and Surgery of the Canine Penis and Prepuce. World Small Animal Veterinary Association World Congress Proceedings.

Millard, H. A. T., Millard, R. P., Constable, P. D., & Freeman, L. J. (2014): Relationships among video gaming proficiency and spatial orientation, laparoscopic, and traditional surgical skills of third-year veterinary students. *Journal of the American Veterinary Medical Association;* **244**(3): 357–362.

Mills KE, von Keyserlingk MA, Niel L. (2016): A review of medically unnecessary surgeries in dogs and cats. *Journal of the American Veterinary Medical Association*; **248**(2): 162-171.

Misk NA, Misk TN, Semieka MA, Ahmed AF (2008): Body surface cysts in some farm animals. In 25th World Buiatrics Congress p. 6-11.

Misk, N.A., J.M. Nigam and J.F. Rifati, (1999): Management of foreign bodies' syndrome in Iraqi cattle. *Agricultural Practice;* **5**(8): 18-20.

Misk, NA. (2019): Fundamentals of general veterinary surgery. Assiut city press, Assiut, Egypt.

MOA (Ministry of Agriculture), (2012): Report Presented on a Seminar in the Establishment of Animal and Animal Products Development and Marketing Authority. Addis Ababa. *International Journal of Nutratiom and Food Sci;* **4**(3): 373–380.

Monsang SW, Pal SK, Kumar M, Roy J. (2014): Surgical Management of Concurrent Umbilical Hernia and Intestinal Fecolith in a white Yorkshire Piglet, Case Report. *Research Journal for Veterinary Practitioners*; **2**: 67-69.

Morales C, Falcón N, Hernandez H, Férnandes C (2011): Accidentes por morded uracanina, casosregistrados en un hospital de niños de Lima, Perú 1995–2009 Rev. *Peru. Med. Exp. Salud. Publica*; **28**(4):639-642.

Morello E, Martano M, Zabarino S. (2015): semitendinosus muscle transposition to repair ventral perineal hernia in 14 dogs. *J. Small Anim Pract*; **56**(6): 370-376.

Morgan, R. (2008): The epidemiology of lameness in working donkeys in Addis Ababa and the central Oromia region of Ethiopia: a comparative study of urban and rural donkey populations. *Colloquium Proceedings*, 99-06.

Mortari AC, Rahal SC, Resende LA. (2005): Electromyographical, ultrasonographical and morphological modifications in semitendinosus muscle after transposition as ventral perineal muscle flap. *Journal of Veterinary Med a Physiol Pathol Clin Med;* **52**(7):359–365.

Mosbah, E., Abouelnasr, K. S. 2014. Commercial polyester/cotton fabric (Damour): a novel prosthetic material for hernioplasty in ruminants. *Iran Journal of Veterinary Research*; **16**(1):105-9.

Narayanan, D. L. Saladi, R. N. and Fox, J. L. (2010): Ultraviolet radiation and skin cancer, *International Journal of Dermatology*, **49**(9): 978–986.

Narayanan, M.K., Sarangom, S.B., Devanand, C.B., Antonia, N.A., Jinu, J., Gadhafi, K.P., Syam, K. V. and Anoop, S. (2014): Diaphragmatic hernia in a kid – first case reported. *Israel. Journal of Veterinary Medicine;* **69**: 146–150.

Nevi TO, Kisani AI, Wachida N. (2015): Paraphimosis in a seven month old weather: A case report, *Paripex Indian Journal of Research*; **4**(9):148-149.

Newman, K.D. (2008): Bovine Cesarean Section in the Field. *Vet. Clin. Food Anim. Pract*., **24**(2):273–293.

Niebauer GW, Shibly S, Seltenhammer M, Pirker A, Brandt S. (2005): Relaxin of prostatic origin might be linked to perineal hernia formation in dogs. *Annals New York Acad Sci*; **1041**: 415-422.

Niehaus, A.J. (2008): Rumenotomy. *Vet. Clin. Food Anim. Pract*., **24**: 341–347.

Nishida, J., Morita, T., Ogose, A., Okada, K., Kakizaki, H., Tajino, T., Hatori, M., and Orui, H. (2007): Imaging characteristics of deep-seated lipomatous tumors: Intramuscular lipoma, intermuscular lipoma, and lipoma-like lipossarcoma. *Journal of Orthopaedic Science*; **12**(6): 533-541.

Nissen T, Wynn R. (2017): The history of the case report: A selective review. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/ PMC4012665/ JRSM Open. Last accessed Aprill 2, 2019.

NMSA (National Mariology Service Agency) (2003): Addis Ababa, Ethiopia.

Noakes, D.E., Parkinson, T.J. & England, G.C. (2009): Veterinary reproduction and obstetrics, Elsevier, China.

Noakes, D. E., Parkinson, T. J., & England, G. C. (2018): Arthur's Veterinary Reproduction and Obstetrics-E-Book, Elsevier Health Sciences.

NRC (National Research Council) (2010): Guide for the Care and Use of Laboratory Animals (8th Ed.). Washington, DC: National Academy Press.

Nuss LK, Fiest M. (2011): Tail amputation for treatment of osteomyelitis of the first and second coccygeal vertebrae in a cow. *Tierarzal Prax;* **3**(4):176-178.

Oakley R, (1999): External coaptation. *Vet Clin North Am Small Anim Pract*; **29:**1083-1094.

Ober, C., Muste, A., Mates, N., Oana, L., Beteg, F. and Vancea, C. (2007): Techniques implant of prosthetic meshes of polypropylene in repair of the abdominal wall defects in horses. *Bull. Univ. Agric. Sci. Vet. Med. Cluj. Napoca*; **64**: 509–513.

Olatuunjii-Akioye, Omobowale, Olaifa, Abiola. (2010): Tail docking in an African lion (Panthera Leo). *Israel Journal of Veterinary Medicine*; **65**(2):75-76.

OLIVIRA, K.S. (2016): Dystocia in dogs and cats: main causes. World Small Animal Association Congress Proceeding. Cartagena, CO: World Small Animal Veterinary Association (WSAVA).

Omeran, B. M. Ramadan E. Abdel-Wahed, Mahmoud H. El-Kammar, Howiada AbuAhmed (2014): Ovariectomy Versus Ovariohysterectomy for Elective Sterilization of Female

Cats. *Alexandria Journal of Veterinary Sciences*; **43**: 73-81

Omidi, A., H. Naeemipoor and M. Hosseini, (2012): Plastic debris in the digestive tract of sheep and goats: An increasing environmental contamination in Birjand, Iran. Bulletin of Environmental Contamination and Toxicology; **88**(5): 687-690.

O'Neill DG, Corah CH, Church DB, Brodbelt DC, Rutherford L. (2018): Lipoma in dogs under primary veterinary care in the UK: prevalence and breed associations. *Canine Genet Epidemiol;* **5**(1): 9.

Orsher RJ. (1986): Clinical and surgical parameters in dogs with perineal hernia. Analysis of results of internal obturator transposition. *Veterinary Surgery*; **15**(3)**:**253–258.

Özak A, Beşaltl Ö, Gökçe P, Can Z. (2001): Köpeklerde perineal herni'nin tanl ve sağaltlml (1999- 2001). *Journal of Technical Vision;* **7**(4): 31-34.

Ozsoy S, Altunatmaz K. (2005): Treatment of extremity fractures in dogs using external fixators with closed reduction and limited open approach. *Veterinary Medicine* **48**(5):133–140.

Pan Z, Pan J, Wang H, Yu Z, Li Z, Yang W, Li J, Zhu Q and Luo Z (2019): Healing physiology following delayed surgery for femoral midschaft fracture caused by high-energy injury: an in vivo study in dogs. *Journal of International Medical Research*; **47**(10):5155-5173.

Papazoglou, L.G. (2001): Idiopathic chronic penile protrusion in the dog: 6 cases. *Journal of Small Animal Practice*, **42**(10): 510-513.

Papazoglou.L, Eleni. B, Stefania. R, Michael. N P, Maria. K. (2014): Current surgical options for mammary tumor removal in dogs. *Journal of Veterinary Science and Medicine*; **2**:2-7.

Parrah JD, Hussain SS, Moulvi BA, Singh M, Athar H. (2010): Bovine uroliths analysis: A review of 30 cases. *Israel Journal of Veterinary Medicine*; **65**(3):103-107.

Pavletic MM, Trout NJ (2006): Bullet, bite, and burn wounds in dogs and cats. Veterinary Clinics: *Small Animal Practice* **36**(4): 873-893.

Peeters, M.E., Kirpensteijn, J. (2011): Comparison of surgical variables and short-term postoperative complications in healthy dogs undergoing ovariohysterectomy or ovariectomy. *Journal of American Veterinary Medicine Association;* **238**(2): 189–194.

Peroni J. (2011): Thoracic trauma: gasping for air. Proceedings. ACVS Symposium. Chicago; 52–54.

Piermattei DL, Flo GL. (1997): Handbook of small animal orthopedics and fracture repair (edn 3). Philadelphia, PA, Saunders.

Pollari, F.L., Bonnett, B.N., Bamsey, S.C. (1996): Postoperative complications of elective surgeries in dogs and cats determined by examining electronic and paper medical records. *Journal of American Veterinary Medicine Association;* **208**(1):1882–1886.

Potter, T. (2007): Enucleation of the bovine eye. *UK Vet*; **12**(5): 57–59.

Pretzer, S.D., (2008): Medical management of canine and feline dystocia. *Theriogenology*; **70**(3): 332-336.

Pugh DG, Baird AN. (2012): Sheep and Goat medicine, 2nd ed. Maryland Heights (Missouri): Elsevier Saunders.

Purohit, G., & Mehta, J. (2006): Dystocia in cattle and buffaloes: A retrospective analysis of 156 cases. *Veterinary Practitioner* **7**: 31-34.

Purohit, G. N., Barolia, Y., Shekhar, C., and Kumar, P. (2011): Maternal dystocia in cows and buffaloes: a review. *Open journal of Animal sciences;* **1**: 41.

Purohit, G.N., Gaur, M., Kumar, A., Shekher, C. and Ruhil, S. (2013): Perspectives of cesarean section in buffaloes. *Asian Pacific J. Reprod.,* **2**(3): 229–237.

Radišić, B., Capak, D., Matičić, D., Harapin, I., Kos, J., Babić, T., Nedeljković, G. (2010): Surgical treatment of a unilateral scrotal hernia in a ram - a case report. *Vet. Arhiv,* **80**(1):145-154.

Radostitis, O.M., Gray, C.C., Blood, D.C & Hinchelift, K.W. (2009): Veterinary Medicine: A Textbook of the diseases of cattle, sheep, pig, goats and horses, 10th edn New York, USA: Saunders Elsevier. Pp. 189-382, 296 and 313.

Radostits M., Gay C. C., Blood D.C. and Hunchcliff K.W. (2003): Veterinary Medicine 10th edition, W.B.Saunders Company Ltd., 493-500

Radostits OM, CC Gay, KW Hinchcliff and PD Constable, (2007): Veterinary medicine textbook, A textbook of the diseases of cattle, horses, sheep, pigs and goats, 10th edition, pp: 2036-2037.

Radostits OM, Gay CV, Blood DC, Hinchcliff KW (2000): Diseases of the urinary system, in Radostits OM, *et al* (eds): *Veterinary Medicine. A Textbook of the Diseases of Cattle, Sheep, Pigs, Goat and Horses,* Ed 9. WB Saunders Company Ltd, pp 479-500.

Rafee MA, Baghel M, Palakkara S, Haridas S. (2015): Obstructive urolithiasis in buffalo calves: a study on pattern of occurrence, etiology, age, clinical symptoms and condition of bladder and urethra. *Buffalo Bulletin*; **34**(3):261-265.

Rafid, H.F., Al-Husseiny, S.H and Al-Ameer, A.N.A., (2017): Surgical treatment of hernia in cattle: A review. *QJVMS*; **17**(2): 61-68.

Rahel, M., (2011): Study on fore stomach foreign bodies in cattle Slaughtered Hawassa Municipal Abattoir, Ethiopia, DVM thesis Gondar University, Faculty of Veterinary Medicine, Gondar, Ethiopia, pp: 4-9.

Rahman, M.A., Islam, M.A., Talukder, A.K., Parvin, M.S. and Islam M.T. (2012): "Clinical diseases of ruminants recorded at the Patuakhali science and technology University veterinary clinic," *Bangdelash Journal of Veterinary Medicine;* **10**(2): 63-73.

Ramani, C. (2010): "Paraphimosis". VSR 421: Regional Veterinary Surgery (2+1). Retrieved from http://ecoursesonline.iasri.res.in/mod/page/view.php.

Ramaswamy V, Sharma HR (2011): Plastic bags-threat to environment and cattle health: A retrospective study from Gondar city of Ethiopia. *IIOAB J;* **2**(1): 6-11.

Ramprapbhu, R., P., Dhanapalan and Parathaban, S. (2002): Diagnostic tests in the diagnosis of traumatic reticuloperitonitis and allied syndrome in cattle: Center of advanced studies in veterinary clinical medicine and therapeutics. *Israel Journal of Veterinary Medicine;* **6:** 48-56, ISSN: 0334-9152.

Rao, C.M., Prasad, B.C. and Krishna, N.V.V.H. (2011): Surgical Management of Lipoma in a Dog. *Veterinary World;* **4:**34.

Rao. K. Rama, Makkena Sreenu K.B.P. Raghavender and P.V.S. Kishore. (2016): Incidence , Pain Assessment and Management of Horn Affections in Buffaloes', **35**(3). 'Original Article Buffalo Bulletin (July-September 2016).

Ravikumar, K., Varudharajan, V., Selvaraju, M. and Prakash, S. (2019): Successful Management of Paraphimosis in a Buffalo Bull. *Indian Veterinary Journal;* **96** (7): 74 – 75.

Reddy N. Vamshi K, G. Aruna Kumari, K. Ramchandra R (2016): Dystocia Due to Fetal Goiter in A Goat-A Case Report. *Journal of Animal Science* **73**(5): 1487-1492.

Remi-Adewunmi, B.D., Gyang, E.O., & Osinowo, A. O. (2004): Abattoir survey of foreign body rumen impaction in small ruminants. *Nigerian Veterinary Journal* **25**: 32-38.

Roberts, S.J., (2004): Disease and Accident of the Gestation Period. In: Veterinary Obstetrics and Genital Disease (Theriogenology). Ch. 7, pp 184 -185.

Romagnoly, S., DeSouza, FF., Rota, A., Vannozi, I., (2004): Prolonged interval between parturition of normal, live pups in the bitch: case report and literature review. *Journal of Small Animal Practice*; **45**(5): 249-253.

Roman, T., Gemedo, B. and Mekonnen, S. (2014): Surgical conditions and requested procedures for ruminants and small animals handled at the College of Veterinary Medicine and Agriculture clinic, Bishoftu, Ethiopia: A retrospective study 1999-2007. *Ethiopian Veterinary Journal;* **18** (1):83-97**.**

Root Kustritz, M. V. (2006): Clinical management of pregnancy in cats. *Theriogenology*, **66**: 145–150.

Rothman KJ. (2012): Epidemiology: an introduction. Oxford: Oxford University Press.

Sagar, P.V., Harish, D and Babu, P.P., 2010. Ventral hernia in an Ongole cow: A case Report, *Veterinary World***; 3**(2): 90-91.

Sahoo, S. and Ganguly, S. (2015): Surgical Management of Abscess in Camel: A Case Report. *World Journal BMS*; **2**(4): 32-34

Salib FA, Farghali HA. (2016): Epidemiological, therapeutic and surgical studies on Tail necrosis in Egypt. *International Journal Veterinary Science*; **5**(2):58-63.

Salim, M.D., Abul Hashim, M, Juyena, N.S, Arafat, Y.A, Dey, R.K, Bag, A and Islam, M.S. (2015): Prevalence of Hernia and Evaluation of Herniorrhaphy in Calves, *International Journal of Natural and Social Science* **2**(4): 35-43.

Samad, M.A. (2001): "Observations of clinical diseases in ruminants at the Bangladesh Agricultural University," Veterinary Clinic. *Bangladesh Veterinary Journal;* **35**: 93-120.

Schoenian, S. (2005): Urinary calculi in sheep and goats. Accessed December 10, 2015.

Schott, H.C. and Woodie, J.B. (2012): Bladder. In: Equine Surgery, 4th edn, Eds: *J.A. Auer and J.A. Stick*, W.B. Saunders, Philadelphia, Pennsylvania; 877-887.

Schreiner DA, Ruegg PL. (2002): Effects of tail docking on milk quality and cow cleanliness. *Journal of Dairy Science;* **85**(10): 2503–2511.

Schultz LG, Tyler JW, Moll HD. (2008): Constantinescu GM. Surgical approaches for cesarean section in cattle. *Canadian Veterinary Journal*; **49**(6): 565-568.

Schulz, K.L.and Anderson, D.E. (2010): Bovine enucleation: A retrospective study of 53 cases (1998-2006). *Canadian Veterinary Journal*; **51**(6): 611–614.

Seid AM and Birhan M (2019): A Review on Equine Wound Management and Healing Process. *Online J. Anim. Feed Res*; **9**(2): 68-85.

Seim HB. (2009): Surgical management of perineal hernia. Proc North Am Vet Conference; 1571–1573.

Shah Z, Ahamd S, Sarwar MS, Khan MA, Ali J. (2016): Surgical intervention of umbilical hernia in dairy cross Holstein Friesian calf. *Meat Sciences and Veterinary Public Health;* **1**(1): 1-3.

Sharif M, Reinacher M. (2006): Clear cell trichoblastomas in two dogs. *Journal of Veterinary Medicine*; **53**(7): 352-354.

Shaughnessy M, Monnet E. (2015): Internal obturator muscle transposition for treatment of perineal hernia in dogs: 34 cases (1998–2012). *Journal of American Veterinary Medicine Association*; **246**(3): 321-326.

Signh J and Kumar A (2001): integumentary system. In Tyagi, R. P. S and J. Singh (eds.) Ruminant surgery, 1st ed. CBS Publishers, New Delhi, India; p. 147.

Singh J, Singh S, Tyagi R. (2019): Ruminant surgery: A Textbook of the surgical diseases of cattle, buffaloes, camels, sheep and goats, 2nd ed.. New Delhi, India: CBS Publishers & Distributors Pvt Ltd.

Singh MK., Gupta AK & Yadav M (2005): The Donkey: It's role & the scope for better management. *Livestock international*; **9**(2): 8-20.

Singh, B.A., Preethi, K.O, Devi, A.K, Gangwar, N.K, Katiyar, S.S, Kale, G, Patel, H and Singh, N. (2014): Ventral Abdominal Hernioplasty Using Nylon Mesh In A Cow, *Indian Veterinary Journal;* **91**(11): 93-94.

Snell, W.L., Orsher, R.J., Larenza-Menzies, M.P., Popovitch, C.A. (2015): Comparison of caudal and pre-scrotal castration for management of perineal hernia in dogs between 2004 and 2014. *Veterinary Journal;* **63**(5): 272-275.

Sogebi, E.A.O., Adefila, I.S., Talabi, A.O., Babalola, S.A. and Eze, C.A. (2016): The use of skin grafts in the management of dehorning complications in West African Dwarf Bucks. *Nigerian Journal of Animal Science;* **2**: 473 - 482.

Sood, P., Kumar, P., A Sharma, P., Barman and Kumar, N. (2011): Successful management of dystocia due to incomplete abortion in a buffalo. *Buffalo Bulletin*; **30**: 4.

Spain, C.V., Scarlett, J.M., Houpt, K.A. (2004): Long-term risks and benefits of early-age

gonadectomy in cats. *Journal of American Veterinary Medicine Association;* **224(**3):372–379.

Sprayberry, Kim A.; Barrett, Elizabeth J. (2015): Thoracic Trauma in Horses. *Veterinary Clinics of North America: Equine Practice*; **31**(1): 199–219.

Sreenu, M. and Kumar, N.R. (2006): Affections of horn in buffaloes. *Indian Veterinary Journal;* **83**: 1206-1207.

Stedile, R., Olivira, S.T., Muccillo, M.D.S., Contesini, E.A., and Beck, C.A.D., (2011): Dystocia in cat due to an ectopic artery. *Vet. Recorded;* **169**(21):556

Steenholdt, Christian; Hernandez, Jorge (2004): Risk factors for umbilical hernia in Holstein heifers during the first two months after birth. *Journal of the American Veterinary Medical Association;* **224**(9):1487–1490.

Stephen JE, Edward CF (2010): Textbook of Internal Medicine, 7th ed., Saunders, Elsevier, Canada.

Stoll MR, Cook JL, Pope ER, Carson WL, Kreeger JM. (2002): The use of porcine small intestinal submucosa as a biomaterial for perineal herniorrhaphy in the dog. *Veterinary Surgery*; **31**:379-390.

Stone, E. A. (2003): Ovary and uterus. The Textbook of Small Animal Surgery; 3rd edn. Ed D. Slatter. Philadelphia, W. B. Saunders. Pp. 1487-1502.

Subapriya, S. Vairamuthu, S., Pazhanivel, N., Ravi Sundar George and M Gokulakrishnan (2020): Cutaneous lipoma in dogs, *Journal of Entomology and Zoology Studies*; **8**(3): 17–19.

Sutradhar, B.C., Hossain, M.F, Das, B.C, Kim,G and Hossain, M. A. (2009): Comparison Between Open And Closed Methods Of Hernioraphy In Calves Affected With Umbilical Hernia, *Journal of Veterinary Science*, **10**(4): 343-347.

Szabo, S., Wilkens, B., Radasch, R.M. (2007): Use of polypropylene mesh in addition to internal obturator transposition: a review of 59 cases (2000–2004). *Journal of American Animal Hospital Association*; **43**(3): 136-142.

Heimendahl, V. A. and Cariou, M. (2009): Normal parturition and management of dystocia in dogs and cats. *In Pract*; **31**(6): 254–261.

Talukder, A., Das, Z., Rahman M.A., Rahman M.T., and Rahman A.N.M.A., (2021): Caesarean Section, followed by ovariohystectomtomy in a Bangladeshi domestic cat: A surgical

intervention for management of dystocia due to partial primary uterine inertia. Journal of *Veterinary Medicine;* **7**(5):1564-1568.

Tamilmahan P, Mohsina A, Karthik K, Gopi M, Gugjoo MB, Rashmi, Zama MMS (2014): Tube cystotomy for management of obstructive urolithiasis in ruminants. *Veterinary World*, **7**: 234-239.

Taylor LH, Wallace RM, Balaram D, Lindenmayer JM, Eckery DC, MutononoWatkiss B (2017): The role of dog population Management in Rabies Elimination-a Review of current approaches and future opportunities. *Front Vet Sci.;* 4:109.

Tercanliogu, H. and Sarierler, M. (2009): Femur Fractures and Treatment Options in Dogs Which Brought our Clinics. *Lucrari Stiiniiifice Medicina Veterinara*; **13(2):** 98-101.

Tesfaye, A. and Curran, M.M. (2005): A Longitudinal Survey of Market Donkeys in Ethiopia, Trop. *Animal Health Production;* **37:** 87-100.

The Donkey Sanctuary (2006): Website. Thedonkeysanctuary.org.uk (Retrieved June 2, 2013).

Theoret C. (2017): Physiology of wound healing. In: Theoret C, Schumacher J, editors. Equine wound management. 3rd edn: John Wiley & Sons, Inc. 1–13.

Theoret CL, Wilmink JM. (2013): Aberrant wound healing in the horse: naturally occurring conditions reminiscent of those observed in man. *Wound Repair Regen.* **21**(3):365–71.

Thorat M G, Bhikane AU, Yadav G U, Ghadage H R and Mahajan M V. (2008): Clinical management of multiple abscesses in bullock. *Intas Polivet.* **9**(1):79-80.

Tibary, A. (2004): Surgery of the sheep and goat reproductive system and urinary tract. In: Farm animal surgery. Fubini, S.L. and Ducharme, N.G. (Edts). Saunders, St. Louis.

Tiruneh, R., Bersisa, G. and Sori, M. (2014): Surgical conditions and requested procedures for ruminants and small animals handled at the College of Veterinary Medicine and Agriculture clinic, Debre Zeit, Ethiopia: A retrospective study 1999-2007. *Ethiopian Veterinary J*ournal; **5**(1): 83–97.

Tiwari, S.K. and Kashyap, D.K. (2011): Chemotherapeutic management of foot abscess in female Asian elephant (*Elephasmaximus*). *Zoo's Print*, **26**(12): 24.

Tobias, K. M. and Ayres, R. (2006): Intestinal anastomosis. *Veterinary Medicine;* **101**(4): 226-229.

Tomlinson J. (1991): Complications of fractures repaired with cats and splints. *Vet Clin North Am (Small Anim Pract);* **21**:735-744.

Tsujita, H. and Plummer, C.E., (2010) Bovine Ocular Squamous Cell Carcinoma. *Vet. Clin. N. Am. Fd. Anim. Pract*., **26(3)**: 511-529.

Tucker CB, Fraser D, Weary DM. (2001): Tail docking dairy cattle: effects on cow cleanliness and udder health. *Journal of Dairy Science*; **84**(1): 84-87.

Türk, C., Petřík, A., Sarica, K., Seitz, C., Skolarikos, A., Straub, M., & Knoll, T. (2016): *EAU Guidelines on Interventional Treatment for Urolithiasis. European Urology;* **69(3):** 475–482.

Tyagi PS, Singh, J. (2010): Ruminant Surgery. CBS Publishers, New Delhi, 226-227.

Tyagi, R.P.S. and Singh, J. (2012): Ruminant Surgery, 11th edn. CBS Publishers and Distributors Pvt. Ltd. New Delhi, pp.167- 174.

Umeshwori, N., Kumar A., Tyagi, S.P. and Kurade, N.P. (2011): Incidence and management of neoplasms in dogs of Himachal Pradesh. *Ind. J. of Animal Sciences.* **81(1):** 26-28.

Unger, M.; Montavon, P.M. and Heim, U.F.A. (1990): Classification of fractures of the long bones in the dog and cat: introduction and clinical application. *Vet Comp Orthop Trauma;* **3(2):**41-50.

Ural K, D Alic, MC Karakurum, MS Aktas, AE Haydardedeoglu and CC Cingi, (2007): Tail-Tip Necrosis in Beef and Dairy Cattle: A Report of Seven Cases in Ankara. *Kafkas Üniv Vet Fak Derg*, **13**: 203-207.

Vail, D.M. and E.G. MacEwen, (2000): Spontaneously occurring tumors of companion animals as models for human cancer. *Cancer Invest*; **18**(8): 781-792.

Valentine, B.A., (2004): Neoplasia. In: Fubini, S.L., Ducharme, N.G. (Eds.), Farm Animal Surgery. Saunders, pp. 23–44.

Valentine, B.A., 2006. Survey of equine cutaneous neoplasia in the Pacific Northwest. *J. Vet. Diagn. Invest*; **18**(1): 123–126.

VanMetre DC, Divers TJ. (2002): Diseases of the renal system: urolithiasis. In: Smith BP, editor. Large animal internal medicine. 3rd edn. St. Louis (MO): Mosby; p. 853–60.

Veena, P., Bharathi, S. and Devarathnam, J. (2013): Surgical management of lipoma in a dog. *Intas Polivet*; **14**(2):475-47.

Vegad, J.L. (2012): A Textbook of Veterinary General Pathology. 2nd Edn, International book distributing Co. pp: 354-57.

Vermunt, J.J., (2008). The Caesarean Operation in Cattle: I*ran. J. Vet. Surg;* **4:** 82-100.

Vidane, A.S., ELIAS, A. J Z., Cardoso, J.M., Harun, M. (2014): Incidence of fractures in the dogs and cats in Maputo (Mozambique) between 1998 and 2008. *Ciência Animal Brasileira;* **15**(4): 490-494.

Villar, J.M., Corbera, J.A., Spinella, G. (2011): Double- layer mesh hernioplasty for repairing umbilical hernias in 10 goats. *Turk Journal of Veterinary and Animal Science;* **35**(2): 131-135.

Vinod Kadapatti, H.K. Santosh, K.M. Srinivasa Murthy, S.P. Koushiek Yadav, C.L. Sunil, Tharasingh D. Lamani and Nagaraja, B.N. (2019): Traumatic Ventral Herniorrhaphy in a HF Cow – A Case Report. *Int.J.Curr.Microbiol.App.Sci.* **8**(9): 649-653.

Vnuck D, Maticic D, Kreszinger M, Radisic B, Kos J, Lipar M, Babic T. (2006): A modified salvage technique in surgical repair of perineal hernia in dogs using polypropylene mesh. *Vet Med-Czech;* **51**(3): 111-117.

Watson C, Penny C. (2003): Crushed tail head syndrome in cattle. *Veterinary Record;* **152**(17): 542–543.

White, S.C., (2012): Prevention of fetal suffering during ovariohysterectomy of pregnant animals. *Journal of American Veterinary Medicine Association;* **240**(10):1160-1163.

Whitfield-Cargile, C.M., Rakestraw, P.C, Hardy, J.N, Cohen, D and Davis, B.E. (2011): Comparison of Primary Closure of Incisional Hernias in Horses with and Without the Use of Prosthetic Mesh Support. *Equine Veterinary Journal*; **43**(39): 69-75.

Williamson LH (2001): Caseous lymphadenitis in small ruminants. *Veterinary clinics of North America: Food animal practice;* **17**(2): 359-371.

Wilson, T.W., and Rossi J. (2006): Factors affecting calving difficulty. *Bulletin 943* Cooperative Extension, University of Georgia, GA, USA, pp. 1-4.

Woods, A. (2018): Between Human and Veterinary Medicine: The History of Animals and Surgery. In: Schlich, T. (Ed.). The Palgrave Handbook of the History of Surgery. Palgrave Macmillan UK, London, pp. 115–131.

World Bank, (2017): International Development Association: Project Appraisal Document on a Proposed Credit in the Amount of SDR 121.1 Million (US$ 170 Million Equivalent) to the Federal Democratic Republic of Ethiopia for a Livestock and Fisheries Sector Development Project (Project Appraisal Document No. PAD2396). Washington DC.

Yasin, M.I. (2017): External Hernias in Ruminants in Dohuk. *Bas.J.Vet.Res*; **16**:348–368.

Youngquist R.S., Threlfall W.R. (2007): Current therapy in large animal theriogenology (2nd Edition). Elsevier Health Sciences.

7. ANNEXES

Annex 1: Patient Recording Format

Date._____
Case No._____

Name of the Hospital: ☐ **VTH** ☐ **SVC**

Animal Detail

Species: Bovine ☐ Ovine ☐ Caprine ☐ Equine ☐ Canine ☐ Feline ☐
Swine ☐ Avian ☐

Breed _____ Sex: M ☐ F ☐ Age _____

Animal identification _____ Name /if any/ _____

Owner Detail

Owners' Name _____Address Town _____Kebele _____ House No___
Occupation_____ Phone No _____

CASE HISTORY

_____

_____

Clinical Finding

Body Temp _____^{o}C Respiration rate _____Breaths/min Heart rate _____ Beat/min Ruminal Motility ____/min Gut sound _____ VMM: Normal pale Congested Joundice Cyanotic CRT:_____Body Condition:_____Superficial Ln: PF___ PS___MND _____RPH_____ OTHER_____

Description of Case

_____

_____

Organ or system affected: ☐ Nervous ☐ Musculoskeletal ☐ Respiratory
Circulatory ☐ Digestive ☐ Urogenital ☐ Integumentary ☐ Others (specify)

Sample Taken

☐ Feces ☐ Blood ☐ Skin scraping ☐ Nasal swab ☐ Vaginal swab ☐

Ruminal content ☐ Urine Other

Differential Diagnosis List:_____
Laboratory Result:_____
Tentative Diagnosis: _____
Definitive Diagnosis:_____

Patient Card

Prognosis:

_____

_____

Observation And Treatment

CLINICAL WORK TO BE PERFORMED:

Surgical_____
Medical_____
Gynecology/Obstetric Follow up /Quarantine

Medical Treatment Administered

Date: _____
Name of Staff in Charge: _____Signature_____
Student in Charge: _____Signature_____

Annex 2: Pre-Anesthetic Evaluation Form

Time: _____

Date: _____

Patient Name:

_____

Requested By:

_____

History:_____

_____

Physical exam data:

_____

_____

_____

Findings/case/ and Diagnosis_____

Labs/Rads/

Other:_____

Procedure/Reason For Anesthesia:_____

Plan/Recommendations:_____

Further Diagnostics:

_____

Pre-Anesthetic Therapy: _____

Premedication: _____

Induction: _____

Maintenance: _____

Analgesia: _____

Fluids:_____

Monitoring: _____

Annex 3: Anesthetic and Intra operative Observations format

Group				Date	Procedure		
Surgeon					AS.Surgeon		
Anaesthetist					Patient monitor		
Animal	Sex	Weight	Physical status				
			Good Medium Poor				
Preanaesth tic drugs					Anaesthetic drugs		
Drug	Dose	Route		Time	Drug	Dose	Route
				Total dose			

Record of Different Parameters

Vital parameters	Before	After induction	

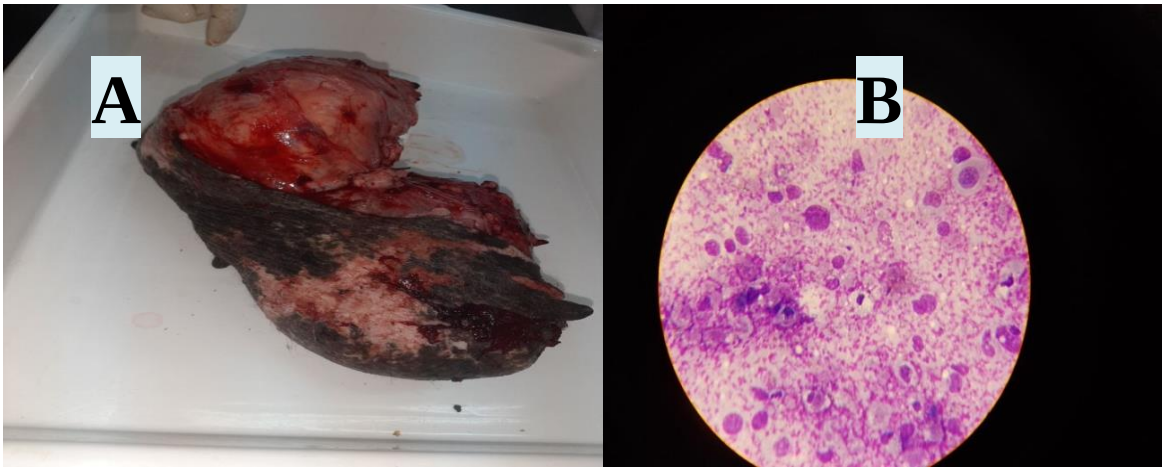
	medication	of Anesthesia		
Temperature	5mn	10mn	20mn	End
HR/mn				
RR/mn				
MM Color				
Pulse quality				
CRT				

Annex 4: Post-Operative Observations and Follow up Format

Examination of days	**Treatment/s**	**Remark/s**
Day 1		
Appetite		
Temperature		
Heart Rate		
Respiratory rate		
Exudates		
Incision sites		
Any other		
Day 2	**Treatment/s**	**Remark/s**
Appetite		
Temperature		
Heart Rate		
Respiratory rate		
Exudates		
Incision sites		
Any other		
Day 3	**Treatment/s**	**Remark/s**
Appetite		
Temperature		
Heart rate		
Respiratory rate		
Exudate		
Incision sites		

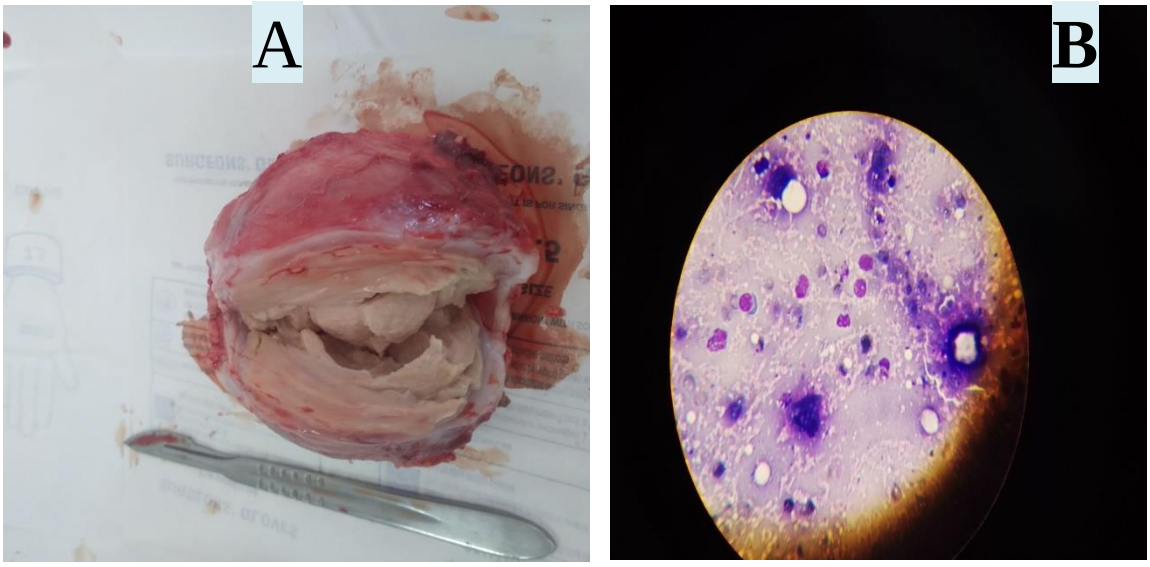
Any		

Annex 5: Cytological examination result of lipomas in dog



A) Gross appearance of removed lipoma mass B) Histopathological appearance

Annex 6: Cytological examination result of lipomas in goat



B) Gross appearance of removed lipoma mass B) Cytological appearance of lipoma