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VARIOUS SURGICAL CASE TREATMENT, OUTCOMES AND COMPLICATIONS IN DOMESTIC ANIMALS IN BISHOFTU

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BY

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VARIOUS SURGICAL CASE TREATMENT, OUTCOMES AND COMPLICATIONS IN DOMESTIC ANIMALS IN BISHOFTU

A Thesis submitted to the College of Veterinary Medicine and Agriculture, Addis Ababa University in partial fulfillment of the requirements for the degree of Master of Science in Veterinary Surgery

By

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Bishoftu, Ethiopia

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VARIOUS SURGICAL CASE TREATMENT, OUTCOMES AND COMPLICATIONS IN DOMESTIC ANIMALS IN BISHOFTU

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STATEMENT OF THE AUTHOR

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LIST OF ABBREVIATIONS

AVMA	American Veterinary Medical Association
CRT	Capillary Refill Time
CSA	Central Statistical Authority
C-section	Cesarean Section
CVMA	College of Veterinary Medicine and Agriculture
EU	Europea Union
HR	Heart Rate
IM	Intramuscular
IU	International Unit
IV	Intravenous
MOARD	Ministry of Agriculture and Rural Development
NMSA	National Metrological Agency
OIE	World Organization for Animal Health
OVH	Ovariohysterectomy
POP	Plaster of Paris
RR	Respiratory Rate
SC	Subcutaneous
SID	Once Daily
SPANA	Society of Protection Animal Abroad
US	United State
VTH	Veterinary Teaching Hospital
WHO	World Health Organization

ABSTRACT

The study was conducted from September 2018 to June 2019 in Veterinary Teaching Hospital found in the College of Veterinary Medicine and Agriculture of Addis Ababa University, and Dire veterinary clinic, with objectives of conducting various surgical treatments in different domestic species of animals with determining postoperative complications and surgical outcomes of each case. The study was based on the case study of the presented cases. The case that was coming to the hospital and clinic during the study period with type of disease to achieve the objective of the study was purposively sampled, diagnosed, surgical treated and followed up until the final outcome of the condition. Twenty-two cases were studied and compiled based on scientific surgical case report publishing format where case history, clinical examination, surgical treatment, postoperative care, postoperative complications and surgical outcomes of diseases were recorded. Accordingly, the findings of each case were discussed in relation to the finding of other literature. The twenty-two complied case studies include 6 cases on cattle (traumatic ruminal fistula, dystocia, horn fracture, fibroma, paraphimosis and uterine prolapse), 7 cases on small ruminants (inguinal hernia, tibia fracture, obstructive urolithiasis, abscess, a hyena bite, and two limb amputation), 5 cases on small animals (dystocia, forelimb amputation, ovariohysterectomy, castration and tail amputation), 3 cases on equines (ventral hernia and two castration) and 1 case on swine (castration). From the total handed cases, postoperative complications were encountered in eight (36.6%) patients with recovery and one patient died. The occurrence of these postoperative complications might be associated with lack of owner commitment to care animal as per advised, nonexistence of aseptic operation theater, scarcity of anti-inflammatory drugs, irregular administration antibiotics and dressing wound site with antiseptics. Indicates cares including pain relief, care of animal by owner per advised, aseptic operation theater, administration of antibiotics and dressing of incision site with antiseptics as per prescription may a play important role in decreasing postoperative complications and mortality of patients after surgical treatment.

Key words: *Case study, Complication, Outcome, Surgical treatment*

1. INTRODUCTION

Ethiopia is known to have huge number of livestock population (CSA, 2013). Despite the huge livestock resource, the contribution to the economic aspect of the country is still lowest. Low economic returns from these resources are associated with several factors such as poor management, the low genetic potential of indigenous breeds and diseases (Lobago *et al*., 2006; Tesfaye and Shamble, 2013). Livestock diseases have impacts that include loss of livestock and farm productivity, reduction of market opportunity and disturbance of human health (Abebe, 2003). The management practices of animals and geo-climatic conditions of Ethiopia are favorable for the occurrence of various diseases and disorders (MOARD, 2010). The incidence of diseases varies with the species, age, sex of the animals and season of the year (Haque and Samad, 1997; Samad, 2001). Treatment of individual sick animal gets less attention until recent years as the policy and manpower resource give more attention to preventive medicine. This has contributed to a low level of infrastructure for a surgical treatment as well as research in surgical disease of domestic animals (Tiruneh *et al*., 2014).

Most of the diseases are treated with medicine only, while few cases need surgical intervention in clinical veterinary practice. Surgical disorders are the serious abnormal condition in animals and may cause fatality if not treated in time. The importance of surgery is to save the life of an animal, to control population and diseases, to prolong the life of an animal and to hasten recovery from an injury. Surgical affection like hernia, urethral obstruction, preputial injuries dystocia, fracture, aural hematoma, wound, local abscess, and hoof overgrowth cause great loss to the farmers of Ethiopia. In spite of obstacles, veterinary practitioners are often conducting minor surgical operations at field level. However, performing major surgical cases are still a challenging approach to the veterinarians and costing the country a lot from mortality (Sarker *et al*., 2014; Tiruneh *et al*., 2014).

Depending on the surgical procedure and type of wound, the rate of postoperative wound infection varies from 0.8 to 18% among small animal surgery patients (Eugster *et al*., 2004; McMillan, 2014) and 0 to 50% among equine surgery patients (Verwilghen, 2015). Although veterinary surgical cases and the postoperative complications are prevalent, the information of the occurrence of various

surgical disorders and postoperative complication in animals is not well organized in different locations, as obtained currently in human surgery practice (Nazarali *et al*., 2014; Sarker *et al*., 2014).

Recently there is an increasing demand for better veterinary services due to the increasing awareness of the importance of treatment of individual animal by both the rural and urban community (Tiruneh *et al*., 2014). A growing concern for veterinary clinical practice proficiency improvement has lead to the establishment of the postgraduate program of veterinary surgery as well as the development of veterinary teaching hospital facilities. The VTH in CVMA of the Addis Ababa University, in addition to its teaching mission and as part of its community service activity provide veterinary clinical service to farm and companion animals for various types of health disorders. Surgical treatment whether elective or emergency, is a constant practice.

Few research works were conducted in the VTH to determine the magnitude of surgical disorders. A retrospective case study done by Tiruneh (2000) and Tiruneh *et al*. (2014) revealed that 689 surgical conditions had been presented to the college's clinic and out of this figure, cattle, sheep, goat, dog and cat, accounted for 53.48%, 21.51%, 2.32%, 19.33% and 3.34%, respectively. The frequent surgical conditions were a local abscess, wound, urethral obstruction, horn fracture, preputial injuries, hoof overgrowth, traumatic hernia, dystocia, ovariohysterectomy and aural hematoma. These researches were done to show the number of surgical cases presented to the clinic. However, they are not sufficient to show postoperative complications and surgical outcomes.

Therefore, the objectives of this study were:

- To conduct various surgical treatments in different domestic species of animals
- To determine postoperative complications and surgical outcomes of each cases

2. MATERIALS AND METHODS

2.1. Study area

The study was conducted from September 2018 to June 2019 at VTH of CVMA and Dire veterinary clinic, Bishofitu. Bishofitu town is found in central Ethiopia, which is located at 45 km South East of Addis Ababa. Bishofitu is situated at 9^0N latitude and 4^0E longitude and an altitude of 1850 meters above sea level in the central highlands of Ethiopia. The average maximum and minimum temperature of the area is 34.7 °C and 8.5 °C respectively, and the average relative humidity is 61.3%. The rainfall is bimodal. It receives an annual rainfall of 1151.6 mm of which 84% is received during the long rainy season covering June to September and the remaining in the short rainy season extending from March to May (NMSA, 2010).

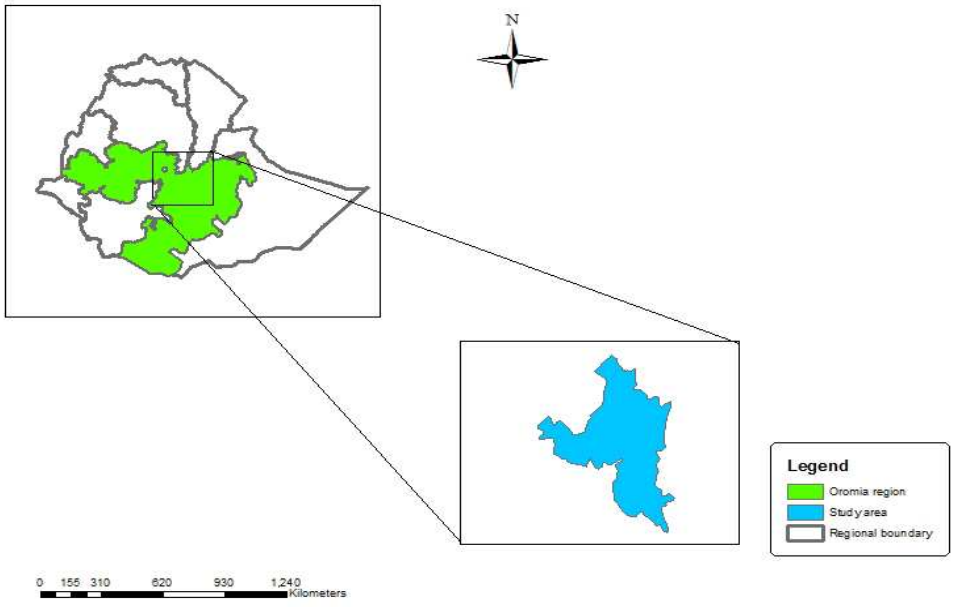


Figure 1: Map of Bishofitu, Central Ethiopia

Source: Bishoftu town Municipal office, 2018

2.2. Study animals

The present study was conducted on 22 animals (Table 1) presented to the VTH and Dire veterinary clinic during the study the period which needs surgical intervention.

Table 1: Total cases sampled for study during study period.

Species	Numbers	Site	
		Hospital	Dire
Cattle	6	5	1
Small ruminants	7	6	1
Small animals	5	5	-
Equines	3	-	3
Swine	1	1	-
Total	22	17	5

2.3. Study design

A case study was carried out on patients admitted to the hospital and clinic during the study period with the type of disease to achieve the objectives of the study were sampled purposively. An individual patient was used to document cases and detailed report of the history, clinical examination, surgical treatment, postoperative care, postoperative complications and follow up of an individual case was included in each case reports.

2.4. Case handling protocol

Individual case recording sheet was used (Appendix V). The species, breed, sex, and age of the patient were recorded. The owner was asked about his/her complaints on the animal presented. Based on the owner's complaints related to the case and all relevant information was recorded. The case was subjected to a detailed clinical examination according to Radostits *et al*. (2007). Heart rate (beats/min), respiratory rate (breaths/min), rectal temperature (°C) and general body condition were recorded. After the compilation of case history and clinical examination, surgical cases were judged as elective or emergency. Postoperative cares were given for each patient and postoperative

complications in each case were recorded if any. In addition, after the end of postoperative care, follow up of the outcome was done through phone communication to the owners and with a home visit.

2.5. Ethical consideration

Before starting the research request that explain the purpose of this study and the possible management planned to reduce pain and suffering of animal during case handling was submitted to Addis Ababa University College of Veterinary Medicine and Agriculture Minutes of Animal Research Ethics and Review committee. After the committee evaluated the importance of this study through different aspect, approval was given (Appendix VI).

3. COMPILED CASE REPORTS

Case admitted to VTH and Dire veterinary clinic for treatment of surgical disorders were complied. Accordingly, twenty-two surgical treated cases during the study period were complied as per the scientific case report publishing format (Abstract, introduction, case history, clinical examination, surgical treatment, postoperative care, postoperative complications, outcome of treatment and discussion).

3.1. Case reports on cattle

3.1.1. Traumatic ruminal fistula in cow

Abstract

Accidental fistulation of forestomachs in cattle is relatively infrequent. Trauma due to sharp objects can result in injuries even to the internal organs. Rumenotomy is a procedure to treat fistulation of forestomachs. This case report summarizes the management of traumatic rumen fistula between the left 11^{th} and 12^{th} ribs intercostal space on cow admitted to VTH by performing rumenotomy. On examination, the rumen wall was found adhered to the flank wall at the wounded area and ruminal discharges from the injured site. The rumen was exteriorized through the left flank incision and from there, the fistula was sutured. The cutaneous wound between 11^{th} and 12^{th} ribs intercostal space was managed as an open wound, postoperative antibiotics were given intramuscularly daily for five days and after surgery amount of water and feed was limited at least for a week. Slight rumen tympany occurred after the first and second days of surgery. Sutures were removed on 12^{th} postoperative day, the ruminal fistula was closed at 20^{th} follow up day and the animal recovered completely. Hence, treating traumatic ruminal fistula by rumenotomy with good postoperative management could be considered as a successful surgical procedure.

Key words: *Cow, Traumatic ruminal fistula, Rumenotomy*

Introduction

Rumenotomy is a routine procedure for many diseases in cattle, such as traumatic reticuloperitonitis, acute and recurrent bloat, ingestion of toxic plants, chemicals, spoiled roughage, or fetal membranes after parturition; placement of a temporary or permanent rumen cannula to relieve bloat; creation of a permanent rumen fistula and impactions. Other reasons include ingestion of foreign bodies, such as nylon ropes or plastic bags that are obstructing the reticulo-omasal orifice, foreign bodies lodged in the distal esophagus and carbohydrate engorgement (Fubini and Ducharme, 2004). Experimental fistulation is performed in many farm animals as a part of research linked with feeding trials. However, accidental fistulation of forestomach in cattle is relatively infrequent. Trauma due to sharp objects on the flank can result in injuries even to the internal organs. Such injuries causing fistulas have been found to be associated mostly with abomasum (Costa *et al*., 2002). To the best of my knowledge, there are very few reports on traumatic fistulation of rumen in cattle. Hence, in this case, successful repair of a traumatic rumen fistula in a cow has been reported.

Case history and clinical examination

A cow aged about 8 years and weighting about 200 kg was presented to the VTH with a history of wound at its left side between ribs space (Fig 2A). A penetrating wound was formed due to sharp material by someone resulting from revenge when the cow ate his cereal. The discharge was started two weeks ago, greenish in color and the animal was apparently normal with usual appetite. The animal was said to have been treated by the local veterinarian.

Clinical examination revealed a penetrating wound at the middle of the left side eleventh and twelfth ribs intercostal space. Ruminal discharges were evident from the injured site which were normal in color and foul in odour. The temperature, heart rate and respiratory rates were within the physiological ranges. On examination, the rumen wall was found injured and adhered to the flank wall at the wounded area. Auscultation of the lungs revealed no abnormality. Careful examination of the discharge established the fact that it was rumen cud and hence, the condition was diagnosed as rumen fistula.

Surgical treatment and postoperative care

Prior to surgery, the animal was kept off from feed for one complete day and from water for twelve hours to evacuate the rumen, and preoperative antibiotic (penstrep 10 ml, IM) was administered before surgery. The fistulation site and paralumbar fossa were prepared aseptically. Rumenotomy was done by the standard procedure as suggested by Fubini and Ducharme (2004). It was performed on the paralumbar fossa following standard procedure under local analgesia was achieved by direct line infiltration of 1000 mg 2 % lignocaine hydrochloride. After completing incision of the abdominal muscle and peritoneum, the adhesions between the rumen and at the site of fistulation were carefully broken down. Then the ruminal wall was pulled caudally to the level of flank incision (Fig 2B), the fistulous orifice on the rumen was identified (Fig 2C), debrided, incision was extended vertical to remove certain amount of rumen content, presence of foreign material was explored and repaired with a double row of inversion sutures (cushing followed lambert) using number 2 chromic catgut. Peritoneum and muscles were sutured with chromic catgut number 2 by simple interrupted pattern (Fig 2D) and subcutaneous tissue was closed with chromic catgut number 1 by simple continuous pattern. Skin edges were approximated with silk number 1 by horizontal mattress pattern.

For postoperative care, the animal owner advised after surgery to limit amount of water and feed at least for week. Slight rumen tympany was occurred at first day and second of surgery as postoperative complication and it was disappear after third day due to limitation amount of feed and water. The cutaneous wound between 11^{th} and 12^{th} ribs intercostal space was managed as open wound by dressing with medvlone and povidone iodine for five days. Penstrep, 10 ml (1ml/20kg) was given IM, SID for five days. Sutures were removed on 12^{th} postoperative day (Fig 2E), rumen fistula was closed at 20^{th} day of follow up (Fig 2F) and the animal recovered completely.

Figure 2: Rumenotomy in cow: Clinical presentation of traumatic rumen fistula (A), pulling of rumen fistula towards site of incision (B), fistula at incision site (C), simple interrupted pattern suturing to close muscles (D), incision site on 12th day (E) and rumen fistula at 20th day (F).

Discussion

Fistulas of compound stomach usually associated with trauma. Among various compartments, abomasum appears more common to become fistulated traumatically followed by rumen (Sharma *et al*., 2011). Similar to the present case, Prakash and Ravi (2009) and Devi Prasad *et al*. (2014) also recorded a successful case of acquired traumatic ruminal fistula in cattle and treated a similar case of rumen fistula at left paralumbar fossa nearer to last intercostal space in cow. Contrary to these findings, Costa *et al*. (2002) treated abomasal ulceration and abomaso-pleural fistula in an old beef master bull, which died later due to development of pneumo-peritoneum. The success in treatment of the present case could be attributed partly to the fact that the diaphragm was not involved.

Peritonitis is a major complication associated with rumen surgery. Any spillage of rumen contents in the abdomen will result in some degree of peritonitis. The degree of peritonitis is dependent on the amount of contamination, blood and tissue levels of antibiotics and the health status of the animal. In addition, animals undergoing rumen surgeries will frequently develop incisional infections, seromas, hemorrhage, fever, intestinal obstruction, bloat, abscesses and death (Fubini and Ducharme, 2004; Andrew, 2008). Azari and Ali Asghar (2014) reported long-term involvement and existence of fibrotic and necrotic tissues around the perforation site. In the current case, only rumen tympany seen at first and second day after surgery as postoperative complication. Because formation of adhesions between the rumen and abdominal wall might have prevented the theoretical probability of peritonitis. William *et al.* (1990) and Ismail *et al.* (2007) also reported this type of complication following rumenotomy. Hence, treating traumatic ruminal fistula by rumenotomy with good postoperative management could be considered as a successful surgical procedure.

3.1.2. Dystocia in Holstein Friesian cow

Abstract

Faulty disposition of fetus can be one of the causes of dystocia. In several cases, using mutation and traction, such cases can be rectified. However, in extreme cases, cesarean section is one of the most common surgical procedures performed by veterinarians. This case report summarizes the management of dystocia in Holstein Friesian cow by cesarean section. The Holstein Friesian cow owner come to VTH with the complaint of his cow could not come to VTH, recumbent and started straining one day ago. Per-vaginal examination revealed fully dilated cervix and the fetus was presented with the dorsolateral position. Cesarean section was done after manual traction was tried using left ventrolateral laparotomy and a dead fetus was delivered. Postoperatively care was done by injection of antibiotic (penstrep), analgesia (meloxicam) and calcium borogluconate. Dressing of suture line daily with povidone-iodine was also carried out. At 12^{th} day of operation, skin sutures was removed and the cow was recovered well without any complication. So immediate decision should be taken for doing cesarean section in such cases if manual traction is unsuccessful.

Key words: *Cesarean section, Dystocia, Holstein Fresian cow*

Introduction

Dystocia refers to abnormal or difficult birth of fetus. It is considered as one of the most important obstetrical and painful condition in cattle (Huxley and Whay, 2006; Noakes, 2009) and it should be given instant veterinary assistance. Bovine is the most affected species with dystocia. Any physical or functional alteration causing hindrance in birth process ultimately paves the way for dystocia (Srinivas *et al*., 2007). Etiology of dystocia has been classified into maternal and fetal causes (Noakes, 2009). Studies on cattle indicate that the fetus is the major cause of dystocia (Wehrend *et al*., 2002) and abnormal fetal presentations at birth contribute to 1-5% of total dystocia cases (Bennett and Gregory, 2001). Broadly speaking , the fetal origins of dystocia in cattle can be divided into those caused by excessive fetal size relative to the maternal pelvis (feto pelvic disproportion) and those caused by abnormalities of the fetus (fetal monsters, fetal diseases and fetal

maldisposition). The commonest fetal cause was maldisposition of fetus in cows (Jeengar *et al.*, 2015).

Any delay in correction or management of dystocia may seize the life of dam or calf. In certain situation, C-section may save life of both or anyone between dam and calf. A number of surgical approaches are available for the bovine C-section 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 this approach varies greatly and has its own advantages and disadvantages. Selection of an approach for C-section mainly depends on skill of the veterinarian and other factors such as the type of dystocia, the cow's condition, the environmental conditions and the availability of assistance during surgery (Vermut *et al*., 2008; Tanjila *et al*., 2017). The present communication describes a case of dystocia due to anterior presentation complicated by deviation head and forelimb lateral in a Holstein Friesian cow.

Case history and clinical examination

A 8-year-old, weighing about 300 kg Holstein Friesian cow owner come to VTH with the complaint of his cow could not come to VTH, recumbent and started straining one day ago (Fig 3A). In addition, the owner told that cow was at full term pregnancy. Per-vaginal examination revealed fully dilated cervix and the fetus was presented with the dorsolateral position. The case tried to correct manual but it was difficult to manage manual due to the absence of space for correction since the cow was recumbent. Therefore, that cesarean section decided to correct the case.

Surgical treatment and postoperative care

In present the case, patient was recumbent right lateral. Left ventrolateral laparotomy site was chosen and aseptically prepared (Fig 3B). C-section was done by the standard procedure as suggested by Arthur *et al*. (2001). She was stabilized with 1500 mg line infiltration of. 2 % lignocaine hydrochloride. The long incisions were made on skin, subcutaneous tissue, abdominal muscles and peritoneum, respectively. Gravid uterus was carried out manually and incision was

made on the uterus from ovarian end forward the cervix avoiding incision of the cotyledons. The dead fetus (Fig 3C) was pulled out from the incised uterus by holding the hind legs with gentle traction. The placenta was removed gently from the uterus and the edge of uterus was thoroughly cleaned. Uterine incision was closed by cushing sutures followed by lambert pattern with chromic catgut number 2 (Fig 3D). Muscle layers with peritoneum and subcutaneous tissue were closed cross mattress followed by simple continuous patterns, respectively by chromic catgut number 1 and skin incision was apposed by silk number 1 suture in horizontal mattress pattern.

Postoperatively, the animal owner was advised after surgery to keep in dry premises until wound healing. Penstrep, 15 ml (1ml/20kg), IM, SID for five days, 150 mg meloxicam, IM, SID for three days were administered and 450 ml (1.5ml/kg) calcium borogluconate was administered (300 ml given IV immediately after surgery and 150 ml given SC at second of surgery). Dressing of suture line daily with 2% povidone-iodine was also carried out. At12th day of operation skin sutures was removed and the cow was recovered well without any complication (Fig 3E).

Figure 3: Cesarean section in Holestain Fresian cow: Lateral recumbent cow (A), aseptically preparation of proposed surgical site (B), dead fetus pulled out from uterus (C), suturing of uterus (D) and cow at 12th day after surgery (E).

Discussion

Faulty disposition of fetus has been reported as cause of dystocia (Noakes *et al*., 2009). Dystocia due to lateral deviation of head and breech presentation are commonest type of ruminant dystocia (Arthur *et al*., 2001). By using mutation and traction, such cases can be rectified. However, in extreme cases, C-section is one of the most common surgical procedure performed by veterinarians (Schuijt and Van der, 2000). Following C- section, the survival rate of dam has been recorded if the operation is done within 24-26 hours of dystocia (Nanda *et al*., 1991; Dhindsa *et al*., 2010). Similar to above reports, the particular case of dystocia being reported here showed an anterior presentation in which the head and forelimbs were in shifted lateral (dorsolateral positioning), the operation done time interval indicated above and dam was survived.

Malpositioned calves with dorsolateral positioning have a two time higher risk of dystocia and a five time higher risk of stillbirth (Anderson, 2012). Johanson and Berger (2003) reported 49% of perinatal mortality was related with unassisted births/delivery. In present case report, lack of timely intervention might leads to fetal death. C-section is a major abdominal operation and complications are common both during and after the operation. Common complications include peritonitis, hemorrhage and wound dehiscence were reported by Newman and Anderson (2005). In the reported case, no such complication was recorded and the cow was fully recovered on 12 days observation. Non-appearance of complication might be associated with the care of animal by owner as advised and good postoperative care. Manual traction unsuccessful here because the dam was recumbent and there was no space for traction. So immediate decision should be taken for doing C-section in such cases otherwise prolonged period of a fetus inside the uterus may damage the uterus and cause infertility of dam.

3.1.3. Horn fracture in cow

Abstract

The horn is prone to various affections like avulsion, fracture, overgrowth, sepsis, fissures, and cancer. Most of these affections do not respond to the routine medical management and demand amputation of the horn. A present case of the fracture of left horn in the adult Friesian cow has been reported due to fighting by another cow. Upon clinical examination, broken horn was suspended, the area was highly contaminated with the soil and purulent discharges from the area. After proper fasting, desensitization and aseptic preparation of base of the horn, an incision was made at base of the horn and the horn was then amputated closely to its base by using the dehorning saw to prevent further complications. Postoperatively, broad-spectrum antibiotics (penstrep) and analgesia (meloxicam) were prescribed and the wound was dressed with povidone-iodine. The skin sutures were removed on 14th postoperative days. The cow was recovered without any complication. Therefore, correction of the contaminated fractured horn by amputation as early as possible is suggested to prevent further complications.

Key words: *Amputation, Cow, Horn Fracture*

Introduction

The horns of cattle are the unique adaptations of the skin. The horn generating cells are located between the junction of horns and skin known as the corium, which is the site for horn production. The procedure of amputation of the horn is the removal of the cornified epithelial tissue and the frontal bone core of the horn. If amputation is not properly done with removal of the whole corium, then horns can start regrowing. Similarly, improper amputation predisposes to frontal sinusitis. Horn amputation is an animal husbandry procedure that is implemented in many dairy and beef cattle production systems every day (Hoffsis, 1995; AVMA 2011). The horn is prone to various affections like avulsion, fracture, overgrowth, sepsis, fissures and cancer. Most of these affections do not respond to the routine medical management and demand amputation of the horn (Sreenu and Kumar, 2006).

Infection is a possible complication arising from horn amputation, but this occurs mostly following invasive procedures that expose the sinus cavity to the external contaminated environment. Furthermore, the use of surgical and nonsurgical instrument, including knives, Barnes (gouge) dehorners, obstetrical wires, Keystone (guillotine) dehorners, and saws may increase the risk of infection during amputation (Hoard and Allenstein, 1993). Normally, the wounds heal well without treatment after amputation. However, the procedure may cause several postoperative complications including bleeding, bacterial infections and fly contamination. Operative animal requires 30-60 minutes for bleeding observation after amputation and tourquents, clamps or electric cauterizing help to reduce blood loss. For prevention of fly contamination, fly repellent is advisable for 10-14 days (Jesse *et al*., 2016). The present communication describes horn fracture case in Friesian cow and its successful surgical management.

Case history and clinical examination

A phone call was received from the owner of a small dairy farm in Bishofitu while we are working in VTH. The owner told by phone the fracture of the left horn of the adult Friesian cow due to fighting by another cow. He also mentioned the horn had already fractured one week ago and difficulty to present the cow to the VTH due to aggressive behavior. After we got consent from VTH director, we traveled to the farm. During clinical examination, the cow had a normal body temperature (38.5 °C), respiratory rate (30 breaths/minute) and heart rate (64 beats/minute), respectively. The mucous membrane was pink with less than 2 seconds CRT (Appendix I) and the cow weighing about 300 kg. The fractured horn was suspended and the area was highly contaminated with the soil and purulent discharges from the area (Fig 4A). Therefore, to avoid further complication amputation of the horn was decided and was appointed for the next day.

Surgical treatment and postoperative care

The cow was kept off feed for 24 hours and withheld water for 12 hours prior to surgery. The operation was performed in a standing position and restrained bull holder. The surgical site was prepared for aseptic surgery. After aseptic preparation of the site, 300 mg of 2% lignocaine hydrochloride was infiltrated in a fan pattern to desensitize the cornual nerve around the cornual

branch of the zygomaticotemporal nerve (Fig 4B). The half of the local anesthetic used to desensitize the cornual nerve was also infiltrated at and around the incision site. Horn amputation was done by the standard procedure (Flap Method) as suggested by Kumar (2005). After adequate desensitization, one incision was taken towards the poll and another incision was taken towards the frontal ridge. These incisions were joined together by taking incision on the anterior and posterior side of the horn at the junction of the base of the horn and skin (Fig 4C). Following skin incision the cornual artery were located and ligated by chromic catgut number 1 to prevent hemorrhages. The incision was extended in an elliptical manner and the underlying tissues are separated at base of horn forming a skin flap. The horn was then amputated closely to its base by using the dehorning saw. The entire skin flap was sutured by simple interrupted pattern using silk number 1. A protective bandage was applied (Fig 4D and Fig 4E).

Postoperatively, 15 ml penstrep (1ml/20kg), IM, SID for five days and 150 mg meloxicam, IM, SID for three days were prescribed. Daily dressing of the suture line was performed with 2% of the povidone-iodine solution. The skin sutures were removed on 14^{th} postoperative days. Follow up was done after two months, the recovery the case was uneventful and uncomplicated (Fig 4F).

Figure 4: Horn amputation in cow: Fractured horn (A), desensitization the cornual nerve (B), incision at the base of the horn (C), applying of protective bandage (D), after application of bandage (E) and on 90th follow up day (F).

Discussion

Horned cattle are perceived by beef producers to be more aggressive than polled (Goonerwardene *et al*., 1999). Horned animals have more problems due to the risk of injuries caused by horn thrusts amongst the animals, which can occur especially when they are kept in loose housing and during transport (Knierim *et al*., 2009). Cow horns have caused facial lacerations and fractures of facial bones (Ugboko *et al*., 2002), abdominal injuries (Abita *et al*., 2008), ano-rectal injuries (Chirdan and Uba, 2004), urethro-rectal injuries (Pal *et al*., 2002) and non-obstetric vulvo-vaginal injuries (Habek and Kulas, 2007). In this case, horned cow causes the fracture of another cow horn while they are fighting each other.

Horn amputation then leaves an open hole that reaches down into the sinuses of the head. Hay or other food particles should be prevented from being thrown on the head of freshly amputated cattle at feeding time. Therefore, the open hole into the head should be covered with gauze or cotton to keep out debris. To avoid infections caused by flies and maggots in the wound, amputation should be done under cool and dry weather conditions. Once an infection is established, it may results in a serious, long-term sinus infection. Chronic sinusitis is a frequent complication of horn amputation (Ward and Rebhun, 1992; Parsons and Jensen, 2006). Also hemorrhage can become a concern. If not controlled, it can result in severe weight loss or death. Bleeding of the two or three main arteries that supply the horn area should be stopped (Parsons and Jensen, 2006). On the contrary, complication was not seen in this case and wound was healed safely. Therefore, correction of contaminated fractured horn by amputation as early as possible to prevent any complication is advisable.

3.1.4. Fibroma in neck of bull

Abstract

Fibromas are the benign neoplasms of fibrocytes with abundant collagenous stroma. This case report describes management of fibroma in an adult bull presented to the VTH with a history of growth on the lateral right side neck of the bull for three years. Clinical examination revealed a circular sized mass, gray in color, painful, immovable and hard on touching. Based on the history and clinical examination the case diagnosed as a fibroma. After restraining with bull holder in the crush, local analgesia infiltrated on the base of the growth and the defect was corrected by surgical excision. Postoperative administration of antibiotics was given for five days and the skin sutures were removed on the 14th postoperative day. Histopathological examination confirmed the condition as a fibroma. The animal recovered uneventfully. On the basis of the current finding, it could be stated that fibroma could be treated successfully by surgical excision.

Key words: *Bull, Fibroma, Surgically excision*

Introduction

Fibromas are the benign neoplasms of fibrocytes with abundant collagenous stroma. The majority of the tumors are round to oval intradermal or subcutaneous masses (Hendrick, 2002). Among domestic animals, fibromas have been frequently described in dogs. However, they are uncommon neoplasms in large animals (Goldschmidt and Hendrick, 2002). Fibromas in white tailed and mule deer (Sundberg *et al*., 1985), human (Kamino *et al*., 1989), cow (Yeruham and Perl, 2001), horse (Scott and Miller, 2011) and dromedary camel (Al-Sobayil and El-Amir, 2013) have also been described. Most of these are tumors of soft tissue structures including the mammary gland, retroperitoneal tissue, testicles, spermatic cord remnants following castration, neck, intestines and reticulum (Premsairam *et al*., 2018).

Carcinogenic compounds, viruses, irritants, oncogenes and parasites are predisposing factors (Stoskopf, 1993). It is one of the most commonly observed in draught purpose bulls due to constant friction caused by the yoke and also a common condition seen especially in those animals used for

carting. Rough roads and extra heavy load are the main incriminating factors (Venugopalan, 2002; Tyagi and Singh, 2006). Fibromas generally is considered to be spontaneous (Groff, 2004; Keller *et al*., 2011) and surgical excision is the treatment of choice for them (Goldschmidt and Hendrick, 2002) which was also performed successfully in the present case.

Case history and clinical examination

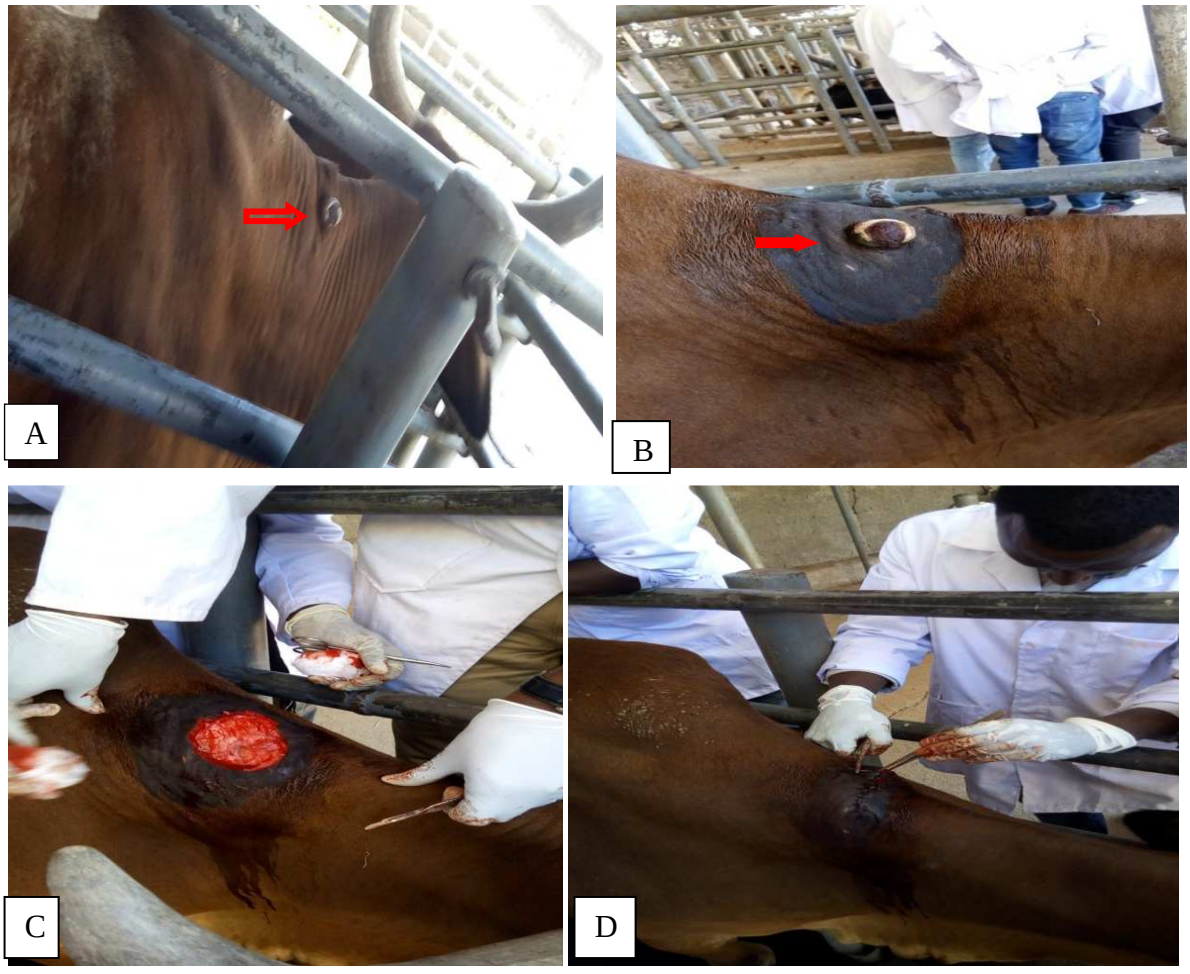
An adult bull weighing about 400 kg was presented to the VTH with a history of growth on the lateral right side neck of the bull for three years. The owner wants to remove the growth, because the he going to fatten the bull and growing mass may cause a market reduction. He also mentioned that the growth was initially small and increased in size gradually and caused difficulty during draughting. Clinical examination revealed a circular sized mass about eight cm in diameter on the neck, gray in color (Fig 5A), painful, immovable and hard on touching and all the clinical parameters within the normal range (Appendix I) at the time of presentation such a temperature 38°C, heart rate 60 beats /minute and respiratory rate 30 breaths/minute. Therefore, based on the history and clinical examination the case was tentatively diagnosed as a fibroma, was decided to go for the surgical excision, and was appointed for the next day.

Surgical treatment and postoperative care

The bull was kept off feed for 24 hours and withheld water for 12 hours prior to surgery. The surgical excision was performed in the standing position after holding bull with bull holder in the crush. The operative site was cleaned, shaved and disinfected with medvlone followed by iodine (Fig 5B) and local infiltration was carried out with 260 mg of 2% lignocaine hydrochloride around the base of the tumour. The elliptical incision was taken about 2 cm away from the base to expose the growth. After incision through the skin, dissected outwards subcutaneously to reach the base of the mass. Then after taking complete dissection at the base, the root of growth was located and the growth was removed completely along with the capsule surrounding the site (Fig 5C) and the blood vessels were ligated at every step. From removed mass tissue sample taken and preserved in formalin until histopathological characterization conducted. The subcutaneous was closed with

absorbable chromic catgut number 1 in a simple continuous pattern and skin suturing was done in cross mattress pattern with silk number 1 (Fig 5D) and povidone-iodine was applied over sutures.

Postoperatively, antibiotic injection 20 ml (1ml/20kg) penstrep, IM, SID for five days, the skin sutures were removed on the 14th postoperative day (Fig 5E) and the wound was healed without any complication. One month after the surgical treatment, an examination of the bull revealed no recurrence of the growth. Histopathological examination confirmed the condition as a fibroma (Fig 5F).



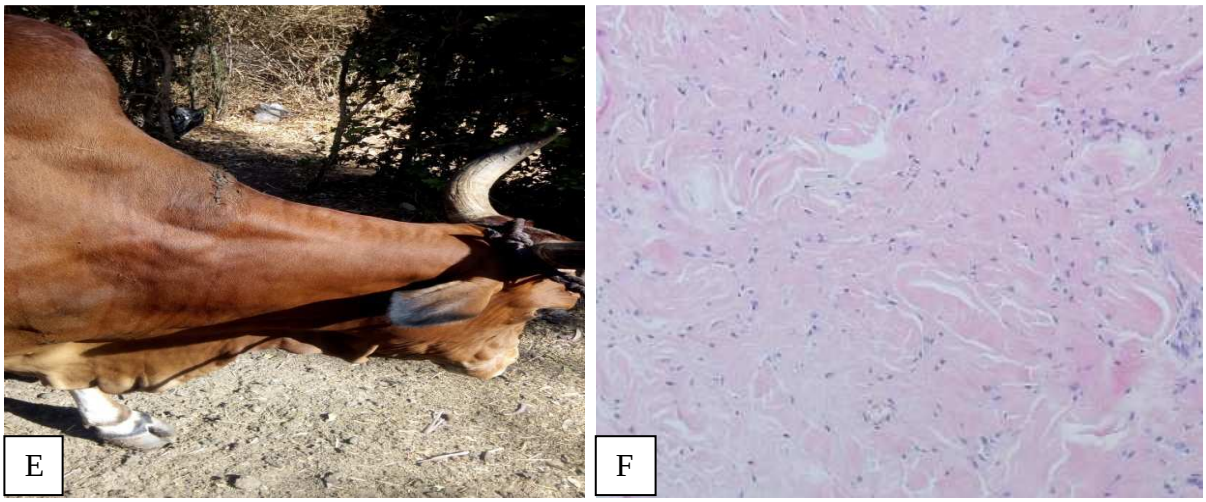


Figure 5: Surgical excision of fibroma from neck of bull: Circular sized mass (A), aseptically prepared surgical site (B), after complete removal of mass (C), suturing of skin (D), on 14 th day after surgery (E) and fibroblasts on histopathological examination (F).

Discussion

Neoplasm may occur anywhere in cattle (Kaswan, 2015). Fibromas most commonly occur on the extremities, ventral body wall, the head and neck (Colitz *et al*., 2000; Sastry, 2001; Yeshwantkumar and Nirmala, 2008). Carcinogenic compounds, viruses, irritants, oncogenes and parasites are predisposing factors (Stoskopf, 1993). In the case reported, it was occurred lateral right side neck due to prolonged irritation by yoke and this finding was similar to previous finding. On clinical examination, the mass appeared firm and hard in consistency and gray in colour, the finding was also observed by previous reports (Sastry, 2001; Yeshwantkumar and Nirmala, 2008). The tumor was identified as fibroma. The ultimate goal of treatment of tumor is complete cure and surgery remains the best way to treat fibroma (Kaswan, 2015). Similarly, the present case report describes surgical management of fibroma in bull without reoccurrence of growth up to last one month. Complete cure without reoccurrence of tumor could be due to surgical removal of most cancerous tissue. On the basis of current finding, it could be stated that fibroma could be treated successfully by surgical removal.

3.1.5. Paraphimosis in bull

Abstract

Paraphimosis is an inability to completely retract the penis into the preputial cavity. This short case report describes the management of paraphimosis in an adult bull presented to VTH with a history of protrusion of the penis and unable to retract back to the preputial cavity from last two days after coitus. Clinical examinations revealed edematous glanspenis with adhesions between preputial skin and penis. After washing, separation of adhesions and repositioning of the protruded penis along with postoperative treatment resulted in recovery. Therefore, correction of paraphimosis by repositioning and retention it into the preputial cavity as early as possible is advisable to prevent necrosis and further damage of the penis.

Key words: *Bull, Glanspenis, Paraphimosis*

Introduction

Paraphimosis is an inability to completely retract the penis into the preputial cavity. It usually occurs after erection (Davidson, 2010). It may be due to either the constriction of penis behind the glanspenis or swelling of glanspenis, making it impossible to draw the organ back through the naturally small preputial orifice (Neal, 1960). This report communicates the successful management of paraphimosis in the bull.

Case history and clinical examination

An adult bovine bull weighing about 400 kg was presented in the VTH with a history of protrusion of the penis from the preputial orifice and unable to retract back after coitus (Fig 6A). The owner also reported sustained penile protrusion for the last two days. Clinical examination revealed the edematous glanspenis covered with necrotized tissues and debris and adhesions were observed between preputial skin and penis.

Clinical management

The bull was restrained physically with right lateral recumbency, hairs around area was clipped and cleaned with.diluted medvlone. After that, the protruded penis was washed with water (Fig 6B) and necrotized tissues and debris were removed from the surface of the penis and the prepuce was exposed. The adhesions between the preputial skin and penis were separated by blunt dissection using forefingers. After separation of adhesion, removing debris and necrotized tissues, reposition of the glanspenis was carried out by sliding it into the preputial cavity and retention was achieved by applying a purse string suture with silk number 1 to the preputial orifice (Fig 6C) by letting small a hole for urination (Fig 6D). Postoperatively, a long acting oxytetracycline (20%) 20 ml (1ml/20kg) was injected IM once to prevent secondary bacterial infections, the suture was removed on the seventh day after correction and the bull was recovered uneventfully without any complications and recurrence.

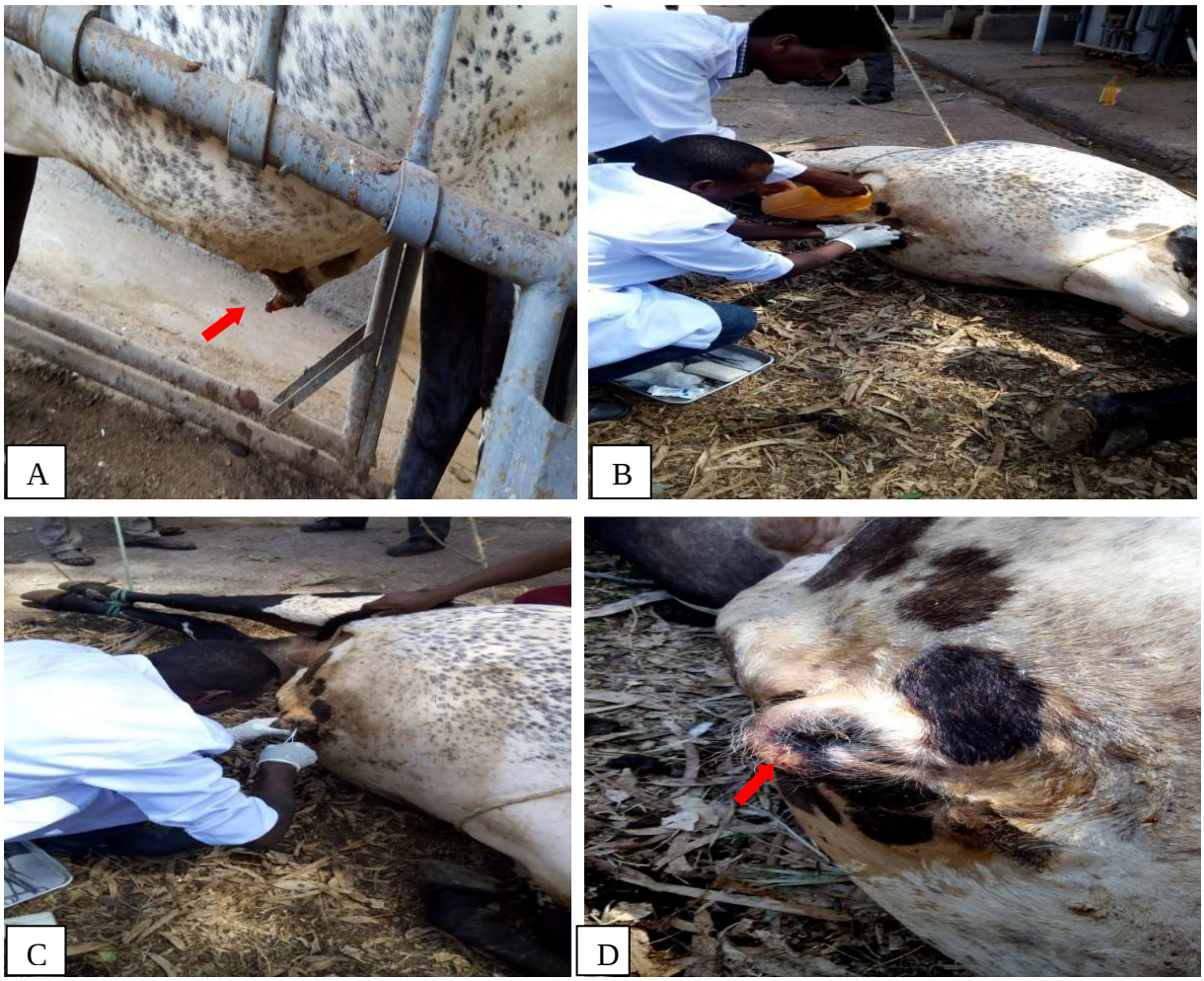


Figure 6: Clinical management of paraphimosis in bull: Protruded penis (A), washing of protruded penis (B), applying pursestring suture (C) and small hole for urination after applying purse string suture (D).

Discussion

The main objective in treating paraphimosis is to reduce the swelling and replace the prolapsed penis back to the preputial cavity as soon as possible to protect it from further injuries and to prevent infection along with maggot infestation (Mahesh *et al*., 2016). Acquired paraphimosis is a result of trauma to the penis, which causes damage to the innervations of the penis leading to the paralysis of penile retractor muscles (Nevi *et al*., 2015). Temporary purse string sutures were applied to the preputial orifice to keep the penis in the preputial cavity as one of the options in the initial surgical

treatment of paraphimosis (Fossum, 2002). In the present case, paraphimosis might be due to the trauma to the penis during coitus and reoccurrence was prevented by putting pulse string in preputial orifice after replacing in to position. Similar cases were managed by applying purse string suture after repositioning by Mahesh *et al*. (2016) and Gunajit and Pubaleem (2018). Kumaresan *et al*. (2014) applied purse string sutures for retention of penis whereas Adeola and Enobong (2016) used tension release incision with simple interrupted sutures for treatment of paraphimosis in dogs. Therefore, correction of paraphimosis by repositioning and retention it into the preputial cavity as early as possible is advisable to prevent necrosis and further damage of the penis.

3.1.6. Uterine prolapse in zebu cow

Abstract

Uterine prolapse is an important reproductive disease of dairy cattle. It occurs most often immediately after parturition and occasionally up to several hours afterward. The presence of a part of the fetal membrane in the genital passage induces strong tenesmus and prolapse. This case report summarizes the management of uterine prolapse in zebu cow with a history of prolapsed genitalia and the inability of standing which calved last night. On clinical examination, the prolapsed mass was found to be lying on the ground and it was swollen, edematous, partially necrotized and stained with soil, dust, and debris. The attached placenta membranes were gently detached. The prolapsed mass of cow was managed by manual pressure replacement after cleaning with water and water contain table salt. The plastic with four holes was applied on the vulva allowing space for urination and sutured by nylon in a horizontal mattress pattern to prevent a recurrence. After management, an antibiotic was given for three days and horizontal mattress suture was removed on 7^{th}day. The cow recovered completely without further complication. Delayed in correction may causes edema, fibrosis, necrosis, and septicemia. For these reason, it should be treated in the early period to save the animal from life-threatening condition.

Key words: *Horizontal mattress, Uterine prolapse, Zebu cow*

Introduction

Uterine prolapse is the protrusion of the uterus from the vulva with the mucosal surface exposed (Gustafsson *et al*., 2004). Uterine prolapse occurs most often immediately after parturition and occasionally up to several hours afterward. The presence of a part of the fetal membrane in the genital passage induces strong tenesmus and prolapse. Various predisposing factors have been suggested for uterine prolapse in the cow. For instance hypocalcaemia, prolonged dystocia, fetal traction, fetal oversize, retained fetal membranes and chronic disease (Ishii *et al*., 2010).

Immediately after prolapsed occurs the tissues appear almost normal, but with passage of time becomes enlarged and edematous. Some animals may develop hypovolaemic shock secondary to internal blood loss, laceration of the prolapsed organ or incarceration of abdominal viscera (Potter, 2008). Success of treatment depends on the type of case, duration of case, degree of damage and contamination. Nevertheless, as a sequel to a normal parturition and if professional assistance is given within an hour or two of its occurrence, the prognosis is good (Arthur, 2001). Replacement of the organ does not offer insurmountable difficulties and recurrence after replacement is uncommon (Arthur, 2001; Bello *et al*., 2012). Hence, in present case, successful management of uterine prolapse in zebu cow has been reported.

Case history and clinical examination

An owner of an adult zebu cow weighing about 200 kg comes to Dire veterinary clinic for the correction of prolapsed genitalia and treating the cow for its inability of standing in his home. He was reported that the cow gave birth to a healthy male calf and the genitalia started protruding from the vulval lips last night while on sitting. Next day morning it was observed that the whole uterus had prolapsed out and the cow could not rise up. On clinical examination, the prolapsed mass was found to be lying on the ground and it was swollen, edematous, partially necrotized and stained with soil, dust, and debris (Fig 7A). A part of the retained placenta severely adhered to an ovarian pole of the gravid uterine horn. The animal was alert, was showing signs of straining and the ocular mucous membrane was slightly congested. Vital parameters like temperature (37.8^{o}C), respiration rate (30

breaths/minute) and heart rate (65 beats/per minute) were within the normal clinical range (Appendix I).

Clinical management and postoperative care

The animal was stand by mechanical support and restrained physical. All dirt and debris were removed and uterine mass was washed with water and finally with solution contain table salt. Partially attached placenta membranes (Fig 7B) were gently detached without injury to caruncles. The uterus was pushed inside little by little, starting with portions near vulval lips. By gentle manipulation and pressure, cotyledons were pushed into the vagina, maintaining lips of vulva remain well apart and without turning inwards. Then by applying synchronous and meticulous pressure and inward force, the prolapsed mass was completely pushed inside vulva and repositioned (Fig 7C). Plastic with four holes which was created manual, was placed on the vulva by allowing space on the ventral part of the vulva for urination and nylon was passed through hole and suture by nylon in horizontal mattress pattern (Fig 7D). After management, 10 ml penstrep (1ml/20kg), was administered IM, SID for three days. On 7^{th}day, horizontal mattress suture was removed and cow recovered completely without further complication.

Figure 7: Clinical management of uterine prolapse in zebu cow: Prolapsed uterus stained with soil (A), retained placenta membrane (B), after repositioning (C) and applied plastic to prevent reoccurrence (D).

Discussion

Uterine prolapse is a seldom reported case in cattle farms and usually occurs with the first 24 hours of calving. In some instances delayed occurrence up to 48-72 hours have been reported in buffaloes (Patil, 2014). In order to ensure a good case prognosis, early intervention is required. Delayed intervention usually results to poor prognosis of the case due to the risk of hemorrhage, shock and death. In present study, the case was reported within 12-16 hours interval after prolapse. The prolapsed organ is exposed to the environment and easily gets contaminated with soil, which harbor

bacterial pathogens. Secondary bacterial infections are another complication that may arise from delayed intervention of prolapse cases (Abdullah *et al*., 2014).

In the ruminants, the postpartum uterine prolapse is generally predisposed or resulted due to long myometrial attachments, violent tenesmus, relaxed atonic flaccid uterus, retention of placenta, excessive traction on fetus, retained fetal membrane, low plane of nutrition, hypocacemia and extreme laxity of the vulval lips (Kumbhar *et al.,* 2009). In the current case, uterine prolapse might be due to the retained placenta was severely adhered to ovarian pole of the gravid uterine horn. The uterine prolapse can be replaced with the animal in standing or recumbent position (Hanie, 2006). For easy replacement of prolapsed mass the hind quarters of the animal has to be elevated so as to create gravity in abdomen to anterior side so that pressure of visceral organs are reduced in pelvic cavity (Resum and Kour, 2015). In the presented case, the condition was corrected successfully in non-raising hind quarter with successful recovery which is commonly practiced in raising hindquarter condition in cattle. This finding was similar with the findings of (White, 2007).

During management, less amount of bleeding was noticed. Horizontal mattress suture was taken to close the dorsal commissure of the vulva to prevent recurrence. After management, an antibiotic (penstrep) was administered for three days to prevent secondary bacterial complication. Also, Bhoi and Parekar (2009) was successfully treated a case of postpartum uterine prolapsed along with retention of placenta in cow by applying horizontal mattress suture in sterile plastic with four holes around the dorsal commissure of the vulva. After complete replacement of the uterus, an injectable broad-spectrum antibiotic was also used for 3-5 days after replacement of prolapsed uterus to prevent secondary bacterial infection (Borobia-Belsue, 2006). The most probable complications of uterine prolapse are hemorrhage, infertility, shock, septic metritis, peritonitis or finally death (Noakes *et al*., 2001). Uterine prolapse may progress into fatal septicemia in delayed case (Hiranya *et al*., 2007). Complications develop when laceration, necrosis and infections are present or when treatment is delayed. However, in the present study complication was not occurred and showed successful recovery. The difference in the result might be associated with time of intervention. Delayed in correction may cause some critical condition such as edema, fibrosis, necrosis and septicemia. For these reason, it should be treated in the early period to save the animal from life-threatening condition.

3.2. Case reports on small ruminants

3.2.1. Inguinal hernia in goat

Abstract

Hernia is the protrusion of a part of an organ or structure through the tissue that normally contains it. It can be caused by so many factors like horn goring, falls, kicks, increase in intra-abdominal pressure and automobile accidents. A four-year-old female goat was presented to the VTH with a history of excessive enlargement lateral to the udder due to a car accident. During the clinical examination of swollen area lateral to the left side of udder revealed fetal movements. On the basis of history and clinical examination, it was diagnosed as inguinal hernia. C-section along with herniorraphy was performed. Postoperatively, the animal was maintained on therapy of penstrep and meloxicam along with regular antiseptic dressing using povidone iodine. Seroma and excessive postoperative swelling occurred as the postoperative complication for four days. The skin sutures were removed on the 14th postoperative day and the goat recovered completely. Hence, to increase the prognosis and to prevent adhesion to the sac, early diagnosis and treatment is suggested.

Key words: *Cesarean section, Goat, Herniorraphy, Inguinal hernia*

Introduction

Hernia is the protrusion of a part of an organ or structure through the tissue that normally contains it (Lippincott and Wilkins, 2006). Hernias are also known as ruptures (Edward, 2005) and they could have many deleterious effects such as lowering the productivity and reproduction of the affected animals (Abdin Bey and Ramadan, 2001). A typical hernia always consist of the “hernia ring” or an opening in the muscle which may have been brought about as a result of an accident, or may have been present at birth; a swelling appearing below the skin “hernia sac”, and the “hernia content”. The hernia sac is usually made up of the skin, muscle fibers or fibrinous connective tissue and sometimes the peritoneum, while the hernia content may be a loop of intestine, omentum, peritoneal fluid, urinary bladder, stomach or the gravid uterus (Edward, 2005).

Hernias may be acquired or congenital, and when congenital, it is inherited as a dominant character (Weaver *et al.,* 2005). It can be caused by so many factors like horn goring, falls, kicks, automobile accidents and increase in intra-abdominal pressure. Factors such as wound dehiscence, obesity, weight of the rumen, continuous standing on slopping rumps, naval infections and pregnancy generally predispose animals to hernia (Blood *et al.,* 1997; Edward, 2005). There are various types of hernias, of them umbilical, ventral abdominal, diaphragmatic and inguinal hernias have been more frequently encountered in animals (Hassan and Hassan, 2003). Abdominal, inguinal and perineal hernias can entrap a fetus or fetuses in their hernia sac leading to dystocia (Radhakrishnan *et al.,* 1993; Sobiraj, 1994). Clinical signs often reflect the size of the hernia and the hernial contents and range from a painless inguinal mass to signs related to incarcerated or nonviable small intestine (Alireza *et al*., 2009). Diagnosis of inguinal hernia is accomplished by clinical signs, radiography and ultrasonography (Abdin Bey and Ramadan, 2001). In this study the surgical treatment of inguinal hernia occurred by a car accident in female goat has been reported.

Case history and clinical examination

A four-year-old female goat weighing about 35 kg in its near term of pregnancy was brought to VTH with a history of automobile accident a few hours ago and the swelling lateral to the left side of udder was observed by the owner (Fig 8A). Palpation of the swelling site revealed fluid thrill and fetal parts. Fetal movements were observed in the lateral region of left side udder during a clinical examination. On the basis of history and clinical examination, the case was diagnosed as inguinal hernia so it was decided to perform a cesarean section and simultaneous herniorrhaphy. After the decision to conduct surgery, the owner informed that he did not want the goat. On the second day, after consultation with VTH head (Dr. Yonas Tolosa) surgery was done.

Surgical treatment and postoperative care

The goat was kept off feed for 24 hours and water for 12 hours before surgery. She was sedated with an IV injection of 38.5 mg diazepam, maintained on fluid therapy (sodium chloride 0.9%) during surgical operation time at a rate of 10 ml/kg/hr and placed in right lateral recumbency and the lateral to left side udder was aseptically prepared. C-section along with herniorrhaphy was performed by

the standard procedure as suggested by Weaver *et al. (*2005). The surgical area was desensitized with a linear infiltration of 140 mg of 2% lidocaine hydrochloride. A longitudinal incision was made on hernia ring site and uterus was exposed immediately below the skin and subcutaneous tissue. One died fetus along with fetal membranes were removed (Fig 8B). The uterine incision was sutured using chromic catgut number 2 with cushing followed by lembert pattern and uterus was replaced in its original abdominal position. In addition, the organs herniated were intestine and omentum, organs were repositioned (Fig 8C and Fig 8D). A tear of the lower abdominal muscle was noticed. Correspondingly the skin incision was extended. The abdominal muscles were sutured with a silk number 1 by simple interrupted pattern. The subcutaneous tissue was sutured with chromic catgut number 0 size using a simple continuous pattern. The skin incision was sutured with simple interrupted suture technique using silk size number 1.

Seroma and excessive postoperative swelling occurred as the complication stayed for four days after the operation. Postoperatively, the animal was maintained on antibiotic therapy with an injection of 3.5 ml penstrep (1ml/10kg), IM, SID for five days, analgesic drug (meloxicam) at a dose of 70 mg, IM, SID for a period of three days along with regular antiseptic dressing using povidone-iodine for 10 days. In addition, cold water treatment was applied on swelling area for two consecutive days. The skin sutures were removed on the 14^{th} postoperative day. The goat recovered completely (Fig 8E). Even after recover owner did not volunteer to take the goat (Fig 8F). Finally, the college was decided the goat be the property of VTH.

Figure 8: Herniorrhaphy in goat: Swollen area lateral to the left side of udder (A), removed dead fetus (B), herniated organs (C), reduction of hernial contents (D), on 5th days of surgery (E) and letter for owner (F).

Discussion

Hernias may be congenital or acquired, they may occur as isolated defects or they may be associated with defects of other parts of the body (caused by a tear in the abdominal wall) (Jettennavar *et al*., 2010). The result of the present study indicated that was acquired inguinal hernia in goat. The case report was harmony with Fossum (2007) who reported traumatic inguinal hernia might occur as a result of congenital weakness of the musculature or abnormality of the inguinal ring. In the present study, gravid uterus might cause weakening of the abdominal muscles due to violent trauma with the blunt object during automobile injury. Inguinal hernia results when a defect permits intestines or other abdominal organs to pass into the inguinal canal. The hernia develops when an abnormally large and patent vaginal ring allows free communication between the vaginal tunic and the peritoneal cavities (Jean and Anderson, 2004). It may be unilateral or bilateral; unilateral inguinal hernias occur more commonly in the left side (Smeak, 2003) as also recorded in the present case.

Surgical management of inguinal hernia consists of identification of the hernia sac, assessment of the viability of the hernia contents, surgical resection of nonviable tissue and herniorrhaphy (Alireza *et al*., 2009). The uterus within a hernia may also protrude in the sac and limit the movement of the small intestine in the sac; such a hernia is likely to be relatively large, and large hernias are associated with less risk for incarceration (Alireza *et al*., 2009). However, in present case the gravid uterus, along with the intestine and omentum, were present in the inguinal sac without any signs of incarceration or adhesion to the sac. The present report supported by Jettennavar *et al*. (2010) who reported fetus in a doe, Serin *et al*.(2009) reported fetuses in bitch and Ramadan and Abdin Bay (2001) reported gravid uterine horns and intestinal loops in the camel.

Complications in dogs treated surgically for inguinal hernia include incisional infection, wound dehiscence, hematoma, seroma, excessive postoperative swelling, hernia recurrence, sepsis or peritonitis and death (Alireza *et al*., 2009). The complication encountered in the case reported were seroma and excessive postoperative swelling. Due to the absence of incarceration and intestinal perforation in this reported case, the prognosis was evaluated to be good. On contrary, Madhu *et al*. (2013) reported uncomplicated healing of surgical management of inguinal hernia in a dog. Hence,

to increase the prognosis and to prevent adhesion to the sac, early diagnosis and treatment is suggested.

3.2.2. Tibia fracture in sheep

Abstract

Fracture is a highly complex injury, resulting in discontinuity of the bony framework mainly caused by the trauma. The tibial fractures were simple transverse, oblique and comminuted fractures. Plaster of Paris bandage is an easy, cheap and effective method of immobilization of injured limbs in small ruminants. A 1-year-old female sheep was admitted to VTH with the complaint of hind limb fracture. Clinical examination revealed an oblique fracture of a right tibia with an open wound on the medial aspect. The fracture was stabilized using a Plaster of Paris cast. For postoperative care, wound dressing was carried out using 5% povidone-iodine at four days interval for twenty days. Injection of penstrep for five days to control secondary bacterial complication and tramadol for three days to control postoperative pain. The animal was kept under complete rest for twenty days. Skin ulceration, heavier in weight, muscle atrophy, weakening of joint and tendon were complications encountered. On day 30, the animal was bearing its complete weight on the fractured limb. There was no complication reported thereafter. Thus, Plaster of Paris could be effective for the correction of tibial fracture with good management.

Key words: *Plaster of Paris, Tibia Fracture, Sheep*

Introduction

Bone is a dynamic and sensitive connective tissue of the animal body, providing skeletal support and motion. Fracture is a highly complex injury, resulting in discontinuity of the bony framework. It is most common problem in routine clinical practice and mainly caused by the trauma. Limb fractures are classified depending on the anatomical location, presence of external wound, extent of bone damage and direction of the fracture line. Tibial fractures may be presented in a variety of form, because there is little soft tissue covering over the cranio-medial aspect of the tibia (Brinker *et al*., 1983). The tibial diaphyseal fractures were simple transverse, oblique and comminuted fractures

(Harasen, 2002). The frequency of tibial (23.2 %), metacarpal (23.2 %) and metatarsal (23.2 %) fractures were almost equal in goats. Regardless of species, most fractures involved shaft of bones and the incidence was more in hind limbs as compared to forelimbs (Patil *et al*., 1991).

Management of fracture in small ruminants demands an easy, cheap and effective method of immobilization (Nunamaker and Newton, 1985; Tyagi and Singh, 2008). POP 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). However, this method have various demerits like malunion, delayed union and nonunion and other demerits includes large callus formation, weakening of tendons, muscle atrophy, delay in weight bearing, interferes with radiographic evaluation, slippage of plasters, softening of plaster cast, wetting of cast due to faulty management which ultimately leads hike of expenses because of reapplication (Mbuiki and Byagagaire, 1984; Singh *et al.,* 1984). In the present case, the successful management of an oblique fracture of the tibial bone in a sheep by POP cast has been reported.

Case history and clinical examination

A 1-year-old female sheep weighing 22 kg was admitted to the VTH with the complaint of breaking a hind limb by a dog bite and inability to bear weight. The animal was already treated by a non-professional person using splint of bamboo before two days. Clinical examination of the animal revealed that it was an oblique fracture of right tibial bone and all parameters measured were found in the normal range. The open wound was located on the medial aspect of the tibia bone (Fig 9A). Fractured bone was visible through the wound site.

Management of fracture

The mild sedation was achieved with 12.1 mg diazepam administration IV and lateral recumbency with the affected limb uppermost, bamboo splints with rope were removed and the wound at the medial site of the tibia was cleaned with soap followed by dressing by using 5% povidone-iodine. Then, fractured parts were aligned anatomically. The cotton bandage was provided from stifle to fetlock joint except at the wound area. This window provision was done for the daily dressing of the wound (Fig 9B). The fracture was stabilized using three bamboo splints were placed around the fractured part, the first bamboo splint was placed cranial to the fracture site, the second bamboo splint was paced caudal to the fracture site and third bamboo splint was placed ventral to fracture site. Gauze over the bamboo splints was applied. After soaked with Luke warm water, POP applied (Fig 9C) over the cotton padding and bamboo splints for immobilization of the fractured limb.

Wound the dressing was carried out using 5% povidone-iodine at the four day interval for twenty days. Injection of 2.2 ml penstrep (1ml/10kg), IM, SID was given for five days to control secondary bacterial complication and injection of 44 mg tramadol, IM, SID was given for three days to control postoperative pain. The animal was kept under complete rest for twenty days. On day 20, the partial weight bearing was observed. The POP cast removed on day 21. Skin ulceration, discomfort to animals due to heavier in weight, muscle atrophy, weakening of joint and tendon were complications encountered. Complete weight bearing of the fractured limb was noticed on day 30 (Fig 9D).

Figure 9: Management of tibia fracture in sheep by POP cast: Oblique fracture at mid shaft of tibia (A), window for daily dressing (B), applying POP cast (C) and sheep on Day 30 (D).

Discussion

The cause for the fracture in present case was dog bite. The current cause for fracture was also recorded by Tambe *et al*. (2012) who reported dog bite and fighting for fracture. The major steps of fracture treatment as reduction or anatomical alignment of displaced fracture fragments and retention and immobilization by external or internal coaptation techniques (Venugopalan, 2009). According to Khalid *et al*. (2006), application of POP cast for stabilizing tibial shaft fractures caused negligible infection and supported early weight bearing by the animal. In addition, Singh *et al.* (2006), Vogel and Anderson (2014) and Kushwaha *et al.*(2011) reported POP cast as the most easily

available, affordable, effective and easy to apply external coaptation technique for fractures below stifle joint and elbow joint. The current case was also successful managed by reduction of fracture followed by application POP cast.

Complications like skin ulceration, after application was heavier in weight which might have lead to discomfort to animals, muscle atrophy, weakening of joint and tendon were seen in present case correction by POP cast. These findings were also recorded in previous reports (Mbiuki and Byagagaire, 1984; Marson and Keenan, 1993; Singh *et al.*, 2008; Solanki *et al*., 2016) who observed muscle atrophy, skin ulceration and weakening of joints and tendons. On the other hand, the findings in present case do not support the findings of Avasthi *et al*. (2012), Vogel and Anderson (2014) and Boyd *et al*. (2009) who were reported malalignment of fracture fragments, softening of POP cast, malunion, breakage of cast, displacement of bamboo splints and probability for fracture diseases. The difference in complications could be due to difference in management that includes absence of complete rest until healing, poor bedding, feeding and watering.

Avasthi *et al.* (2012) reported goats suffering from long bone fractures were immobilized by POP cast and concluded the final clinical outcome as excellent with complete weight bearing while standing and walking at 45^{th} day. Doijode *et al*. (2018) reported very good weight bearing while standing and walking on 60^{th} day for goats suffering from tibial bone fracture. In opposition, reported case complete weight bearing achieved at 30^{th}day result might be associated with age sheep and good management of sheep like avoiding of POP cast from wetting. This finding was nearly in agreement with that of findings of Doiphode (1994) who found complete weight bearing for goats and sheep in 6-18 months age at 27.5 days. Thus, POP could be effective and economical to correct fracture tibia if managed properly after application.

3.2.3. Obstructive urolithiasis in male goat

Abstract

Urolithiasis refers to the disease conditions resulting in urethral obstruction with predisposing factors like age, type of feed and water, season, castration. The urethral process is a common obstruction site in sheep and goats. Urethral process amputation is a first line treatment urolithiasis in small ruminants. A male goat was presented to the VTH with the complaint of vocalizing and straining for urination, progressive distention of the abdomen for the past one day. In addition, he mentioned about intensively management of the goat and feed with concentrates. Upon the clinical examination, the goat was restless, arched back, a pale mucous membrane, tachycardic, hyperpneic and had a normal rectal temperature. There was a urethral pulsation, swelling on the scrotal region and pain on palpation, the mildly distended abdomen and the glans and urethral process dark red color. Based on the history and clinical signs, the case was diagnosed with obstructive urolithiasis. Treatment was instituted by amputation of the urethral process. The goat received oxytetracycline (10%) for five days and meloxicam for three days with dietary changes. The goat responded well to treatment without reoccurrence of obstruction. Hence, the urethral process amputation with proper postoperative management can be an effective treatment for obstructive urolithiasis.

Keywords: *Amputation, Concentrates, Goat, Urolithiasis*

Introduction

Urolithiasis is a condition of the urinary tract in which insoluble mineral and salt concretions develop and aggregate around a nidus of proteineous material within the bladder or urethra (Belknap and Pugh, 2002). Urolithiasis refers to the disease conditions resulting in urethral obstruction (Onmaz *et al*., 2012). It is the most widespread and economically important disease of ruminants, which affects both sexes; however, urinary blockade is a major problem only in males because of the anatomical confirmation of their urinary tract (Makhdoomi and Gazi, 2013). The etiology of disease is complex and multifactorial and is known to have many predisposing factors like age, type of feed and water, season, castration which play an important role in pathogenesis of disease. Young goats and calves are frequently affected with this frustrating condition. The species wise incidence

has been reported as: goats 49.83%, cattle 32.87%, dogs 14.53%, horses 1.38%, sheep 1.04% and cats 0.34% (Amarpal *et al.*, 2004; Amarpal *et al*., 2013).

The obstruction site is usually in areas of the narrowed urethral diameter, more commonly at the urethral process of sheep and goats (Van Metre, 2004; Ewoldt *et al*., 2008). The irritation at the lodged site causes inflammation and swelling leading to urethral occlusion. A partial obstruction will show signs of dribbling blood tinged urine after stranguria, tenesmus, tail twitching, colic signs, bloat, and rectal prolapse may also be seen. On the other hand, a complete obstruction may give signs similar to partial obstruction with the absence of dribbling urine after stranguria. The severe sequelae following a complete obstruction is urinary bladder rupture causing uroperitoneum. Uroperitoneum is accumulation of urine in the peritoneal cavity caused by leakage of urine from any part of the urinary tract such as kidneys, ureters, urinary bladder and urethra (Braun and Nuss, 2015).

Obstructive urolithiasis in ruminants has been corrected with medical treatment but the result is unrewarding one. Treatment of obstructive urolithiasis is definitely surgical, once the obstruction is complete (Ewoldt *et al*., 2008). Choosing number one surgical technique in preference to another relies on weighing varying success rates between studies, intrinsic complications, technical difficulties and costs associated with each procedure (Van Metre *et al*., 1996; May *et al*., 1998). Amputation of the urethral process is successful in approximately one half of small ruminant urolithiasis cases; however, where urine flow is reestablished, recurrence remains high, with 80-90% reobstructing within hours to days. Urethral process amputation remains a first line treatment (Haven *et al*., 1993). In this study, successful repair of obstructive urolithiasis in a male goat by urethral process amputation has been reported.

Case history and clinical examination

A 1-year-old male goat weighing 35 kg was admitted to the VTH with the complaint of vocalizing and straining for urination and progressive distention of the abdomen for the past one day. The goat was managed intensively and feed with concentrates. On the clinical examination, the goat was restless, arched back, a pale mucous membrane with CRT of 3 seconds, tachycardic (128 beats/min), hyperpneic (36 breaths/min) and had a normal rectal temperature (39.1°C) (Appendix I). There was the abdomen appeared to be mildly distended (Fig 10A), a swelling on the scrotal region and pain on palpation and urethral pulsation (Fig 10B). The cranial extremity of the penis, including the glans and urethral process, presented in a dark red color. Based on the history and clinical examination, the case was tentatively diagnosed as obstructive urolithiasis and amputation urethral process was decided.

Clinical management

Management of obstructive urolithiasis generally involves establishing a patent urethra (Ewoldt *et al.*, 2008). Thus, the urethral process amputation was indicated in this case. The goat was sedated with 19.25 mg diazepam IV administration, positioned in the right lateral recumbency, the hair around the preputial area was clipped and disinfected using medvlone and povidone- iodine. The glans penis and urethral process were extruded out by pushing back the prepuce (Fig 10C). A 40 mg of 2 % lidocaine hydrochloride injection was injected into the glans penis and the urethral process was amputated with scissors (Fig 10D). The urine flow was started restoring immediately after amputation of the urethral process amputation. Postoperatively, the goat received 3.5 ml oxytetracycline (1ml/10kg) (10%), IM, SID for five days and 17.5 mg meloxicam IM, SID for three days. The owner was advised to made dietary changes (concentrated feed was limited). The urine flow was completely restored. Upon the phone call on the seventh day, the owner reported that the goat has any problem while urinating. After one month follows up evaluation, the goat was found normal upon clinical examination.

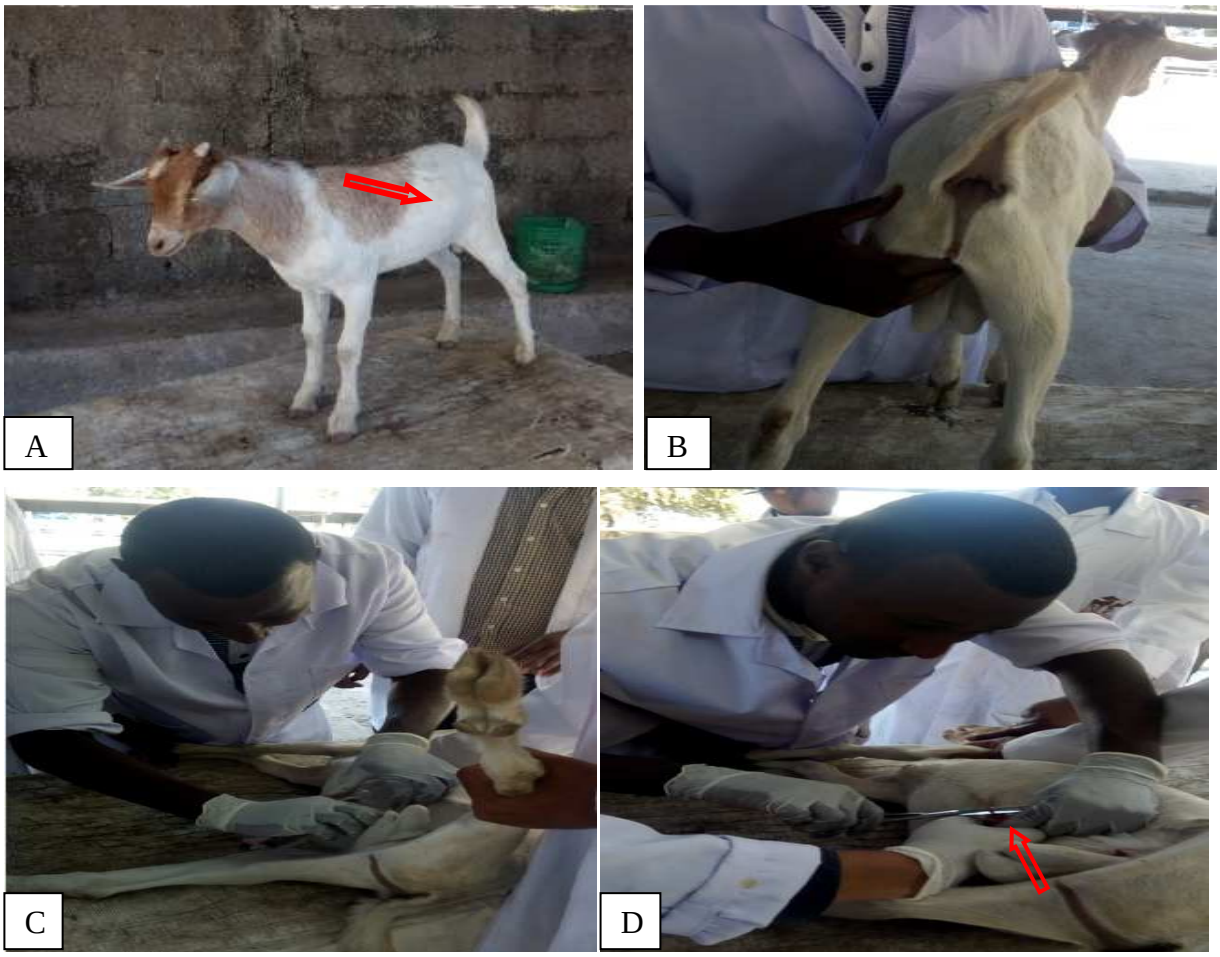


Figure 10: Urethral process amputation in male goat: Clinical presentation of goat with distended abdomen (A), examination of urethral pulsation (B), pushing of prepuce back (C) and urethral process amputation (D).

Discussion

Urolithiasis in small ruminants is more commonly identified in males because of the length and diameter of the urethra. Males subjected to early castration are more likely to develop obstructive urolithiasis due to the decreased urethral diameter (Belknap and Pugh, 2002). For this case, the calculi formation was attributed to mineral imbalance intake, since the goat was raised in an intensive system receiving fed with high grain diet. The grain diet feeds contain more level of phosphorus and magnesium and relatively less level of calcium and potassium predisposed to this

condition (Singh *et al*., 2017). In addition, age of goat might be contributed for development of obstruction due to the underdeveloped (narrower) urethral process (Fazili and Ansari, 2007).

On clinical examination the goat showed tachycardia, which was above the normal reference value (Appendix I). This was recorded by many authors in their cases of obstructive urolithiasis (Singh, 2005). Increased heart rate may be due to the accumulation toxic metabolites/waste product may result in electrolyte disturbances. Respiratory rate was higher than the normal reference value (Appendix I), which could be due to pain produced by urethral obstruction, electrolyte disturbance and hypovolumic shock (Wilson and Lofstedt, 1990). Jadon *et al*. (1987) reported the same work in calves. Rectal temperature of the goat was within the normal range, which was also seen by the study of Parrah *et al*. (2011) in experimentally created urethral obstruction in calves. In opposition, Helayel *et al*. (2015) reported pyrexic at 40 °C in ram. The clinical signs observed in present includes arched back, urethral pulsation, swelling on the scrotal region and pain on palpation and mildly distended abdomen were also reported by Helayel *et al*. (2015) and Abba *et al*. (2015).

Treatment options for goats with obstructive urolithiasis include medical management, surgery or both, but medical management alone is often unrewarding (Gutierrez *et al.,* 2000). Uroliths trapped within the urethral process may be removed by gentle manipulation or by amputation of the urethral process. Amputation of the urethral process is successful in approximately one half of small ruminant urolithiasis cases; however, where urine flow is reestablished, recurrence remains high, with 80-90% reobstructing within hours to days (Radostits *et al.,* 1994; Gutierrez *et al.,* 2000). On contrary, in this case the obstruction was completely relieved after performing the amputation of the urethral process. This result similar with Gugjoo *et al.* (2017) reported successful management of obstructive urolithiasis in three sheep and one goat by amputation of urethral process along with postoperative care. The absence of reobstruction in this case might be due to limitation of concentrate feed after treatment. Hence, obstructive urolithiasis can be effectively treated by urethral process amputation with proper postoperative management.

3.2.4. Abscess in goat

Abstract

Abscesses infection of farm animals is detrimental to the livestock due to the tremendous economic losses of animals, meat, skin and wool production associated with this affection. It can occur secondary for trauma as a result of fighting between animal, contamination of injection sites and may be any injurious conditions. An owner presented a goat to VTH with the history of the growing swelling in the hind limb around the femur, kept in the extensive system and got an injury in hind limb three weeks ago. The most ventral part of swelling was prepared aseptically, pus was aspirated, sent to laboratory and *staphylococcus species* was isolated. The ventral part of the abscess was incised, pus was drained and the pouch was flushed with iodine. Postoperatively, penstrep and cleaning the pouch of abscess prescribed for five days. However, the goat died on the third day. Trauma on the skin provides a favourable condition for entrance of microflora and causes disease condition. For that reason, animals should be protected from the trauma.

Key words: *Abscesses, Goat, Ventral incised*

Introduction

Abscesses infection of farm animals is detrimental to the livestock due to the tremendous economic losses of animals, meat, skin and wool production associated with this affection (Paton *et al*., 1988, Alharbi and Mahmoud, 2012). Sheep and goat industries worldwide suffer significant economic losses because animals with abscesses may become anemic, emaciated, causes carcass condemnation or decrease reproductive and production efficiency and death (Stoops *et al*., 1984; Connor *et al*., 2000; Hassan *et al*., 2011). Most subcutaneous abscesses result from traumatic skin penetration (Mosa *et al*., 2010). Sheep and goat abscesses caused by *Staphylococcus* (79.5%), *Corynebacterium pseudotuberculosis* (24.5%) and other bacteria including *streptococci* and *Pasteurella* species representing 5.5% (Zidan *et al*., 2013). *Staphylococci* are widespread in nature and occur as a normal inhabitant of skin (Mustafa, 1987). They may infect wounds and be present in cutaneous abscesses and lesions (Fuente *et al*., 2010). In this case, drainage of abscess caused by *staphylococcus species* in goat has been described.

Case history and clinical examination

An owner presented an adult goat weighing 25 kg to VTH. The owner mentioned that the goat brought from the market one month ago, kept in the extensive system (market) and got an injury in hind limb three weeks ago. The goat had growing swelling in the hind limb around the femur. Gradually the goat started to lose its appetite and develop poor body condition. The body temperature was 39.2^0C, respiration was 20 breaths/minute and heart rate was 80 beats/minute. All the measured parameters were in the normal range (Appendix I). Clinical the patient revealed depression, rough hair coat, painless swelling and it covered the whole femur from top to bottom (Fig 11A). The most ventral part of abscess was prepared aseptically, the swelling was aspirated by 10 ml syringe and the content taken out was pus. Thus, it was decided for draining and sample sent to the microbiology laboratory.

Clinical management

The most ventral part of the swelling was prepared aseptically and incised with number 24 scalpel blade (Fig 11B). The pus was drained and the pouch was flushed with 2% tincture iodine (Fig 11C). Postoperatively, 1.3 ml penstrep (1ml/20kg), IM, SID for five days and cleaning the pouch for five was prescribed for goat. However, administration of penstrep and cleaning pouch was continued only for two days and the goat died on the third day.

Figure 11: Clinical management and etiology of abscess in goat: Swelling on left hind limb (A), aseptically preparation ventral part (B), cleaning abscess pouch after draining (C) and bunch of cocci on Gram staining (D).

Laboratory diagnosis and result

Aspirated sample was sent to the microbiology laboratory immediately after collection. A loop sample was inoculated into 9 ml nutrient broth media and incubated for 24 hours. After the 24 hours, again a loop of a sample from the nutrient broth was taken and streaked on a blood agar plate and incubated for 24 hours. Golden in color and zone of hemolysis colonies grew, *staphylococcus* was suspected and further subcultured on the mannitol salt agar plate and incubated aerobically for 24 hours. Yellow colonies with yellow zones grew. For Gram staining of a colony that grew on the

mannitol salt agar, with sterile cooled loop, a drop of a sterile water was placed on a clean labeled microscopic slide. The loop was again sterilized over Bunsen burner flame and allowed to cool. With the cooling loop, a very small sample of a bacterial colony was picked up and gently stirred into the drop of water/saline on the slide to create an emulsion. The slide was allowed to air dry and then fixed by passing it through Bunsen burner flame quickly three times. The sample was stained with Gram staining (Appendix II). A drop of oil immersion was added on the stained slide and observed under 100 X objective lens of a binocular microscope. Gram positive bunch of cocci was observed (Fig 11D). Therefore, the culture characteristics and Gram staining was done confirmed the presence of *staphylococcus species*.

Discussion

Abscesses can occur secondary for trauma as a result of fighting between animal, contamination of injection sites and may be any injurious conditions. The organism gains access to the body through contaminated abrasions or wounds (Mosa *et al*., 2010). The abscesses infection percentage in sheep and goats in most farms ranged from 2-7 % and in few farms reached more than 20 % depending on the management practices. *Staphylococcus* is a common member of the natural microflora (Hanson *et al*., 2011). Yet it is still considered as a potential pathogen that it may negatively affect human and animal health by causing sever necrotic lesions, abscesses (Lowy, 2000) and bacteraemia (Reacher *et al*.,, 2000). *Staphylococcus* species appeared as the bacterial cause for the abscesses in this case. This result is in harmonious with that of Musa *et al.* (2012) while disagree with the result of Mosa *et al*.(2010) and Al-Harbi (2011) who isolated *Pasteurella, E. coli, Klebsiella* pneumonia from abscesses. Any trauma on skin of animals provide favourable condition for entrance of microflora and other type of micro-organism. For that reason, animals should be protected from environment expose to the trauma.

3.2.5. Hyena bite in goat

Abstract

Anima bites result in three main types of soft tissue trauma namely punctures, lacerations and avulsions. As a treatment, primary closure is more appropriate than second intention healing if the debridement performed as soon as possible. This case report summarizes the management of laceration a wound due to hyena bite in an adult goat presented to VTH with a history of a wound on dorsal scapula region of the forelimb. Clinical examination revealed margin of wound contain debris, the middle area of wound bright red in color and there was suspended skin and muscles. After careful management of wound, primary closure was made. For postoperative care, penstrep was administered for five days to combat postoperative complication and tramadol was give for three days to reduce postoperative pain along with the antiseptic dressing. The animal recovered fully and only small scared area seen along with incision site of skin after two months follow up. In conclusion, lacerated wound can be sutured with properly debridement before closure.

Key words: *Goat, Hyena bite, Primary closure*

Introduction

Trauma, infection or oncologic surgery are common causes of cutaneous defects (Field *et al*., 2015). Anima bites are result wound by trauma. It can result in three main types of soft tissue trauma namely punctures, lacerations and avulsions (Stefanopoulos and Tarantzopoulou, 2005 Stefanopoulos, 2009). As treatment, debridement should be performed as soon as possible in principle, but there is no consensus on which treatment is more appropriate, primary closure or treatment with the wound left open (Chaudhry *et al*., 2004; Garbutt and Jenner, 2004; Smith *et al*., 2004). Second intention healing of extremity defects may lead to prolonged healing time, significant wound contracture, fragile epithelial areas and non-healing wounds (MacPhail, 2013). Leaving open bite lacerations are not provide satisfactory result. Primary closure not only minimizes the postoperative scarring but also reduces infection rate (Callaham, 1994). Hence, in present case, successful repair of the hyena bite injury by debridement followed by primary closure has been reported.

Case history and clinical examination

An adult female goat weighing 36 kg was admitted to VTH with history of an ovoid wound at the dorsal scapula region due to hyena bite eight hours at night near their house and presented to VTH three hours of next day (Fig 12A). On presentation, the goat was found to be in good physical condition. Clinical examination revealed, there was debris on the margin of wound, the bitten area there was a suspended skin and small portion of the muscle, the middle area of wound was bright red in color and clinical parameters were found in the normal range. Thus, the wound was considered as lacerated wound and decided for primary closure after proper management of the wound.

Surgical treatment and postoperative care

The goat was restrained in lateral recumbency and sedated with IV injection of 19.8 mg diazepam. Anesthesia of area was achieved with a ring block technique using 120 mg of 2% lignocaine hydrochloride. The lacerated area was thoroughly cleaned with water and was aseptically prepared for reconstructive surgery using diluted medvlone. Surgical debridement of lacerated skin margins was performed using a blunt edge of scissor by trimming of tissue with debris for freshening the wound (Fig 12B). Simple continuous patterns were placed to appose lacerated muscles using a vicryl number 2. Skin was closed by simple interrupted pattern using number 1 silk (Fig 12C). Postoperatively, 1.8 ml penstrep (1ml/20kg) was administered IM, SID for five days and 72 mg of tramadol was administered IM, SID for three days along with a daily antiseptic dressing of wound for three days. Skin sutures were removed on 10^{th} postoperative days and follow up was done after two months, which only a small scared area was seen along with incision site after surgery (Fig 12D).

Figure 12: Primary closure of hyena bite in goat: At presentation (A), debridement of wound (B), skin after sutured by simple interrupted pattern (C) and small scar after two months (D).

Discussion

Management of an animal bite wound should start with proper local care of the wound. The wounds should be washed vigorously and irrigated with saline solution to reduce the high inocula of the oral flora of the biting animal and devitalized tissues should be debrided. Surgical closure of animal bite wounds is controversial and an evidence based approach is currently lacking (Maimaris and Quinton, 1988; Brook, 2009). In present case, clean wound was created by cleaning with water followed by diluted medvlone and by trimming devitalized tissues. After proper management of

wound, surgical apposing was done and wound was healed without any infection. This finding is parallel with Maimaris and Quinton (1988) who reported comparison on treatment of dog bite wounds by primary closure with non-closure and it was concluded that dog bite wounds can be safely sutured. Additionally, this work also supported by Chen *et al*. (2000) who recommended suturing for lacerations with an approximately 6% rate of wound infection where cosmesis is the primary concern. However, suturing is not recommended in wounds at high risk of infection (Dendle .and Looke, 2008). A follow up of the patient was made after two months, during which only small scared area was seen along incision site. This finding was supported by Gopinath *et al*. (2015). In conclusion, lacerated wound can be sutured with properly debridement before closure.

3.2.6. Limb amputation in sheep

Abstract

In sheep, limb amputation could be performed to save the life of animals in some incurable conditions. In the present study, disarticulation of the limb was performed in sheep were, namely scapulothoracic disarticulation and disarticulation at the hip joint to explain whether the animal tolerates the amputation or not and to recommend better surgical procedures for genetically valuable animals. Sheep in which hip disarticulation was done, tolerate well the operation, able stand and walk immediately few minutes after surgery. However, sheep with scapulothoracic disarticulation even unable stand. Thus, scapulothoracic disarticulation is not alternative from euthanizing for sheep or even for genetically valuable animals.

Key words: *Disarticulation, Hip joint, Sheep, Scapulothoracic*

Introduction

In veterinary field, the surgical amputation of limb in farm animals is uncommonly practiced. However, this type of surgical operations is relatively common in small animals with the same aforementioned indications (Pal *et al*., 2011; Fossum, 2013). Limb amputation is indicated based on the irreversible nature of the injury or poor prognosis resulting in a non-functional limb. Reported indications for limb amputation in veterinary species include catastrophic injury to associated soft tissue structures such as muscles, tendons, ligaments and nerves, chronic or gangrenous infection, osteomyelitis, loss of blood supply and open, comminuted long bone fractures. Limb amputations are uncommon in farm animal practices and very few were reported. It is due to animal size, animal intended use, value of animal, temperament and high cost for the primary repair. These animals will either be slaughtered or euthanized. Fracture repairs are recommended based on the prognosis of the affected limb and other factors, however when options are limited, amputation should be recommended as an alternative to euthanasia (Desrochers *et al*., 2014).

Many serious injuries to the limbs causing severe bone and soft tissue damage and a fracture that is unstable following multiple surgical stabilization procedures may require amputation and amputation of limb is recommended (Satyanarayana and Mallika, 2009). Nevertheless, these researches were done to show the amputation is alternative to euthanize, they are not sufficient to show the adopted surgical procedures (disarticulation). Therefore, the objectives of this study were to explain whether the animal can tolerate the amputation or not and to establish the adopted surgical procedures (disarticulation) or recommend better surgical procedures for genetically valuable animals.

Case history and clinical examination

Case one: A six month male sheep weighing 18 kg was brought to the VTH for a primary complaint of traumatic injury at the left forelimb after biting with a dog at eleven hours of the day. The owner brought the sheep to the hospital at three hours of the next day. On clinical examination, the patient was dull but responsive, tachycardia (120 beats/minute) and the mucous membrane was pink. The patient exhibited unable to stand, with a highly lacerated wound, separation of neck scapula from

attachment (Fig 13A), laceration of muscles extending to the elbow joint and the lacerated muscles were highly contaminated with debris and the limb extremities were cold. Based on that, we told for the owner, the prognosis of an animal was poor; the owner has not volunteered turn sheep to his home and leaves out in VTH. We give information about for VTH director (Dr. Yonas Tolosa), he provides the necessary material for us and we decided to conduct scapulothoracic disarticulation.

Case two: A five month male sheep weighing 10 kg was brought to the Dire veterinary clinic with a complaint of a dog bite on the left hind limb three days ago. The sheep was brought to clinic by the dog owner and he told that assistant veterinarian in Dire veterinary clinic was treat the patient two days ago, but there was no any recover. Clinical examination was revealed muscles and ligament covered the femur up to knee joint starting near to the hip joint was forcefully separated (Fig 14A), maggots created in the wound site, the sheep was alert, unable stand, area below bitten area was cold and measured clinical parameters were found in the normal range. After examination, we told the cost of treatment and prognosis of animal for a dog owner, he leaves out sheep in Dire veterinary clinic to give a price of sheep for sheep owner. We brought the sheep to VTH, VTH director (Dr. Yonas Tolosa) facilitates necessary material for us and we decided to perform hip joint disarticulation.

Surgical treatment and postoperative care

Case one: Sheep was positioned on the operative table and sedated with 9.9 mg diazepam, IV administration. The area around the traumatic wound was prepared by the shaving of hairs, washing with soap and water, then skin around lacerated muscles was disinfected with 2% povidone-iodine solution from the center to periphery and sterile surgical drape was put around prepared area leaving incision site (Fig 13B). Local infiltration was performed around the incision site using 2% lignocaine hydrochloride at a dose of 200 mg of skin surface (Fig 13C). The animal was restrained in the right lateral recumbent position keeping left forelimb upper side. The patient was administered IV fluids (Lactated Ringer’s solution) at a surgical rate of 10 ml/kg/hour and vital parameters were heart rate, respiration, CRT including mucous membrane color were monitored closely every 5 minutes.

Lacerated trapezium, omotransversarius and rhomboideus muscles were transected from their attachment to expose medial surface of scapula and seratus vetralis muscle. Seratus ventralis muscle was transected to expose the brachial plexus and axillary artery and vein. Brachial plexus was transected after trans-fixation of artery and vein. Then other muscles brachiocephalicus, deep and superficial pectoral and latissimus dorsi muscles were transected from humeral insertion to make free from all attachment for removal of forelimb along with scapula (Fig 13D). After removal, the brachial plexus and blood vessels were covered with an approximation of muscles bellies with vicryl number 2 in simple continuous pattern. Skin was sutured with silk number 1 in cross mattress pattern and bandage was applied.

For postoperative care, 1.8 ml penstrep (1ml/10kg) was prescribed IM, SID for five days and 36 mg tramadol was prescribed IM, SID for three days along with dressing of wound site with antiseptics. However, a daily wound dressing with medvlone followed by povidone-iodine and penstrep injection was continued for four days until that the sheep was euthanized due to the problem of premises in VTH. The post-surgical recovery was looked well with an expression of normal behavior. The patient started to consume food a few minutes after surgery but could not stand until euthanized.

Case two: Sheep was positioned on the operative table and sedated with 5.5 mg diazepam, IV administration. The area around the traumatic wound was prepared by the shaving of hairs, washing with soap and water, then the skin around lacerated muscles was disinfected with 2% povidone-iodine solution from the center to periphery and covered with a sterile surgical drape. Local infiltration was performed around the incision site using 2% lignocaine hydrochloride at a dose of 120 mg of the skin surface. The animal was restrained in the right lateral recumbency position keeping left hind limb upper side. The patient was administered intravenous fluids (Lactated Ringer's solution) at a surgical rate of 10 ml/kg/hour, IV and vital parameters were heart rate, respiration, CRT including mucous membrane color were monitored closely every 5 minutes.

The skin incision was made in a curved manner crossing the midfemur and then upward and caudally to the tuber ischii (Fig 14B). The skin was bluntly dissected to expose the femoral triangle. The femoral blood vessels were ligated together with the saphenous nerve. The sartorius, pectineus,

gracilis and abductor muscles were transected. The joint capsule the hip joint was incised medially, cranially and caudally and the ligament of the head of the femur was transected. The lateral cutaneous femoral nerve and caudal branches of the deep circumflex iliac blood vessels were doubly ligated and transected. The semimembranosus, semitendinosus, quadratus femoris, gluteus medius, gluteus profundus, obturatorius externus and gemelli were transected. The joint capsule was incised completely and the limb was removed. The acetabulum was covered by suturing the deep fascia covering the gluteobiceps to that of the gracilis and sartorius on the medial side in simple continuous pattern by vicryl number 2. Then, the superficial fascia and skin were closed in a routine pattern in horizontal mattress pattern by silk number 1 (Fig 14C).

For postoperative care, 1ml penstrep (1ml/10kg) IM injection was given for five days daily and 20 mg tramadol was given for three days daily for IM injection with daily wound dressing by medvlone followed by povidone iodine for five days. The sheep was stand (Fig 14D) and started feeding immediately few minutes after surgery. After 8^{th} day, the suture material was removed and recovered without any complication. After 9^{th} day, the sheep was given for sheep owner without return of treatment cost because of the problem of premises and absence of attendant in VTH. It was very difficult for 5^{th} year my group students and me to keep until 8^{th} day of surgery. Follow up was done after one month, sheep was fully health no problem with walking.

Figure 13: Scapulothoracic disarticulation in sheep: Contaminated wound left forelimb scapula (A), area covered with surgical drape (B), local infiltration of lidocain (C) and removed of forelimb along with scapula (D).

Figure 14: Disarticulation at the hip joint in sheep: Injured left hind limb (A), skin incision made cranially to mid femur (B), closed skin by simple interrupted pattern (C) and immediately after surgery (D).

Discussion

Decision regarding any options in treating fractures in ruminants are primarily based on the prognosis of the animal relating to the severity and nature of the fractured limb, cost of treatment, economical and genetic potential value of the animal, complexity of the procedure, unpredictable postoperative complications, prolong postoperative care and poor quality of life issues (Borujeni, 2008; Desrochers *et al*., 2014). Fractures involving the limbs can be managed with splints, casts, external skeletal fixation and trans-fixation pinning and casting (Anderson and St Jean, 2008). Amputation is considered an alternative to euthanasia in severe injuries where genetic preservation

or sentimental value to the client is high (Desrochers *et al*., 2014; St Jean and Anderson, 2014). Foreleg amputation in some rare species like dog and red deer were also reported in literature (Quessada, 2003; Sharma *et al*., 2017).

In the case one and case two reported here, disarticulation of the left forelimb at the level of the scapulothoracic disarticulation and disarticulation of the left hind limb at the level of hip joint, respectively were selected as an alternative to euthanasia after considering the severity of the injury, to explain whether the animal can tolerate the amputation or not and to recommend better surgical procedures (disarticulation) for genetically valuable animals. The site of disarticulation of case one was similar to Sharma *et al*. (2017) who reported forequarter amputation (scapulothoracic disarticulation) in dog. Besides, this site of selection was also supported by Desrochers *et al*. (2014) who reported amputation of the limbs can be performed through disarticulation. The site of disarticulation in case two was supported with finding Misk and Hifny (1979) who reported hip joint disarticulation in goats. The operations were conducted under the effect of local anesthesia with admission of a premedication agent. This finding correlate well with those previously reported (Abraham *et al*., 2017).

A common question that arises against amputating an animal's limb is the weight of the animal. Based on a survey conducted on clients experiences with their dogs after a limb amputation, no significant association were found between weight, age and quality of the dogs to the speed of adaptation and difficulty in locomotion in three legs (Kirpensteijn *et al*., 1999). In current cases, case one could not stand and walk until euthanized but case two stand and walk immediately few minutes after surgery. Unlike to case one finding, Sharma *et al*. (2017) reported the dog after scapulothoracic disarticulation adapt operation well, able stand and walk. The difference in adaption of operation might be due to the inability to distribute weight in remained three legs after amputation unlike to dogs. Finding in case two was in line with Tmumen *et al*. (2016) finding who reported a surgical amputation at the middle of left femur, to save the life of a Libyan Doe, was successfully performed. After the operation, the animal was tolerated walking on three legs. Moreover, this finding agreed with previous reports (Pal *et al*., 2011, Devi *et al*., 2016, Abraham *et al*., 2017) and with forelimb amputation in dog at level of humerus on this case-report thesis. Accordingly, Amputation at the level of the scapulothoracic disarticulation should not consider as an alternative to

euthanasia with the severely comminuted scapula and humeral fractures. On the other hand, amputation is an alternative to euthanasia for a severely injured hind limb for genetically valuable animals.

3.3. Case reports on small animals

3.3.1. Dystocia in cat

Abstract

Most of the common cause of dystocia in the queen cat is uterine inertia. This case report summarizes management of dystocia in a queen cat due to secondary uterine inertia presented to VTH with history of overdue pregnancy, blackish green vaginal discharges with continuous straining for three days, which has given birth to two live fetus three days back. Per-vaginal examination revealed the presence of dead fetus, which was diagnosed as a case of dystocia. There was a rupture in the body of the uterus and based on owner's request ovariohysterectomy was performed followed cesarean section. For postoperative care, tramadol for three days and penstrep for five days along with an antiseptic dressing of surgical site 5 % by povidone-iodine were given. Sutures were removed on 10^{th} postoperative day. The cat was recovered uneventfully without any complication.

Key words: *Cesarean section, Cat, Dystocia, Ovariohysterectomy*

Introduction

Dystocia in cats occurs in 3.3 to 5.8 percent of all parturitions (Pretzer, 2008) and is an important cause of stillbirth and early neonatal death (Gunn-Moore and Thrusfield, 1995). Most common cause of dystocia in the queen cat is uterine inertia (Noakes *et al.*, 2000). Etiology is not precisely defined and will be multi-factorial with mechanical, hormonal, physical and genetic components all playing part. It is classified as primary (no uterine contractions) or secondary (initially uterine contraction, later cease due to muscular exhaustion) (Van den Weizden and Taverne, 1994). Dystocia is the primary factor in initiating secondary uterine inertia. Surgical intervention is required

in approximately 60-80 % of dystocia cases in the queen (Gilson, 2003). C-section is common in small animal practice, especially practices devoted to reproduction or emergency and critical care. In one study, 58% of C-sections were performed on an emergency basis. There is an increased mortality risk for dams and decreased puppy survival when C-section is performed on an emergency basis (Moon *et al*., 1998). In the present study, dystocia due to secondary uterine inertia in queen cat and its emergency surgical management has been reported.

Case history and clinical examination

A three-year-old queen cat with a history of overdue pregnancy was presented to VTH. The animal was having blackish green vaginal discharges with continuous straining for three days, which has given birth to two live fetuses three days back. During clinical examination, patient revealed 37.4^0C body temperature, 72 beats/min heart rate and 30 breaths/min respiratory rate. Her body weight measured around three kilograms (3kg). Per-vaginal examination revealed the presence of dead fetus inside the birth canal which indicates initially there was good uterine contraction and subsequently uterine inertia has been developed (Fig 15A). The history and symptoms indicate dystocia due to secondary uterine inertia. To save the life of the queen cat, cesarean section was performed.

Surgical treatment and postoperative care

The cat was premedicated with diazepam, 1.5 mg IV five minutes prior to surgery. Lactated Ringer's solution was given at surgical rate (10 ml/kg/hr, IV) was administered from induction until the end of surgery. The animal was secured in dorsal recumbency and surgical site from umbilicus to pubic symphysis was prepared aseptically (Fig 15B). The anesthesia was induced by the combination of ketamine 15 mg plus diazepam 0.75 mg, IV and maintained by 7.5 mg ketamine plus 0.375 mg diazepam, IV.

The midline incision (Fig 15C) about 8 cm behind from umbilicus towards pelvis was taken. The abdomen was opened carefully avoiding injury to underlying viscera. Gravid uterine horns were exteriorized to the incision site and abdominal cavity was packed with sterile gauze to avoid infiltration of uterine fluids into the peritoneal cavity. There was a rupture in the body of the uterus

and the incision was extended from the ruptured site of uterus and removed one dead fetus. Upon the owner's request, OVH was done. The peritoneum and linea alba were closed with simple interrupted sutures by using chromic catgut number 2. The subcutaneous tissues were closed chromic cat number 2 by ford interlocking pattern. The skin was sutured with silk number 1 using cross mattress sutures pattern. Postoperatively, 0.3 ml penstrep (1ml/10kg) IM, SID for five days and 6mg tramadol IM, SID for three days along with an antiseptic dressing of the by povidone-iodine 5 % solution. Sutures were removed on the 10^{th} postoperative day. The cat was recovered uneventfully without any complication (Fig 15D). Follow up by telephone was done after postoperative management, no problem was reported.

Figure 15: Cesarean section with ovariohysterectomy in cat: Per-vaginal examination (A), aseptically prepared ventral midline (B), midline incision (C) and on 10 th day after surgery (D).

Discussion

In present case, clinical sign like blackish green vaginal discharges and 37.4 ^{0}C body temperature were similar with Angelika and Matthieu (2009) finding who reported clinical signs for indication of occurrence of dystocia are include: the animal's body temperature has dropped to less than 37·8°C and returned to normal with no evidence of labour, there is a green vaginal discharge. Uterine inertia most common of maternal factor cause dystocia. The uterus is no longer able to contract and push the babies through the vaginal canal. It can occur at any stage of labour and may be associated with

uterine exhaustion (Ekstrand and Linde Forsberg, 1994). In current case dystocia also caused due to uterine inertia.

Ovariohysterectomy at the time of C-section has been a controversial issue. It has been suggested that elective OVH at the time of hysterotomy should not be performed to avoid the additional stresses to the dam of longer anesthetic time, shifts in body fluids, and blood loss (Gaudet, 1985). Results of present case finding showed no important complications or contraindications to the use of C-section followed by OVH. Limitations of this procedure include the fact that the dam can no longer be used for breeding. Present work was supported by Robbins and Mullen(1994) who reported importance of conducting both procedure at same time with following advantages: minimal anesthetic time for the dam, provides an opportunity to affect population control in pets of clients who may not be able to afford to return for a second surgical procedure (OVH), it does not compromise the health of the dam and safe for the neonates.

The rupture of the uterus is an acute, life threatening condition observed by the end of pregnancy or during parturition that appears most commonly as a result of dystocia (Hajurka *et al.*, 2005). Rupture during the whelping is most likely to occur in cases in which the uterine wall is compromised by the presence of infection, a dead fetus, uterine torsion, or careless obstetrics procedures. It can be also caused by excessively large doses of oxytocin (Jackson, 2004). In current case, the uterine rupture occurred might be due to long term straining to delivery fetus and presence of dead fetus in the uterus. Hajurka *et al*. (2005) reported similar finding. OVH used for treatment of uterus rupture in present case, supported by Hayes (2004) who suggested ovariohysterectomy for treatment of uterine rupture. While others have recommended repair of uterine defect followed by abdominal lavage and postoperative antibiotic therapy (Thilagar *et al.*, 2004). In the current case, dystocia was due to secondary uterine inertia in queen cat and its successful management was performed cesarean section followed by ovariohysterectomy, although further studies are necessary to confirm this finding.

3.3.2. Forelimb amputation in dog

Abstract

Amputations of limbs in small animal, practices are common especially in dogs with cases of severe trauma to the limbs. A female dog weighing 18 kg was brought to VTH for a primary complaint of traumatic injury at the right forelimb after car accident reached. On clinical examination, the injury was highly comminuted and contaminated fracture with soil from carpal joint up to the distal part of the humerus. Because the fracture was severe trauma (comminuted fracture), amputation was done at the level of proximal 3rd of the humerus around the forelimb. The postoperative complications formed following this operation were opening of skin flap after removal of bandage due self-mutilation operation site and incisional site discharge. After surgery, postoperative antibiotic and analgesic were given, the wound was dressed daily by 2% povidone-iodine until wound healing and the plastic collar was applied. The suture materials were removed on 16thday of surgery and the dog recovered fully without any difficulty to adapt amputation. Hence, amputation could be alternative to euthanasia for sever fracture of humerus in dogs.

Key words: *Amputation, Comminuted fracture, Dog, Humerus*

Introduction

Limb amputation secondary to primary boney tumors, severe trauma or catastrophic injury is considered a viable option in small animal veterinary practice where successful treatment or salvage of the limb is precluded (Pal *et al*., 2011). Amputations of limbs in small animal practices are common especially in dogs with cases of severe trauma to the limbs or osteosarcoma. Limb amputation is indicated based on the irreversible nature of the injury or poor prognosis resulting in a nonfunctional limb. Reported indications for limb amputation in veterinary species include catastrophic injury to associated soft tissue structures such as muscles, tendons, ligaments and nerves, chronic or gangrenous infection, osteomyelitis, loss of blood supply and open, comminuted long bone fractures (Drygas *et al.* 2008; Fitzpatrick *et al.* 2011).

The change in gait caused by the amputation of a limb may lead to an increased incidence of orthopaedic diseases of the remaining limbs, especially in large breed dogs. Therefore, the potential

contraindications for limb amputation include severe orthopaedic or neural disease in other limbs or extreme obesity (Anderson and Mann, 1994; Kirpensteijn *et al*., 1999). The preoperative condition of the animal, the animal's expected ability to adapt postoperatively and the owner's attitude towards their pet as an amputee affect the decision to amputate (Kirpensteijn *et al*., 2000). Despite having obvious gait abnormalities, dogs and cats adapt well after an amputation (Forster *et al*., 2010). Kirpensteijn *et al. (*2000) reported no significant association between the weight and age of the dogs and how quickly they were able to adapt post amputation.

Humerus fractures account for approximately 10% of all fractures in dogs and cats and most of these involve the middle and distal one third of the bone. Motor vehicle trauma seems to account for the majority of humeral fractures in dogs and cats. The humerus as a unique shape and complex surrounding anatomy with important nerves and vessels making fracture repair a challenge (Simpson, 2004). Fracture repairs are recommended based on the prognosis of the affected limb and other factors, however when options are limited, amputation should be recommended as an alternative to euthanasia (Desrochers *et al*., 2014). In present case, a successful forelimb amputation of dog at level of humerus due car accident has been reported.

Case history and clinical examination

The volunteer elementary school student told for us while we are in VTH at working time, car accident reached on a stray dog and she was found around their fence. A female dog weighing 18 kg with a good body condition score was presented to the VTH, for a primary complaint of traumatic injury at the right forelimb after a car accident, reached. On clinical examination, the dog was dull but responsive, dehydrated, having 37.5^0C body temperature, respiratory rate 24 breaths/min and heart rate 120 beats/min. The mucous membrane was pale. The highly comminuted and contaminated fracture with soil from carpal joint up to distal part of the humerus (Fig 16A) was seen in the right leg of the forelimb of dog.

Surgical treatment and postoperative care

The dog was sedated with an IV injection of 0.9 mg diazepam, 36 mg tramdol was given as preoperative analgesia, maintained on fluid therapy (sodium chloride 0.9%) during surgical operation time at surgical rate (10 ml/kg/hr, IV), placed in dorsal recumbency and the affected limb from carpus to the dorsal and ventral midline was aseptically prepared in a standard fashion. The anesthesia was induced by a combination of ketamine 90 mg plus diazepam 1.8 mg, IV and maintained by 45 mg ketamine plus 0.9 mg diazepam, IV.

Limb amputation was performed by the standard procedure as suggested by Nunamaker and Newton (1985). The skin incision was done at the level of proximal 3rd of the humerus around the forelimb and dissection of the subcutaneous tissue was continued in the same plane (Fig 16B). The biceps brachii muscle and medial head of triceps were separated. After the exposition of the brachial artery and vein, median, ulnar and musculocutaneous nerve followed by transection of nerves and ligation of the artery and vein. The biceps brachii muscle and medial head of triceps were transected. The cephalic vein was ligated and the radial nerve was transected. The brachycephalic muscle was elevated from the humerus and Gigli wire was applied to remove the distal forelimb. Muscles were sutured by chromic catgut number 2 with simple interrupted pattern around the humeral stump (Fig 16C). The subcutaneous tissue was closed by chromic catgut number 0 with a ford interlocking pattern and the skin closed by horizontal mattress by silk number 1. The bandage was applied at the site of surgery after end of the operation.

The postoperative complication formed following this operation were opening of skin flap after removal of bandage due to self-mutilation of operation site and incisional site discharge for ten days. The care after surgery was, 36 mg tramadol having an analgesic effect given IM, SID for three days and 1.8 ml penstrep (1ml/10kg) given IM, SID for five days. The wound was dressed daily by 2% povidone-iodine until wound healing, skin flap was closed for the second time by sedating patient, plastic collar was applied at second day to prevent self mutilation, feed, water ,and premises care provided safely (Fig 16D, Fig 16E). The suture materials were removed at the 16th day of surgery and at 30th day, follow up there was no problem (Fig 16F, Fig 16G).


A


B


C


D


E

Figure 16: Forelimb amputation at the level of the humerus in dog: Comminuted and contaminated fracture in right leg of fore limb (A), skin incision (B), suturing muscles (C), shows postoperative care (D and E) and at 30th Day (F and G).

Discussion

Fractures involving the limbs can be managed with splints, casts, external skeletal fixation and transfixation pinning and casting (Anderson and Jean, 2008). Amputation is considered an alternative to euthanasia in severe injuries where genetic preservation or sentimental value to the client is high (Jean and Anderson, 2014; Desrochers *et al*., 2014). Decision regarding any options in treating fractures are primarily based on the prognosis of the animal relating to the severity and nature of the fractured limb, cost of treatment, economical and genetic potential value of the animal, complexity of the procedure, unpredictable postoperative complications, prolong postoperative care, and poor quality of life issues (Borujeni, 2008 ; Desrochers *et al*., 2014).

In the present case, the open, highly comminuted and contaminated fracture were seen on site of accident of the dog. Therefore, amputation of the humerus at its proximal third was done in an attempt to prevent osteomyelitis and further spread of infection to other bones. The current decision for amputation of limb supported by Anderson and Jean (2008), Desrochers *et al*.(2014), Vogel and Anderson (2014) and Mulon and Desrochers (2014) who were reported amputation for open fractures increase the likelihood of complications as well as poor prognosis when there is extensive

damage to the skin, muscular and neurovascular, high speed crush injury, highly comminuted fracture and contaminated.

Short term wound complications following pelvic or thoracic amputation in cats and dogs were typically minor and resolved after treatment. Following limb amputation, an overall infection rate of 9-12.8% in dogs and 3.6% in cats, was documented. Incisional site discharge along with severe generalized edema and bruising was reported day one postoperatively, which progressed to complete dehiscence with purulent discharge and necrotic muscle bellies (Raske *et al*., 2015). On contrary, in the present case an incisional site discharge without purulent odor for ten day this might be due to good postoperative care.

According to Budsberg *et al*. (1987) the distribution of bodyweight on each limb at standing is 30 % to each forelimb and 20 % to each hind limb, suggesting that it might take longer to adapt to walking on three legs after the amputation of a forelimb. Dogs are thought to compensate for the loss of a forelimb by shifting their weight to the hind limbs. The proportion of a dog's bodyweight carried by its forelimbs varies with the breed (Off and Matis, 1997). However, in present case was no longer difficulty in dog to adapt walking with three legs after amputation of one leg of forelimb, which was similar finding with Kirpensteijn *et al*. (1999). Hence, the amputation could be alternative to euthanasia for sever fracture of the humerus in dogs.

3.3.3. Ovariohysterectomy in dog

Abstract

Ovariohysterectomy is an irreversible technique which is used for the sterilization of the female animals to prevent the uncontrolled breeding. A 1-year-old local breed stray bitch with a history of absence of parity was reported to VTH for birth control. Before surgery, the bitch parameters were evaluated and OVH was done as a birth control measure through ventral midline incision behind the umbilicus. The bitch was followed after surgery for 7 days in a clean squeeze cage with postoperative treatment by penstrep for five days and tramadol for three days along with dressing surgical site with 2% povidone-iodine. No complication was noted and the bitch recovered uneventfully. On the 14th day, the suture was removed and it was noticed that the surgical site was healed completely. Hence, OVH is advisable for birth control the dog.

Key words: *Birth control*, *Bitch*, *Ovariohysterectomy*

Introduction

Ovariohysterectomy is one of the most routinely performed major abdominal surgeries in the veterinary practice (Jason, 2009). It is an irreversible technique which is used for the sterilization of the female animals (Kirsan *et al*., 2013) where surgery is done under proper general anesthesia and sterile operating technique (Virginia *et al*., 2012). The OVH usually is accessed through ventral midline incision, which frequently encompasses the half or the middle third of the umbilico pubic distance and involves surgical removal of the ovaries and uterus. Surgery is usually performed at 4 ½ to 9 months of age (Machado *et al*., 2012).

Complications associated with OVH often result from inappropriate technique while performing the procedure and are easily prevented by being attentive to good surgical technique. Complications that have been reported secondary to OVH in the dog and cat include hemorrhage, wound healing complication, ovarian remnant syndrome, stump pyometra, stump granuloma, vaginoperitoneal fistula formation, ureteral trauma, accidental ureteral ligation and urinary incontinence (Burrow and Batchelor, 2005). It is done as a method of contraception to prevent the uncontrolled breeding, as

well as to prevent and treat diseases associated with the reproductive system, such as mammary neoplasia, benign prostatic hyperplasia, alleviation of the risk of pyometra, and oestrus attraction of male dogs resulting inconvenience to the owner (Davidson *et al*., 2004; Howe, 2006). In this case study, successful OVH in bitch to control birth has been described.

Case history and clinical examination

A 1-year-old, 11 kg weighing local breed bitch with history without parity was brought to the VTH for birth control. At first general physical examination was done. The bitch had good body condition and all the parameter was within normal limit. The owner told that there was no probability pregnancy and it was decided to spay the bitch.

Surgical treatment and postoperative care

The bitch was kept off from feed for 12 hours and 3 hours from water. The bitch was kept on the operation table and mouth was tied with a gauze to prevent from biting during restraining. She was sedated with an IV injection of 0.55 mg diazepam, placed in dorsal recumbency, the caudal midline behind the umbilicus was aseptically prepared (Fig 17A) and covered with sterilized draper keeping the operative site open (Fig 17B). The surgery was maintained on fluid therapy (sodium chloride 0.9%) during surgical operation time at the surgical rate (10 ml/kg/hour) and controlled under general anesthetic injection of diazepam 1.1 mg plus ketamine 55 mg intravenously. The maintenance anesthetic dose was given at half of the induction dose during the surgery.

Ovariohysterectomy was performed with a ventral midline incision according to standard techniques (Howe, 2006). Ventral midline incision behind the umbilicus was performed on skin and subcutaneous connective tissue (Fig 17C), a substantial amount of fatty tissue, was bluntly dissected to visualize the line alba. Using tooth forceps, the linea alba was grasped in the middle and tented up before being incised with a scissor. The uterine horn was identified by fingers and ovaries were found following the horn to their ends. The broad ligament (mesovarium) attached to the ovaries were torn so the ovaries were identified. The right ovarian artery was ligated and transfixed with vicryl 1-0. Then right ovarian artery was cut. The same procedure was followed for left ovary. The

uterine body and related arteries were ligated just in front of the cervix leaving the cervix as the natural barrier. The entire uterus and ovaries were then removed. The abdomen was checked for bleeding. The peritoneum and linea alba layers were sutured with simple continuous pattern with vicryl number 1-0. The subcutaneous layer was sutured with a subcuticular pattern using vicryl number 1-0. The skin was then closed with simple interrupted suture pattern using silk 1 number and incision site was dressed by 2% povidone-iodine (Fig 17D).

For postoperative treatment and care, after surgery, 1.1 ml penstrep (1ml/10kg) was administered IM, SID for five days and 22 mg tramadol was administered IM, SID for three days with dressing 2% povidone-iodine. The patient was kept in a clean squeeze cage and observed for 7 days. No complication was noted and the bitch recovered uneventfully. On the 14^{th} day, the suture was removed and it was noticed that the surgical site was healed completely.

Figure 17: Ovariohysterectomy in dog: Dorsal recumbancy (A), surgical field covered with sterilized draper (B) ventral mid line incision (C) and dressing incision site after surgery (D).

Discussion

Every year millions of unwanted puppies are born. About 75% of the worldwide dogs, often referred to as stray, are free to roam and reproduce. Every year between 8 and 10 million dogs enter shelters and 4 to 5 million of these animals are euthanized due to only lack of homes (Kutzler *et al*., 2006). Macpherson *et al*. (2013) identified free roaming dog as a source of transmitting diseases to livestock and humans. Free roaming dogs are mostly responsible for bites (Jackman *et al*., 2007). Among the zoonoses, rabies is of particular concern for humans and livestock where dogs are

responsible for more than 90% of the estimated 55,000 human deaths and for the millions of people that every year takes post-exposure vaccine following a bite (Knobel *et al*., 2005).

Large scale culling, which have now been shown to be ineffective because immigration and increased birth rates quickly compensate for the losses. Additionally, culling dogs is not an effective approach to reduce the impact of zoonotic diseases such as rabies (Morters *et al*., 2013). Surgical sterilisation is currently the main control method advocated to control free roaming dog populations (Lembo, 2012). Many surgical sterilization techniques have been described for female dogs, including midline OVH, early age gonadectomy, ovariectomy, laparoscopic OVH and ovariectomy (Howe, 2006; VanGoethem *et al*., 2006). OVH is considered to be the most reliable method in the control of dog population control as a part of rabies control programmes in rabies endemic areas (Musal and Tuna, 2005). Similarly, in present case ovariohysterectomy was conducted to control unwanted puppies.

In present case, OVH was done through ventral midline. This work was supported by Coe *et al*.(2006) who reported a ventral midline approach as standard technique for canine OVH. The patient of the present study had no preoperative antibiotic administered before the surgery. This work similar with Burrow *et al*. (2005) who recommended preoperative antibiotics are not necessary during OVH procedures. Complications associated with OVH include hemorrhage, wound healing complication, ovarian remnant syndrome, stump pyometra, stump granuloma, vaginoperitoneal fistula formation, ureteral trauma, accidental ureteral ligation and urinary incontinence (Burrow and Batchelor, 2005). However, in reported case the bitch recovered uneventfully without any noticeable complication. This finding was also reported by Azizunnesa *et al*. (2017). Absence of complication might be due to appropriate provision feed, water and dry kennel and good postoperative care. In conclusion, OVH can be considered as 100% safe birth control measure and humane rather than euthanizing the homeless dogs.

3.3.4. Castration in dog

Abstract

Castration is one of the most common surgical procedures performed to control the stray dog population. A stray dog faced a car accident in the perineal region in the road and I brought to VTH. The dog was treated and recovered from injury; open castration was done through the prescrotal midline. For postoperative care, broad-spectrum antibiotics (penstrep) was administered for three days, anagesic drug (tramadol) was given two days, wound was dressed for povidone-iodine and the collar was applied to prevent self-mutilation. Swelling of the scrotum and urinary inconsistency were complications occurred after surgery. Skin suture was removed the seventh day of surgery after the wound was completely healed with a small scar in the incision site. Hence, castration is recommended for control of the dog overpopulation.

Key Words: *Complication, Open castration, Stray dog*

Introduction

Castration is one of the most common surgical procedures performed in veterinary practice by small animal practitioners (Ajadi and Oyeyemi, 2014; Howe, 2015; Kaufmann *et al*., 2017). It is the removal of the testes (Johnston, 1991). Generally, castration can be done through surgical, chemical or by immuno castration methods (Kustrix, 2006; Ajadi and Oyeyemi, 2014). Surgical sterilization possesses certain social and physical values that make it advantageous for pets, owners and society (Carter, 1990). It is done as a method of contraception to aid in the pet overpopulation problem and to modify undesirable behavior, such as urine marking, inter male aggression and mounting of other dogs (Brendler *et al*., 1983).

It is almost the sole method for control of pet's overpopulation globally (Brenda, 2002). A castrated stray dog takes up a space in the dog population, preventing new dogs from appearing by using up resources, while still not being able to breed itself and give birth to new puppies. A population with a high percentage of castrated dogs contributes to a lower turnover rate in the population, which can help maintain vaccination coverage (OIE, 2009; WHO, 2013). Castration campaigns, conducted

over long periods of time, may achieve complete effectiveness when used in isolation. Even a small change in birth rates can make a dramatic difference in euthanasia rates over time through the impact on population dynamics (Frank, 2004).

There are risks associated with castration of male dogs. For instance, it increases the risk of prostate carcinoma, hemangiosarcoma, mast cell tumors, lymphosarcoma and lymphoma, as well as other kinds of cancer. It has also been shown to correlate with an increased rate of autoimmune diseases and other diseases such as joint disorders and dermatological conditions (Kaufmann *et al*., 2017). Despite being a common surgical procedure in small animals, it has potential postoperative complications such as wound dehiscence, scrotal swelling, hemorrhage, subcutaneous bruising, scrotal hematoma and self-trauma at surgical site (Gizawiy *et al*., 2004; Adin, 2011; Ajadi, 2013). In this case report surgical management of castration in stray dog has been described to control the over population of dog.

Case history and clinical examination

A 19 kg stray dog was faced car accident around the perineal region when I am walking around campus. After the dog faced car accident, the dog could not walk and lay on the ground immediately (Fig 18A). I brought the stray dog with a horse cart to the VTH. Injury around the perineal region was treated, followed up was done for two weeks and the dog was completely recovered from injury. After that, surgical castration was decided on a stray dog to control the stray dog population. On clinical examination, the dog revealed all parameters in the normal ranges.

Surgical treatment and postoperative care

The dog was fasted for 12 hours and restricted from water for 3 hours. The surgical patient was brought from a kennel by using dog handler and kept on the operation table. The dog was sedated with 0.95 mg diazepam with an IV injection, placed in dorsal recumbency, scrotum including midline in front of the scrotum was prepared aseptically, transferred to another table and covered with sterilized draper keeping the open proposed area for the incision (midline in front of the scrotum). On testis was pushed forward with forefinger to bring into the midline in front of the

scrotum under the skin. An incision was made on midline in front of the scrotum (Fig 18B) and testis was removed by pressing between thumb and forefinger. The cord was ligated by chromic cat number 2 after detaching of a less vascular part. The second testis was removed through the same incision, a similar procedure was followed and skin was apposed with silk 1 by three simple interrupted stitches.

For postoperative care, 0.95 ml penstrep (1ml/20kg) was administered IM, SID for three days, 38 mg tramadol was given IM, SID for two days, the incision site was dressed with 2% povidone-iodine for five days and the collar was applied to prevent self-mutilation of incision area (Fig 18C). Swelling occurred in scrotum and penile area 2^{nd} day of operation which was stayed until the 5^{th} day of operation (Fig 18D) and urinary incontinence for three days after operation were complication faced in this case. The skin suture was removed the seventh day of surgery and at 15 day follow up wound was healed completed (Fig 18E) with a small scar on the site of incision (Fig 18F). After full recovery, I gave the dog for police officer in CVMA as a gift.

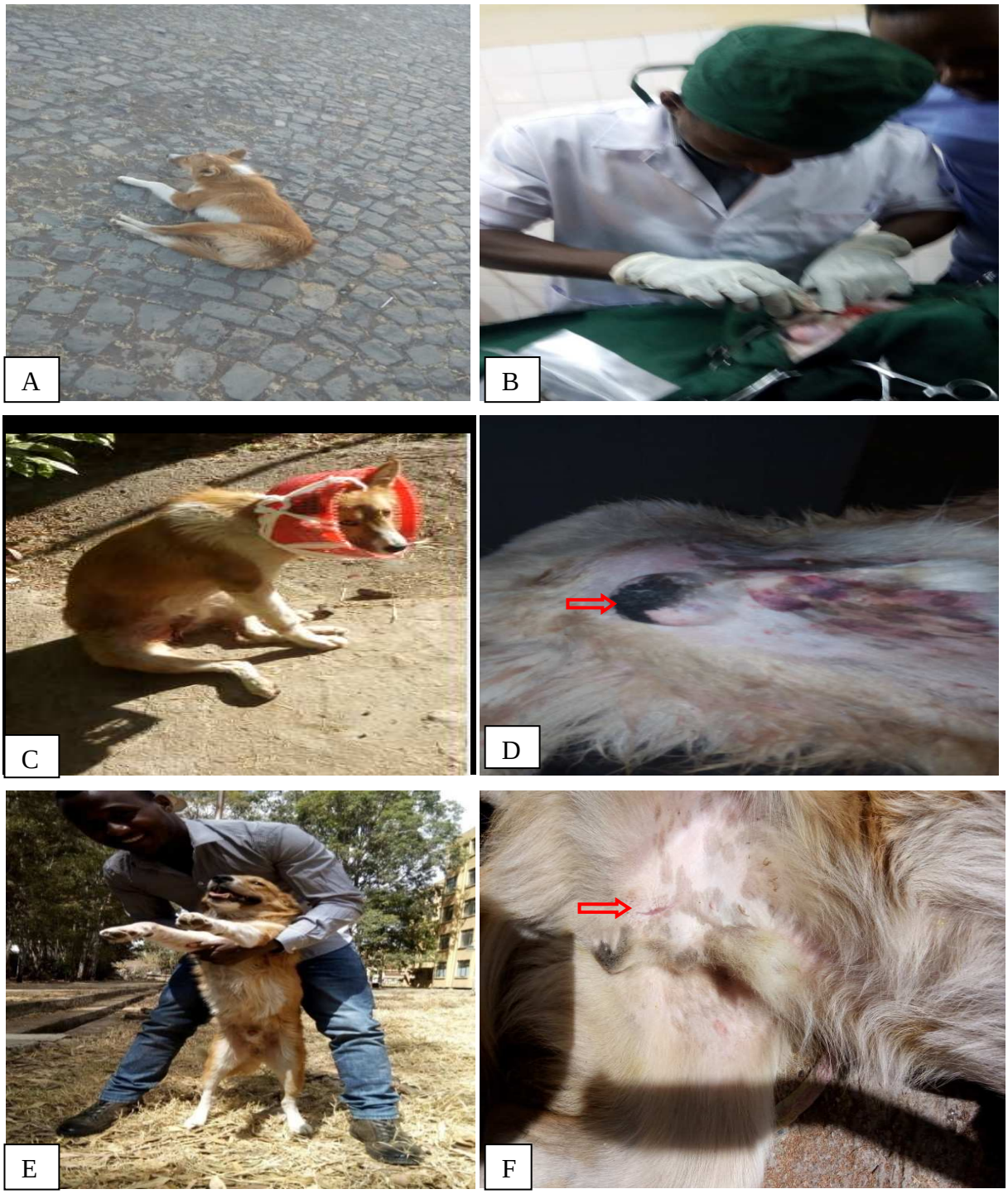


Figure 18: Castration in dog: Immediately after car accident (A), incision midline in front of scrotum (B), collar to prevent self mutilation (C), Swelling of scrotum on the 2nd day (D), at 15th Day of follow up (E) and small scar on the site of incision (F).

Discussion

Castration is the surgical removal of the testes and a permanent way of making a male dog infertile. Perception towards castration varies from one country to another. When it is widely encouraged and promoted in some countries like the US, it is disliked and discouraged in most European countries. At least, it has been declared illegal in Norway (Farstad, 2011), possibly because dogs' population is not a problem in these countries. Millions of healthy dogs are euthanized every year in the developing countries (Patronek and Rowan, 1995). Therefore, castration is a good measure of population control. In present study, castration was done to control dog population since dog was stray. This work agreed with Adedeji *et al.* (2010) who suggested castration of stray dogs as one of the strategies of reducing dogs' population and indirectly by controlling roaming, may also contribute to reduce incidence of dogs' bites and hence rabies transmission to human usually associated with such bites. In addition, this method was reported to have been used successfully to control rabies transmission from dog to human in Jaipur, India (Reece *et al.,* 2013).

Castration of dog has its own advantages and disadvantages. Among the benefits of castration are decreased incidence of reproductive behaviours and reduced roaming. On the contrary, castration may predisposition to knee injury and obesity (Mckenzie, 2010) as well as associated postoperative complications. There are different methods of castration includes prescrotal midline approach, postscrotal approach and scrotal ablation. Prescrotal midline approach is considered as the ideal method for castration of dog. In this approach complications are less, time of healing is the least and only faint scar is the remnant of operation (Misk, and Samia, 1991). Likewise, in this case, castration done (approached) through prescrotal midline and small scar developed on the incision site.

Complication rates for routine castration ranged from 2.6-20% of the cases, majority of which were minor and require no treatment (Pollari *et al.,* 1996; Burrow *et al.,* 2005). Potential postoperative complications associated with castration includes wound dehiscence, scrotal swelling, hemorrhage, subcutaneous bruising, scrotal hematoma and self-trauma at surgical site (Gizawiy *et al*., 2004; Adin, 2011; Ajadi, 2013). In present case scrotal swelling persisted only for four days after surgery. In addition, urinary consistency in this case also observed. This finding is in line with Lima *et al*.

(2016) who reported the high incidence of urinary incontinence in male felines following neutering. Hence, castration is recommended for dog overpopulation problem.

3.3.5. Tail amputation in dog

Abstract

Tail amputation performed on those dogs whose tail or associated structures have been injured. A one-year- old male dog was presented VTH with complain of injury on the tail due to bite by another dog. The dog treated in VTH two weeks ago and there was no any recover. The injured site of tail was contaminated with the debris on clinical examination; in addition, the animal was in severe pain. Amputation the tail at the level above injury site of tail was taken. Care for surgery, oxytetracycline wound spray was applied on the incision site of tail, penstrep was given for three days, tramadol was given for two days. The suture material was removed 10^{th} day after surgery. The tail stump healed uneventfully and the animal recovered fully. Hence, tail amputation is the last option of treatment for severing traumatic tail if medical treatment is unsuccessful.

Key words: *Amputation, Dog, Tail injury*

Introduction

Animal tails are known to be important for social signalling in some animal species (Tucker *et al*., 2001). Tail docking refers to the amputation of part or all of an animal's tail. In dogs tail docking is commonly performed as a routine surgical procedure (Bennett and Perini, 2003). Tail amputation should only be performed on those dogs whose tail or associated structures have been injured or where there is occult pathology of this appendage (Wansbrough, 1996). Therapeutic caudectomy is indicated for traumatic lesions, infections, neoplasia and perinanal fistula. Complications include infection, dehiscence, scarring, fistula recurrence and anal sphincter and rectal trauma (Olatunji-Akioye *et al*., 2010). In mature dogs, tail amputation is most commonly performed for treatment of traumatic skin loss, ischemia, or denervation. Combined with other therapies, tail amputation may also improve outcome (Salib and Farghali, 2016). In present case-report, a successful tail amputation in dog has been described.

Case history and clinical examination

A 1-year-old male dog weighing about 16 kg was presented to VTH with complain tail injury due to biting by another dog. The dog was treated two weeks ago in VTH and there was no change after treatment. An injured area on the tail was contaminated with debris (Fig 19A) was diagnosed on clinical examination in addition to bleeding of the tail from injured part and the animal was aggressive in condition with severe pain. A decision to amputate at the tail above the level of injury was taken.

Surgical treatment and postoperative care

The dog was restrained by applying gauze on the mouth. Sedation was achieved with diazepam at doses of 6.4 mg IV injection. Tail amputation was carried out according to Tobias and Karen (2010). The area around the wound was shaved and disinfected following which a tourniquet was applied to the base of the tail root (Fig 19B) to reduce hemorrhage. Five milliliters (5 ml) of 2% lignocaine hydrochloride was infiltrated caudal to the tourniquet at the point of proposed amputation, and semilunar skin flaps were made and extended beyond the point of disarticulation (Fig 19C). The skin flaps were retracted cranially. The two lateral and medial caudal vessels were ligated with size 1 chromic catgut and severed just proximal to the proposed site of transection dorsally and ventrally to expose the coccygeal muscles. The coccygeal muscles were transected and the coccygeal vertebrae disarticulated. The dorsal and ventral skin flaps were pulled over the tail stump and sutured with size 1 silk using simple interrupted pattern (Fig 19D). Postoperatively, oxytetracycline wound spray was applied on the incision site of tail, 1.6 ml (1ml/10kg) penstrep was given IM, SID for three days and 32 mg tramadol was administered IM, SID for two days. The suture material was removed on the 10^{th} day after surgery. The tail stump healed uneventfully and the animal recovered fully.

Figure 19: Tail amputation in dog: Contaminated tail with debris (A), applied tourniquet to the base of the tail root (B), semilunar skin incision (C) and closed skin by simple interrupted pattern (D).

Discussion

In present case the tail was badly injured (Fig 19A), the etiology for injury of tail was, bite during fighting with another dog. This finding in line with Olatunji-Akioye *et al*. (2010) who has been reported tail amputation in a single case in association with tail fracture injury sustained through fighting with a cage mate as mainly therapeutic. Besides, this finding also supported by Ural *et al*. (2007) who employed amputation in severely affected cattle tail.

The reasons for tail docking include prevention of fecal soiling in lambs which can predispose animals to fly strike (French *et al*., 1994) and tail biting in pigs to prevent serious injury (Simonsen *et al*., 1991). Tail docking in dairy cattle may have originated for two reasons: to control disease transmission and improve the milker's comfort (Tucker *et al*., 2001). In Karakkas lambs, deposition of fat in the tail which requires more energy than deposition of lean meat makes tail docking necessary to improve carcass characteristics (Gokdal *et al*., 2003). In this case, tail amputation was done to prevent further infection. This work agreed with Olatunji-Akioye *et al*. (2010). Complications associated with tail amputation include infection, dehiscence, scarring, fistula recurrence and anal sphincter and rectal trauma (Olatunji-Akioye *et al*., 2010). Arguments against tail docking include acute pain, chronic health problems associated with docking, impaired locomotion and impaired communication by docked dogs (Bennett and Perini, 2003). In this case, successful surgical management of tail amputation was done in a dog. Tail amputation is the last option of treatment for severing traumatic tail if medical treatment is unsuccessful.

3.4. Case reports on equines

3.4.1. Castration in mule

Abstract

Castration is one of the most common surgical procedures performed by veterinarians to eliminate aggressive behavior of equine. The eight years male mule weighing 250 kg presented to the Dire veterinary clinic with the complaint aggressive behavior to handle. After assessment normality of clinical parameters, open castration was done through circular incision on the tip of scrotal skin. The surgical wound was cleaned with povidone-iodine solution and procaine penicillin was administered for postoperative care. Mild form swelling was observed for three postoperative days in peak form. At the 20th day of follow up, the scrotal incision was completely closed.

Key words: *Aggressive behavior, Castration, Mule*

Introduction

Castration is one of the most common surgical procedures performed by equine veterinarians. Castration can be performed in either standing or recumbent animal. It is most commonly performed to eliminate aggressive behavior of equine. Other indications of castration include testicular neoplasia, testicular trauma, orchitis, torsion of spermatic cord, hydrocele, varicocele and inguinal hernias. The two most common techniques are either a closed or an open technique that leaves the scrotal incision(s) open to heal by second intention. Irrespective of the chosen technique, the incidence of castration related complications is generally regarded as low (James *et. al.*, 2008; Saifzadeh *et al*., 2008).

Postoperative swelling and edema of the prepuce and scrotal area are the most common complications of equine castration. The generally reach peaks 3-4 days after surgery and resolves completely in 10-12 days. Swelling beyond this time or swelling associated with clinical signs such as a stiff gait or reluctance to move or urinate is abnormal. This is often caused by failure to remove enough scrotal skin, failure to stretch the skin and subcutaneous tissue after castration, or inadequate

exercise after castration, any of which allows the scrotal incision(s) to close prematurely and excess fluid to accumulate (May and Moll, 2002). Castration sites need to heal from the inside out. If the outside skin heals first, serum and blood can accumulate in a pocket and the site will become infected. To overcome complications that accompany traditional castration techniques researchers have experimented with primary closure of the castration wound to attain first intention healing. Postoperative care after the surgery is extremely important, especially if the skin incision is left open to heal on their own (Vaghela *et al*., 2016). In this case report, a successful castration in mule has been described.

Case history and clinical examination

The owner presented eight years male mule weighing 250 kg to the Dire veterinary clinic with the complaint aggressive behavior to handle, he asks us to resolve this problem. The mule presurgically evaluated by various physiological parameter like heart rate, respiration rate, pulse rate, mucous membrane color, they were found along with normal range. To manage aggressive behavior open castration was decided.

Surgical treatment and postoperative care

Mule was placed in lateral recumbency (Fig 20A). The spermatic cords were desensitized by directly injecting 200 mg of 2% lignocaine hydrochloride to each spermatic cord to block the spermatic nerve and aseptic skin preparation was done (Fig 20B). Castration was carried out according to Schumacher (2012). A circular incision was made on the tip of scrotal skin (Fig 20C), two artery forceps applied on the spermatic cord (Figure 20D), parallel incision to the median raphe also made tunica dartos, scrotal fascia, and parietal tunic. The testis was prolapsed out of the tunic and the spermatic cord was separated from the parietal tunic, cremaster muscle and ductus deferens. These less vascular structures were ligated using chromic catgut number 2 and removed distal to the ligature. The vascular bundle of the spermatic cord was also ligated using chromic catgut number 2 and removed below the ligature. The other testicle removed in a similar manner. The mule was standing with immediately after and there was no problem (Fig 20E).

For postoperative care, the owner advised to give adequate exercise for animal. The surgical wound was cleaned with povidone-iodine solution and 5,500,000 IU procaine penicillin (22,000 IU/kg) was administered IM for 5 days (irregularly because the farmer was not volunteer to brought the mule to the clinic). Mild form swelling was observed for three postoperative days in peak form and causes the mule reluctant to move. After the third day, the swelling started decreasing and walked without reluctance after 10^{th} of surgery. At the 20^{th} day of follow up, the scrotal incision was completely closed.

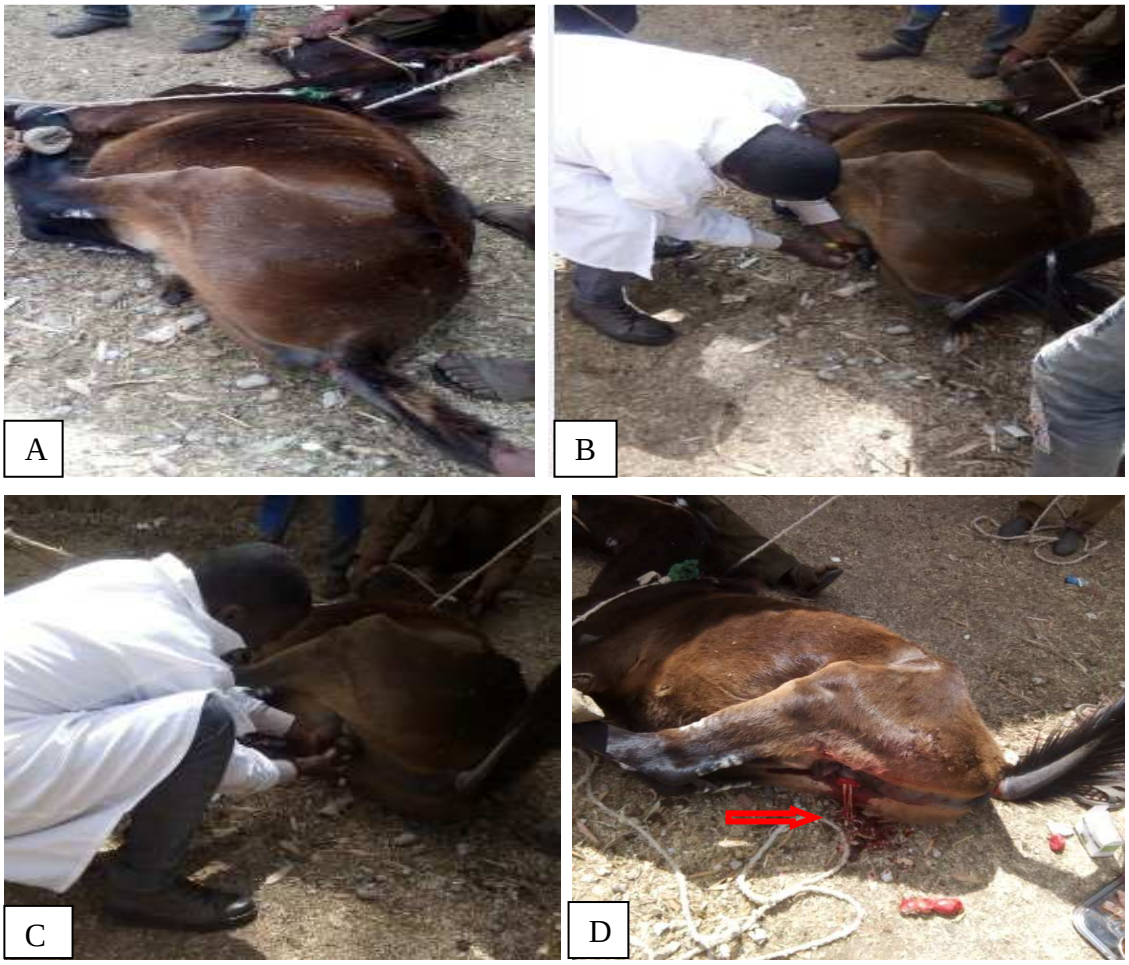


Figure 20: Castration in mule: Lateral recumbency (A), preparation of surgical site (B), circular incision on scrotal skin (C), two artery forceps on the spermatic cord (D) and immediately after surgery (E).

Discussion

The postoperative complication observed present castration was swelling on the preputial and scrotal regions. The current result was in line with the previous findings of Carmalt *et al*. (2008) and Kummer *et al*. (2009) who were reported swelling following castration and greatest 4-5 days after surgery has been performed. Postoperative swelling on the preputial and scrotal area may be attributed to irregular admistration of antibiotic, lack of anti-inflammatory drugs for postoperative care and inadequate exercise following surgery. The present complication of castration also harmonious with report of scrotal swelling by Shoemaker *et al*.(2004) who have been reported scrotal swelling, oedema, hemorrhage, omental herniation, eventration, penile trauma, bacterial infection of the spermatic cord, incisional infections, hydrocele formation and peritonitis.

In present study, swelling following castration caused mule to reluctant to move until 10 days after surgery. This finding supported by Schumacher (1996) who reported excessive postoperative swelling can be painful and result in an unwillingness to exercise. Clinical healing of scrotal incision completed 20^{th} after surgery. This finding is shorter than donkey in this case report thesis. The difference healing time might be associated with species difference or postoperative care. However, present finding, healing time of scrotal incision was higher than Vaghela *et al*. (2016) who reported

12-17 days for horses. Increased time for healing in current castration might be resulted from poor management after operation or species differences.

3.4.2. Castration in donkey

Abstract

Castration is one of the most common surgical procedures performed in equine practice to reduce or prevent masculine or aggressive behavior in animals unsuitable for breeding. The owner presented male donkey to the Dire veterinary clinic with the complaint aggressive behavior. After evaluation of various parameter presurgically, open castration has been decided. Castration did by incision on the scrotal skin and parietal tunic parallel to the median raphe. Procaine penicillin given with the dressing of wound by povidone-iodine for postoperative care. Mild form swelling was observed until 14th of surgery and at the 25th day of follow up the scrotal incision was completely closed

Key words: *Aggressive behavior, Donkey, Open castration, Swelling*

Introduction

Castration is one of the most common surgical procedures performed in equine practice. Potential reasons for performing this procedure include a desire to reduce or prevent masculine or aggressive behaviour in animals unsuitable for breeding, testicular trauma or neoplasia, or inguinal herniation (Shoemaker *et al*., 2004). The procedure may be performed in a standing, sedated animal or in a recumbent animal under general anaesthesia (Schumacher, 1996). Although the procedure is considered to be routine, complications can occur and remain a common cause of malpractice claims against equine practitioners. The majority of complications encountered after castration tend to be mild and resolve with minimal treatment, but more serious or life threatening complications, such as eventration, peritonitis and hemorrhage can also occur (Schumacher 1996, Searle *et al*., 1999). Ligation of the spermatic cord is recommended, in order to reduce the risk of postoperative complications. The procedure is reported to prevent evisceration in closed castration techniques, but does not reduce the risk of hemorrhage and even increases the risk of infection due to suture

material being left *in situ* (Schumacher, 1996; Kilcoyne *et al*., 2013). In this case, a successful open castration in donkey has been reported.

Case history and clinical examination

The owner presented adult male donkey (Fig 21A) weighing 200 kg to the Dire veterinary clinic with the complain aggressive behavior to handle, he asks us to resolve this problem. Presurgically various physiological parameters were evaluated like heart rate, respiration rate, and mucous membrane color, they were found along with normal range. The distention of testicles was also evaluated. Thus, to manage aggressive behavior donkey, open castration has been decided.

Surgical treatment and postoperative care

Donkey was placed in lateral recumbency. Each spermatic cord was desensitized by directly injecting 200 mg of 2% lignocaine hydrochloride (Fig 21B) and aseptic skin preparation was done. Castration was done by the standard procedure as suggested by Schumacher (2012). The parallel incision to median raphe was made on the scrotal skin, tunica dartos, scrotal fascia and parietal tunic, approximately 2 cm apart and 10 cm long (Fig 21C). Ligament of the tail of epididymis (attaching parietal tunic to epididymis) was bluntly dissected and two artery forceps applied on the spermatic cord. The less vascular structures were ligated using vicryl number 2 and removed distal to the ligature. The vascular bundle of the spermatic cord was also ligated using vicryl number 2 and removed below the ligature (Fig 21D). The second testicle removed through the same incision, a similar procedure was followed. The donkey was stand immediately after surgery and followed for a few hours for bleeding in clinic, there was no problem.

For postoperative care, owner advised to give adequate exercise. The surgical the wound was cleaned with 2% povidone-iodine solution for five days and 4,400,000 IU procaine penicillin (22,000 IU/kg) was administered IM for five days (irregularly). Mild form swelling was observed until the third day after surgery and causes the donkey reluctant to move. After the third day, the swelling started decreasing and walked without reluctance after 14^{th} of surgery. At the 25^{th} day of follow up the scrotal incision was completely closed.

Figure 21: Castration in donkey: Clinical examination of donkey (A), desensitation of each spermatic chord (B), parallel: skin incision to median raphe (C) and ligation of spermatic chord (D).

Discussion

Complications that result from castration, including scrotal swelling, edema, hemorrhage, omental herniation, eventration, penile trauma, bacterial infection of the spermatic cord, incisional infections, hydrocele formation and peritonitis have been reported (Thomas *et al*., 1998; Shoemaker *et al*., 2004). Most postoperative complications are mild and not considered life threatening, but eventration, haemorrhage, penile trauma and peritonitis may be fatal. Postoperative swelling and edema of the prepuce and scrotal area are the most common complications of equine castration

(Kilcoyne *et al*., 2013). In case reported here, only scrotal swelling which was decreased after third day and end at 14 days, was occurred as postoperative complication. This finding was within estimate with May and Moll (2002) who reported scrotal swelling peaks 3-4 days after surgery and resolves completely in 10-12 days in horses. Whereas, Marntell *et al.* (2006) and Vadalia *et al.* (2012) claimed recovery of all the animals without any complications. Scrotal swelling in present case could be due to poor postoperative care (irregular administration of antibiotics, irregular dressing of wound site and lack of anti-inflammatory drug).

Castration sites need to heal from the inside out and wound healing by second intention. If the outside skin heals first, serum and blood can accumulate in a pocket and the site will become infected. Clinical wound healing is complete after approximately 12-17 days (Vaghela *et al*., 2016). Vadalia *et al*. (2012) performed castration in 18 horses by open method and complete wound healing required an average of 12 to 14 days in the entire horses group. However, in current case complete the scrotal incision healing took 25 days. This finding is also higher than finding in mule in this case report thesis. The wound healing prolonged in present case might be attributed to the moderate degree of swelling observed in this donkey or species differences.

3.4.3. Ventral hernia in horse

Abstract

Abdominal wall hernias are most frequently encountered in surgical practice and caused by a tear in the abdominal wall. Any trauma such as a kick in camel, horn thrust in cattle or violent contact with a blunt object or automobile accident or an abscess in abdominal cavity may lead to weakening of abdominal muscle thereby resulting in herniation of the abdominal contents. The study was conducted on eight years old cart horse with a history of faced violent contact with another horse cart two days ago. On physical examination, the right ventrolateral region of the abdomen was found protruded. Based on history and physical examination the case was diagnosed as a traumatic ventral abdominal hernia, herniated organs were repositioned to the position by surgical intervention and hernia ring was apposed by nonabsorbable suture material by ovelapping pattern. Edema occurred as a postoperative complication for five days after surgery. Penstrep for five days, meloxicam for three days and the ventral abdomen of was compressed with a sterile bandage as postoperative care. Suture material was removed at 10^{th} postoperative and horse recovered fully. Thus, nonabsorbable suture materials could be effective in closing the hernia ring if an opening is small.

Key words: *Abdominal hernia, Horse, Traumatic*

Introduction

Hernia is defined as the protrusion of an organ or tissue through an opening. The opening is caused by a tear in the abdominal wall or it may be a natural opening like the inguinal canal or femoral canal. There are different types of hernia in small and large animals. A ventral hernia is defined as a hernia through any part of the abdominal wall other than a natural orifice and the hernia is ventral to the stifle skin fold or a ventral hernia is caused by the migration of viscera through a tear in the abdominal wall. Ventral abdominal hernia is commonly found acquired condition in ruminants and horses (Krishnamurthy, 1995; Venugopalan, 2000).

Any trauma such as a kick in camel, horn thrust in cattle or violent contact with blunt object or automobile accident or an abscess in abdominal cavity may lead to weakening of abdominal muscle

there by resulting in herniation of the abdominal contents. Abdominal distension due to pregnancy or violent straining during parturition may lead to ventral hernia. An excessively long caudal flank incision for C-section in the camel may subsequently cause hernia (Arthur, 1989; Krishnamurthy, 1995). There are three parts of hernia including the ring, the sac and the contents (Al-Sobayil and Ahmed, 2007). In ventral or lateral abdominal hernia, the hernial swelling is very prominent. Systemic symptoms are usually absent. The contents of hernia are usually omentum or intestines or both. The hernia may be reducible or irreducible, and strangulation is rare (Venugopalan, 2000).

Surgical treatment is effective for the reduction of the eventration content and reconstruction of the abdominal wall. This can be complex, mainly when there are alterations in the anatomic composition, adherences of structures and thin friable tissue. Moreover, the weight of the abdominal viscera on the peritoneal wall is an aggravating factor, predisposing the occurrence of relapse of the eventration, requiring the reinforcement of the suture line and many times, the use of materials to enhance tension support (Auer and Stick, 2012). Incisional complications, including edema, dehiscence, drainage or surgical site infection and incisional hernia occur commonly following ventral midline celiotomy in horses, leading to prolonged hospitalization, longer recovery times and increased cost (Kobluk *et al*., 1989; French *et al*., 2002; Mair and Smith, 2005). In this case-report, a successful surgical management of traumatic ventral hernia in horse has been described.

Case history and clinical examination

A male, eight years old, cart horse weighing 500 kg admitted to Dire veterinary clinic with a history of violent contact with another cart of a horse two days ago and area in which violent contact occurred was protruded. During the physical examination, a protrusion of abdominal organ following traumatic rupture of the abdominal wall on the right ventrolateral region of the abdomen (Fig 22A). Parameters, temperature (37.5 ^{0}C), respiratory rate (14 breaths/min) and heart rate 32 beats/minute, were found in the normal range (Appendix I) and was diagnosed as a traumatic ventral hernia. Therefore, surgical intervention was decided to correct a traumatic ventral hernia.

Deferential diagnosis

A hernia should be differentiated from abscess, tumor, hematoma and cyst. Abscess, tumor and cyst develop slowly where as hernia is of sudden occurrence. In developing abscess, there are symptoms of local inflammation and it does not fluctuate under the skin. An abscess has a tendency to point. In hematoma, the collection of blood may feel like free fluid or may give a slight crepitating sound on palpation. A cyst fluctuates uniformly and has no tendency to point and pain or functional symptoms' are absent. The presence of hernial ring confirms hernia. Exploratory puncture or radiography may also be done for conformation (Gadre *et al*., 1989).

Surgical management and postoperative care

The patient was kept in lateral recumbency position, circular block by 300 mg of 2% lignocaine hydrochloride. The ventral abdomen was prepared for aseptic surgery. Surgery was done by the standard procedure as suggested by Venugopalan (2000). A sufficient longitudinal incision was done in the middle of the swelling and exposed hernial opening. Force pressure was used to control subcutaneous hemorrhage, if any. The hernial sac was dissected from overlying skin and dissection was continued laterally to expose the hernial ring. The hernial sac was opened and contents such as cecum, omentum, or fat were repositioned into the abdominal cavity. After reduction of organs into abdominal cavity (Fig 22B), ruptured abdominal muscle was closed by using overlapping pattern by silk number 1 (Fig 22C). Excess skin of the sac was removed and the subcutaneous tissue and skin were apposed with simple continuous suture by using chromic catgut size number 2-0 and horizontal mattress suture by using silk number 1, respectively. Then herniated organs were repositioned to the position and horse stand and walk immediately (Fig 22D).

Postoperatively antibiotic, 25 ml penstrep (1ml/20kg), IM, SID for five days and pain killer, 125 mg meloxicam, IM, SID for three days, the ventral abdomen was compressed with a sterile bandage after dressing to protect the surgical site from the external environment and to minimize postoperatively edema for five days. The surgical wound was healed at 10^{th} postoperative day and sutures were removed the same day.

Figure 22: Herniorraphy in horse: Clinical examination of traumatic ventral hernia (A), reduction of the protruded abdominal organs (B), closed abdominal muscles by overlapping pattern (C) and after surgery (D).

Discussion

Ventral hernia is commonly seen in the ventral abdominal wall near the midline and size of the hernial opening varies in diameter and nature of hernia contents depends on the site of the herniation (Krishnamurthy, 1995). Similar location was also noticed in the present study. Ventral and incisional hernias are common surgical problems in large animals and may occur due to midline or paramedian incision, or wherever the abdominal wall is severely traumatised (Tirgari, 1980; Kawcak and Stashak, 1995). Trauma contributes the highest percentage of the total causes of ventral hernia

(Giusto *et al*., 2016; Hassen *et al*., 2017). In this case, also trauma by violent contact with another horse cart was cause for ventral hernia. Diagnosis of ventral abdominal hernia is easy, physical symptoms include presence of hernial swelling which is the classic sign of herniation. The swelling varies in size and shape. In uncomplicated hernia no pain is elicited on palpation (Roe *et al*., 2004). Likewise, in present case, swelling found in right lateral region of abdomen and systemic symptoms were absent. The presence of hernial ring confirms hernia. Both cecum and omentum were the contents of hernia in this case which was similar finding with Venugopalan (2000).

There are lots of treatment options for ventral abdominal hernia that depend on the size of the hernial opening. Application of bandage, clamps or ligatures may be helpful in a few cases where the hernial ring is small. Surgical intervention is useful in case of large hernial opening but in extensive ventral abdominal hernia may require hernioplasty (Abdin-Bey and Ramadan, 2001). Although small abdominal wall defects can be treated with good results, the outcome for larger defects is variable, both in humans (Sorour, 2014) and large animals (Elce *et al*., 2005; Whitfield-Cargile *et al*., 2011). Generally, the prognosis of ventral hernia repair with a tension free mesh implantation is associated with a fair-to-good prognosis even for defects up to 30 cm × 20 cm but complications such as wound infection, edema , surgical site infection and relapse of hernia may arise (Elce *et al*., 2005; Bernard *et al*., 2007; Whitfield-Cargile *et al*., 2011). In the case reported, hernia opening was closed by nonabsorbable suture material (silk) overlapping pattern. Edema occurred as postoperative complication for five days after surgery, it was controlled by a postoperative treatment. Thus, nonabsorbable suture materials could be effective in closing the opening if hernia ring is small.

3.5. Case report on swine

3.5.1. Castration in piglets

Abstract

Castration of male piglets is a common management practice carried out on commercial swine farms to prevent aggressive behavior and the occurrence of boar taint. The owner of the swine farm from Bishofitu town visited VTH. The owner mentioned that he had thirty male piglets on his farm, age was two months and he wants to castrate them to prevent boar taint. On physical examination, all piglets were found apparently health and castration was performed in all thirty male piglets. After surgical castration, oxytetracycline spray was applied on the incision site. There was no postoperative complication was reported and piglets recovered fully.

Key words: *Boar taint, Castration, Piglets*

Introduction

Surgical castration of male piglets is a common management practice carried out on commercial swine farms. The indications for castration include reduction of aggressive male behavior, ease of management and prevention of the occurrence of boar taint, a distinctive unpleasant odor/flavor which can be perceived during cooking/eating of meat from entire male pigs (Bonneau, 1982). Therefore, pigs are castrated in 90 day of life (Migdał *et al*., 2008). Castration of commercial pigs in Europe and North America is usually performed by the farmer, and typically without any kind of anesthesia. The piglet is usually held by the hind limbs with the head down for the procedure. This type of restraint, however, carries a higher risk for complications. Additionally, surgical castration is a painful procedure and castrating piglets without the benefits of anesthesia or analgesia is an important animal welfare concern (Prunier *et al*., 2006).

Improving the technique of surgical castration with either general and/or local anesthesia in piglets of all ages will certainly reduce acute pain during castration but does not eliminate stress and discomfort due to catching and handling the animals before surgery nor will it prevent the chronic

post castration pain. Performing general anesthesia is expensive and time consuming (Jäggin *et al.*, 2001). Castration with lidocaine given either intratesticularly or into the scrotal sac has been shown to successfully reduce pain related hormonal and behavioral responses (Prunier *et al*., 2002; Marx *et al*., 2003). Potential complications associated with surgical castration include hemorrhage, excessive swelling or edema and infection. These can reduce performance, compromise health and in some cases, increase mortality. A meta analysis of 15 studies in 2009 showed that male piglets that had been surgically castrated had significantly higher mortality rates than their intact littermates (Allison *et al*., 2010). In this short communication, open castration in piglets has been described.

Case history and clinical examination

The owner of the swine farm from Bishofitu town visited VTH. The VTH director (Dr.Yonas Tolosa) assigned me to solve the problem. The owner mentioned that he had thirty male piglets on his farm and he wants to castrate them to prevent boar taint. He mentioned also age piglets were two months. On physical examination, all piglets were found apparently health and decided to perform castration in all thirty male piglets.

Surgical castration and postoperative care

Prior to surgery, piglets were fasted for overnight to avoid spoilage of operation site by defection. They were restrained by the farmer workers. The perennial area and scrotum were cleaned with antiseptic solutions for sterilization. Castration was done by the standard procedure as suggested by Jean and Anderson (2006). About 40 mg of lignocaine hydrochloride was injected subcutaneously along the length of each testicle. The scrotum was pressed and the testicle was fixed (Fig 23A), vertical incisions was made in the scrotum skin (Fig 23B), testicles was gently taken out after cutting the tunica vaginalis (Fig 23C), spermatic chord was ligated with auto ligation, the spermatic chord below the ligation was incised and testicle was removed. A similar procedure was followed to remove another testicle. After castration, oxytetracycline spray was applied in the incised area (Fig 23D). All piglets were fully recovered without any complication.

Figure 23: Castration in piglets: Fixing of testicle (A), vertical incision on the scrotum (B) tearing of the tunica vaginalis (C) and sprayed oxytetracycline spray (D).

Discussion

Current European legislation allows surgical castration up to an age of 7 days of age without anesthesia (EU, 2008). If castration is practiced after the seventh day of life, it shall only be performed under anesthesia and additional prolonged analgesia by a veterinarian. Age of piglets in current study were two months and surgical castration was performed by local anesthesia (lignocaine hydrochloride). Surgical castration involves making two vertical incisions on each side of the scrotum, removing the testes, and severing the spermatic cords, usually by pulling (Prunier *et al*., 2005; Carroll *et al*., 2006). Similar procedure was used in present surgical castration of piglets. Potential devastating complications following castration include herniation/evisceration, hemorrhage and infection (Jean and Anderson, 2006). No major intra operative or postoperative complications were occurred in this study. Hence, castration must be done in early age otherwise castration procedure made with local anesthesia.

4. POSTOPERATIVE COMPLICATIONS AND SURGICAL OUTCOMES

During the study period, surgical treatments were given for twenty-two patients admitted to hospital and clinic. Castration was the most common surgery performed in 4 (18.18%) patients, followed by limb amputation in 3 (13.6%), herniorrhaphy in 2(9%), and C-section in 2(9%) patients. Complications were documented in 8 (36.36%) patients. Most common complication observed was swelling in 4 (50%) patients, followed by postoperative seroma in 2 (25%). During the study period, 1 patient (4.5%) died after surgical intervention (Table 2 and 3). Postoperative cares including administration pain relief, administration of antibiotics and dressing incision site with antiseptics were given to reduce postoperative complications. Moreover, each farmer were advised on to take necessary care after and before given surgery.

Table 2: Cases developed postoperative complications and surgical outcome.

Species	Numbers	Postoperative complication	Percentage	Survived	Died
Cattle	6	1	16.67	6	0
Small ruminants	7	2	28.57	6	1
Small animals	5	2	40	5	0
Equines	3	3	100	3	0
Swine	1	0	0	1	0
Total	22	8	36.36	21	1

Table 3: Type of cases and postoperative complications

Type of cases	Number of cases	Complications	Number of cases
Rumen fistula	1	Rumen tympany	1
Dystocia	2	-	-
Horn fracture	1	-	-
Fibroma	1	-	-
Paraphimosis	1	-	-
Utreine prolapse	1	-	-
Hernia	2	Swelling	1
		Seroma	2
Tibia fracture	1	Muscle atrophy	1
		Skin ulceration	
		Weaking of joint and tendon	
Urolithiasis	1	-	-
Abscess	1	Death	1
Hyena bite	1	-	-
Limb amputation	3	Incisional site discharge	1
		Opening of skin flap	
Ovariohysterectomy	1	-	-
Castration	4	Swelling	3
Tail amputation	1	-	-

5. CONCLUSION AND RECOMMENDATIONS

In this case-report thesis, several surgical treatment approaches has been conducted in different domestic animals. Most frequently performed surgical treatment was castration. From the report, we understood that postoperative complications are common after surgical treatments with low mortality. Many complications may be controlled and survival rates of animals after surgery are significantly improved by careful management of postoperative care regimens including pain relief, administration of antibiotics and dressing of incision site with antiseptics. Furthermore, preoperative management, sound surgical technique and owner care for the animal as per advised are invaluable. Although several postoperative complications are noticed, the overall outcomes of the surgical treatment appear to be promising for patients in which other options have failed or surgery is indicated.

Based on the above conclusion the following recommendations are drawn:

- The government and college should take the measure on building of patient care room to provide intensive postoperative care.
- The animal attendant should be employed and variety type of drug should be present.
- Operation theater should be constructed for both large and small animals and fulfilled with necessary materials to conduct surgery aseptically.
- Owners should be made aware of the common complications and provide care for the animal as per advised.
- A detail study on factors associated with postoperative complications and surgical outcomes should be studied.

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7. APPENDICES

Appendix I: Clinical parameters

Species	Temperature(^{o}C)	HR(Beats/Min)	RR(Breaths/Min)	CRT
Cattle	37.5-38.5	60-70	30	Less than 2 sec
Goat	39.1	70-80	12-20	Less than 2 sec
Sheep	39.1	60-70	19	Less than 2 sec
Dog	38.9	80-90	14-22	Less than 2 sec
Cat	38.5	100-130	20-30	Less than 2 sec
Donkey	36.7-38.3	28-44	8-16	Less than 2 sec
Horse	37.5-38.5	32-36	10-14	Less than 2 sec
Mule	38.5	32-36	10-14	Less than 2 sec
Pig	39.0	60-70	10-12	Less than 2 sec

Appendix II: Gram staining procedure

1. Make a thin smear of the material for study and allow to air dry
2. Fix the material to side by passing the slide three or four times through the flame of a Bunsen burner so that the material does not wash off during the staining procedure
3. Place the smear on a staining rack and overlay the surface with crystal violet solution
4. After 1-3 minutes of exposure to the crystal violet stain pour off and wash the remaining stain with iodine solution, leaving the slide covered with for 1-2 minutes
5. Drop off the iodine solution and wash in alcohol unless no crystal violet dye is washed off anymore
6. Counter stain with carbon fuschin for 2 minutes
7. Wash with water, place the smear in an upright position in a staining pack and allow the excess water to drain off and the smear and to dry
8. View the smear under microscope under oil immersion

Appendix III: Recommended dosage for anaesthesia

Species	Type of anaesthesia	Preanaesthetic dose (mg/kg) and route	Induction dose (mg/kg) and route
Dog	Diazepam	0.05 – 0.4, IV	-
Cat		0.1 – 0.5, IV	-
Small ruminants and cattle		0.55-1.1, IV	-
Dog	Diazepam + Ketamine	-	0.1-0.4 + 5, IV
Cat		-	0.25 + 5, IV

Source: Muir *et al.* (2000)

Appendix IV: Recommended dosage for Analgesics

Species	Analgesics	Dose	Route
Dog	Meloxicam	0.1 -0.2 mg/kg	IV/IM
Food animals and equines		0.5-2 mg/kg	IV/IM
Cat		0.05- 0.1mg/kg	IV/IM
Small animals and small	Tramadol	2 - 5 mg/kg	IM
ruminants			IM
Ruminants, small animals,	Lidocaine	0.5-5mg/kg	IM
equines and swine			

Source: Muir *et al.* (2000)

Appendix V: Case recording sheet

Date _____

Case number _____Species_____ Breed _____ Age _____

Sex_____Color_____Estimated body weight _____

Case history_____

_____

_____

_____

Clinical findings:

Body temperature _____Respiratory rate_____

Heart rate_____Mucous membrane color_____

Capillary refill time_____

Abnormalities _____

Diagnosis_____

Samples taken _____

Laboratory result _____

Type of treatment _____

Complication after treatment _____

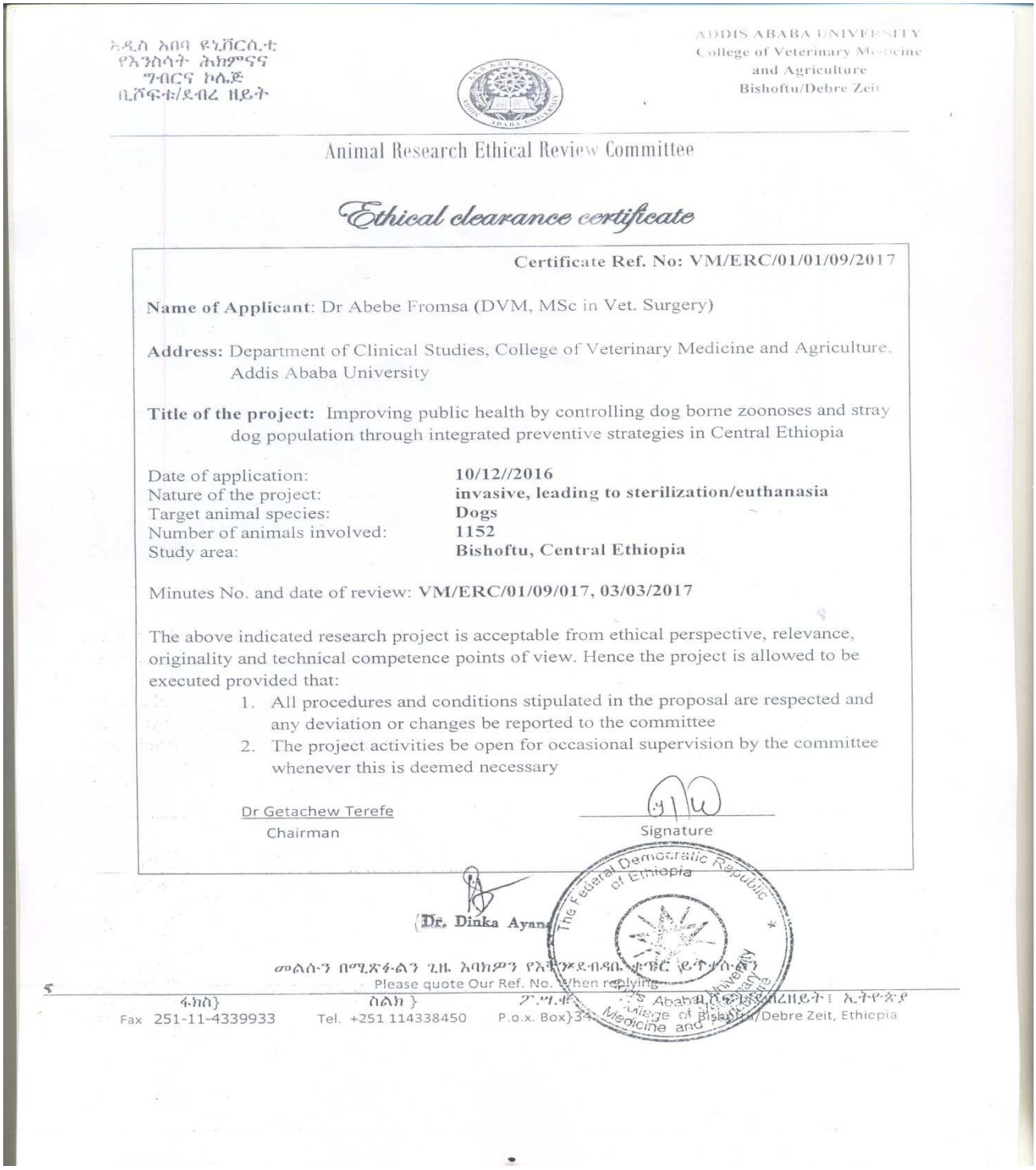
Care after treatment _____

Advice given to the owner _____

Follow up appointment _____

Outcome of treatment _____

Appendix VI: Ethical clearance



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ADDIS ABABA UNIVERSITY
College of Veterinary Medicine
and Agriculture
Bishoftu/Debre Zeit

Animal Research Ethical Review Committee

Ethical clearance certificate

Certificate Ref. No: VM/ERC/01/01/09/2017

Name of Applicant: Dr Abebe Fromsa (DVM, MSc in Vet. Surgery)

Address: Department of Clinical Studies, College of Veterinary Medicine and Agriculture, Addis Ababa University

Title of the project: Improving public health by controlling dog borne zoonoses and stray dog population through integrated preventive strategies in Central Ethiopia

Date of application:	**10/12//2016**
Nature of the project:	**invasive, leading to sterilization/euthanasia**
Target animal species:	**Dogs**
Number of animals involved:	**1152**
Study area:	**Bishoftu, Central Ethiopia**

Minutes No. and date of review: **VM/ERC/01/09/017, 03/03/2017**

The above indicated research project is acceptable from ethical perspective, relevance, originality and technical competence points of view. Hence the project is allowed to be executed provided that:

1. All procedures and conditions stipulated in the proposal are respected and any deviation or changes be reported to the committee
2. The project activities be open for occasional supervision by the committee whenever this is deemed necessary

Dr Getachew Terefe
Chairman

Signature

Dr. Dinka Ayana

The Federal Democratic Republic of Ethiopia

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Please quote Our Ref. No. When replying

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