AGREEMENTS BETWEEN RADIOLOGICAL AND HISTO-PATHOLOGIC DIAGNOSIS OF CASES ON PRE-OP NEURORADIOLOGY SESSION

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A PAPER TO BE SUBMITTED TO DEPARTMENT OF RADIOLOGY, ADDIS ABABA UNIVERSTY, AND MEDICAL FACULITY FOR PARTIAL FULFILLMENT OF THE REQUIRMENTS FOR POSTGRADUATE PROGRAMME COMPLETION.

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SCHOOL OF GRADUATE STUDIES

I hereby certify that I have read and evaluated this thesis Entitled **Agreements between Radiological and Histo-pathologic diagnosis of cases on pre-op Neuro-radiology session at TikurAnbessa specialized hospital, Addis Ababa University, Addis Ababa, Ethiopia,** prepared under my guidance by **DrAberaJemal**. I recommend it be accepted and submitted as partial fulfillment of the requirements for the post graduate study in radiology

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Summary

Introduction: Intracranial and spinal mass lesions are an important cause of neurological morbidity and common indication for cross sectional imaging. Given the wide range of pathological cases that can present as intra cranial mass lesions, the radiologist has an important role in limiting the differential diagnosis in clinical decision making process and in further management of cases. so far there are few reports on radiological and histological and pathology correlation done in Ethiopia and no report done giving emphasis on cases discussed on inter-departmental management session ; like , pre-operative Neurosurgery and radiological session. Thus, this research contribute the knowledge of the imaging appearance of various intracranial tumors and subsequently to improve the diagnostic accuracy and role of radiology in the management decision .

Objectives: To assess the correlation of preoperative radiological diagnosis of lesions with histological diagnosis in TikurAnbesahospital , Addis Abebea , Ethiopia , from January 2016 to August 2017 G.C.

Methods: Hospital based prospective cross- sectional study was conducted on 78 patients who underwent surgery for the intra-cranial and spinal lesions at TikurAnbessa Specialized Hospital in a period of 21 months from January 2016 to August 2017 G.C.

Patients included here are those who had either CT or MRI or both report with confirmed histopathology result.

Result:There was morethan 80 % of concordance between pre operative radiologic diagnosis and histological diagnosis based on based on top diagnosis and first differential diagnosis given on neuro- radiology and neurosurgery joint session discussion in imaging evaluation of Glial tumor , Menigioma and Sellar/Parasellarregin tumors.

Conclusion: Glial tumor and Meningioma were the most frequent intracranial tumors presented. It was seen that pre operative radiologic diagnosis accuracy was high for most of intracranial tumor.

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Abbreviations

AAU: Addis Ababa University

CN: Cranial Nerve

CPA: Cerebellopontine Angle

CSF: Cerebrospinal Fluid

CT: Computed Tomography

FLAIR: Fluid Attenuated inversion recovery

IAC: Internal Auditory Aanal

McM: Myungsung Christian Medical Center

MRI: Magnetic Resonance Imaging

NPV: Negative Predictive Value

PPV: Positive Predictive Value

TASH: TikurAnbessa Specialized Hospital

1. Introduction

1.1 Background

Radiology is a specialty of medicine that uses various imaging modalities for the diagnosis and treatment of disease. Radiology uses imaging technologies, such as X-ray radiography, magnetic resonance imaging (MRI), nuclear medicine, ultrasound, computed tomography (CT), and positron emission tomography (PET) to see within the human body in order to diagnose disease and abnormalities.(1)

The radiology department of TASH, the largest specialized hospital in Ethiopia, is one of the departments of school of medicine undertaking several academic and research activities, since its establishment the department has been providing mainly diagnostic radiological services,in particularly for better managementof diseases and overall better patient care. It has been training residents in radiology and participating in interdepartmental activities recently it has showed an advancement on the number and different variety of its cross sectional diagnostic imaging devices and also in number of residents studying radiology and sub specialty fields like body imaging and neuro -radiology. The department has also started pediatric and MSK sub specialty fields since 3 years back. The neurosurgery and pathology departments of TASH are also in continuing advancements with an increase in the number and type of neurosurgeries performed. Histopathology is still the gold standard diagnostic method and the department has also recently established an overseaconsultation with experienced pathologists abroad. Among the many interdepartmental management sessions the radiology department is now, participating, Neuroradiology-neurosurgery joint session is one of the interdepartmental management sessions conducted in radiology department. It is started three years back, in collaboration with neuro-surgery department, and conducted on two times per week bases and there is multi-departmental session including pathology department once per month. .

The overall aim being to improve the management and increase better patient outcome and in improving the concomitant teaching value. During the session brief and relevant clinical history and physical finding with laboratory investigations are presented by neurosurgical residents and the images are discussed and differential diagnosis and most likely diagnosis is given by senior consultant radiologist.

1.2 Statement of the problem

Intracranial mass lesions are important cause of neurological morbidity and a common indication for cranial imaging. Given the wide range of pathological processes that can present as intra cranial mass lesions, the radiologist has an important role in limiting the differential diagnosis in an individual case in order to facilitate the clinical decision making process andappropriate management of the cases with many similar presentation of the different disease processes.(1)

The incidence of intra cranial and spinal tumors in Ethiopia is not known as there are limited studies done in the country. Most patients come with advanced health problems due to several economic, social problems and inaccessibility to the limited number of facilities having modern imaging and practices of neurosurgical procedures.(1)

The incidence of intra cranial tumors in Africa is not known but some studies suggest that it may be less frequent. Primary intra cranial tumors account for the majority, 70-80% of all intra cranial tumors, with metastatic tumors accounting for the remaining 20-30%. The frequency of intra cranial tumors increases with age, and metastatic tumors are most common in older age groups. (1)

As there was a limited study which compares imaging finding before operation and postsurgical pathology result specifically on the neurosurgical diseases giving emphasis on inter departmental teaching management session; a continuum study conducted starting from January 2016 to august 2017 G.C, with intention to contribute the knowledge of the imaging appearance of various intracranial tumors and subsequently to improve the diagnostic accuracy and role of radiology in the management decision.Therefore, the research wasdone in collaboration with the department of neurosurgery and histopathology expertise of the same Hospital.

1.3. Literature review

There are many researches describing the sensitivity and specificity of different modalities on particular group of surgical cases. Data from the newly instituted Intracranial Tumour Registry (ITR) at the University Hospital of the West India (UHWI) to report on the radio-pathologic correlation of meningioma' seen at that institution,. Of a total of 138 cases with imaging suggestive of meningioma,. There was positive radio-pathologic correlation in 75% of the patients who had histologic appraisal of their intracranial lesions(3) .

Ishita Pant, SujataChaturvedi, Deepak Kumar Jha1, Rima Kumari, SamtaParteki, Central nervous system tumors: Radiologic pathologic correlation and diagnostic approach showed that concordance was maximal for tumors of the sellar region and meningeal tumors (97.7%).(2)

A study done in the department of Radiology and imaging Dhaka Medical College Hospital(DCMH) in 2011 specifically on CPA schwannoma to determine the diagnostic accuracy of MRI in the evaluation of intracranial extra axial CPAschwannoma 42 consecutively selected patients referred for the evaluation of CPA acoustic schwannoma.showed that on T1WI it appears hypo intense 100%, on T2WI it showed hyper intense 84.6% and heterogeneously hyper intense in 92.3% of FLAIR image.On post contrast homogenous enhancement 57.6% and heterogeneous 42.3% cases of acoustic schwannoma was seen. Dural tail was observed in 26.9%. Perilesional edema was observed in 76.92%. (3)

Case report and literature review of Imaging features of brain tuberculoma **,**Department of Radiology, Muhimbili National Hospital, Dar-Es Salaam. Tanzania , has showed that , CT and MR provide essential information that aids in diagnosis of brain tuberculoma. in this it was showed that the diagnosis of brain tuberculoma is difficult because the imaging presentation is varied and can be non-specific; other parameters may be required to establish the definite diagnosis. (4)

A cross sectional study was conducted on 96 patients who underwent surgery for Intracranial mass lesions at TikurAnbessa Specialized Hospital (TASH) and MyungsungChristian Medical Center (MCM) . The CT scan sensitivity, specificity, and accuracy in differentiating meningioma's from other intracranial masses, taking the first differential as most likely

diagnosis, was 80%, 95% and 88.6% whereas for glioma it was 71%, 85.7% and 83% respectively.(5)

A study at TASH, in Ethiopia to assess the frequency and diagnostic performance of plain skull x-ray and CT of meningioma,, showed CT scan had a diagnostic accuracy of 83%, sensitivity of 74%, specificity of 95%, PPV of 95% and negative PV of 75%.(6)

2. Justification and significance

As there is few research in this area .This study will platform for the future literature to be done with overall aim improving the diagnostic accuracy of imaging in the patient management .

3. Objective of the Study

3.1. General objective

- To Assess the correlation of preoperative radiological diagnosis of cases with histological diagnosis in TikurAnbessa Hospital, Addis Ababa, Ethiopia from January 2016 to August 2017 G.C.

3.2. Specific objective

- To identify the accuracy of radiological imaging diagnosis on cases discussed in the management session.
- To examine the diversity of cases discussed in the session.

4. Materialsand Methods, Study Population.

4.1. Study area and population

The study was conducted in TASH, Ethiopia, from January 2016 to August 2017 G.C.

4.2. Study design.

Hospital based prospective cross sectional study was conducted for the patients whose images and case summary were discussed on preop- neuroradiology joint sessions and had histopathology diagnosis result, and joint neuroradiology-neurosurgery

4.3. Source population

All neuro- surgical patients whose cases were presented on preoperative neuro radiology sessions.

4.4. Study population.

- All neurosurgery having brain CT and or MRI and whose images discussed on the neurosurgery and neuro-radiology joint session and having postsurgical histopathologyresult.

5. Operational Definition

"perilesionalEdema in brain ":

1. absent
2. small peripheral ring
3. edema is _50% of total lesion size
4. edema is _50% of total lesion size

6. Sample Size Calculation and Sampling Techniques:

Consecutive sampling technique was used:

For sample size estimation 50% proportion is used which gives the maximum sample size for a confidence interval and precision of 5% and sample size of 384 was calculated. But the number of cases discussed during the joint sessions from January 2016 to August 2017 were ~ 135. Among this only 78 were operated and among these 73 case who had histopathology result were included in the study.

7. Data Collection Method and Analysis.

Data was collected by using a structured questionnaire. The chart of 135 patients who were discussed on the management sessions from jan to august 2016 and underwent surgical procedure were revised. The log book of neurosurgical patient and their pathological record was revised. Those who were operated are picked from the log book of neurosurgical patients and their pathologic result was recorded from pathology department blog book. Their images were interpreatedby neuroradiology fellows and or senior neuroradiologistsduring the time of session discussion. The study included all age categories that came from all regions of the country.

8. Data Quality Control

The quality of data checked by reviewing questionnaires for completeness and relevance by the supervisors and principal investigator.

9.Data Analysis and Interpretation

The data collected was entered, after being encoded and analyzed using SPSS version 20 statistical packages. Data cleaning was performed to check for frequencies, accuracy, and consistencies and missed values and variables. Any logical and consistency error identified during data entry was corrected after revision of the original completed questionnaire. The cleaned and edited data was ready for appropriate statistical analysis. The mean, standard deviation and the proportion of the variables was done.

10. Ethical Considerations

Ethical clearance for the conduct of this study was obtained from the radiology department ethical clearance committee. Data collection was started after the formal letter is forwarded and permission obtained from the medical directors of the hospitalandSurgical and pathology

departments. The confidentiality was ensured including by using code numbers during the process data collection using the questionnaire format.

11. Dissemination of Result

The final paper will be submitted to the department of radiology and also be prepared for publication. Feedback will also be forwarded to neurosurgery and pathology departments.

12. Results

Out of the 78 cases discussed in the joint session, 75 were operated and 73 had histopathology results. The main clinical presentation described at admission were head ache 44(56.4%), body weakness 9(11.5%), visual loss 8 (10.3%), abnormal body movement 17(22.3%).

socio demographic

Out of the 73 cases 47(64.4%) male and 26(35.6%) were female and wereaged from 8 month to 65 years and most tumor were between the age range of 30 to 40yrs.

Out of the total of histopathology confirmed cases, CT only used for one cases accounting for (1.4%), MRI only was used for 52(71.2. %) and both CT and MRI were used for 20(27.4%) cases.

Table 1: Distribution of clinical feature of patient presentation by sex (N=73).

	Clinical features				Total
	headache	body weakness	abnormal body movement	visual loss	
male	24	6	11	6	47
female	16	3	6	1	26
Total	40	9	17	7	73

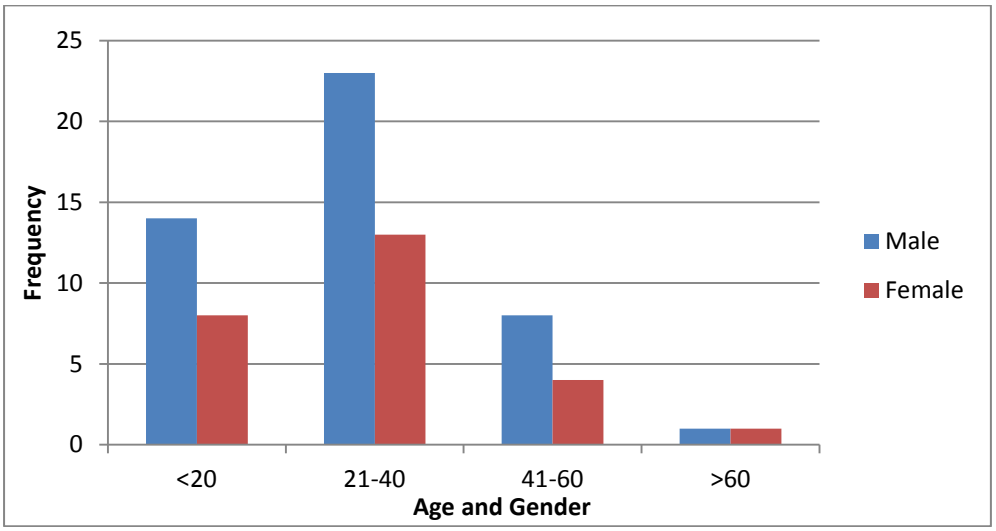

Figure 1: Distribution of cases by age and gender

The majoritycases were commented to be located extra axial 39(53.4%) andthe intraaxial masses accounted for 34(46.6%) of cases. Among the intra axial, 22(66.7%) of them were supra tentorial and 11 (33.3%) were infra tentorial. Among the extra axial masses; 30(77%) were supra tentorial ,9(23%) were infra tentorial. The sellar region mass accounted for 15 (20%) cases intracranial masses.

Table 2: Shows anatomic distribution of histologic confirmed intracranial tumors (N=73)

			Total
	supra tentorial	**Infra tentoral**	
Intra axial=34(46.6%)	**24(70.5%)**	**10(29.5%)**	**34**
Extra axial =39(53 .4 %)	**29(74%)**	**10(26)**	**39**
Total	**53**	**20**	**73**

Histologic confirmedintracranialcases were73 and the most frequent were Glial tumors =**22(30.1%),**Meningioma= **15,(21 %)** Meduloblastomaand pitutaryMacroadenoma each5(7%)**,**Hemangioblastoma =3(4.2%), ***Craniopharyngioma*** **=** 3(4.2%) and Tuberculoma =2(2.8%).The rest are one for each case (1.4%)

Table 3: Shows Frequency distribution of histological diagnosed intracranial masses (N=73)

	FREQUENCY	PERCENT
ADAMANITNIOUS***CRANIOPHARYNGIOM***	2	2.7
GLIAL TUMOR WHO IV	9	12.3
INTRAVENTRICULARHAMARTOMA	1	1.4
MENINGIOMA WHO II	1	1.4
ADENOCYSTIC CARCINOMA	1	1.4
ATRT GRADE IV	1	1.4
BASAL CELL ADENOCYSTIC CARCINOMA	1	1.4
CAVERNOUS HEAMANGIMA	1	1.4
COLLOID CYST	1	1.4
CRANIOPHARYINGIOMA	1	1.4
EPIDERMOID CYST	1	1.4
EPNENDYMOMA	1	1.4

GLAL TUMOR WHO III	1	1.4
GLIAL TUMOR WHO IV	1	1.4
GLIAL TUMOR WHO I	3	4.1
GLIAL TUMOR WHO II	7	9.6
HEMANGIOBLASTOMA	3	4.1
HIGH GRADE SEROUS OVARIAN TUMOR	1	1.4
INVASIVE PITUTARY ADENOMA	1	1.4
LARGE B CELL LYMPHOMA	1	1.4
MALIGANENT PERIPHERAL NERVE SHEATH TUMOR	1	1.4
MEDULLOBLASTOMA WHO IV	5	6.8
MENINGIOMA WHO I	10	13.7
MENINGIOMA WHO II	2	2.7
MENINGIOMA WHO III	2	2.7
OSTEOBLASTOMA WITH ANEURYSMAL BONE CYST	1	1.4
PARAVENYTICULAR HEMATOMA	1	1.4
PITUTARY ADENOMA	4	5.5
POORLY DIFFERENTIATED CARICNOMA	2	2.7
ROUND BLUE CELL TUMOR	1	1.4
SHISTOSOMIASIS	1	1.4
SCHWANNOMA	2	2.7
Tuberculoma	2	2.7
TOTAL	73	100.0

Table 4: Shows the percent distribution of histological confirmed case of Glial tumor (n=22)

WHO grade Glial tumor	Frequency	Percent
Glial Tumor WHO IV	11	50
Glal Tumor WHO III	1	4.5
Glial Tumor WHO II	7	31.8
Glial Tumor WHO I	3	13.6
Total	22	100.0

Table 5: Shows the percent distribution of histological confirmed case of Meningioma WHO grade.(n=15)

WHO grade of Meningioma	Frequency	Percent
Meningioma WHO II	1	6.7
Meningioma a WHO I	10	66.7
Meningioma WHO II	2	13.3
Meningioma WHO III	2	13.3
Total	15	100.0

Over all out of 34 histologic confirmed intra-axial masses, Preoperative radiologic diagnosis were in line with the histologic diagnosis for 31(91%) based on top radiologic diagnosis.

For Glial tumor preoperative radiologic diagnosis were in line with the histologic diagnosis 95 % high grade(85.7%) glial tumor and low grade Glial tumor(83.4%) based on top radiologic diagnosis Preoperative radiologic diagnosis was not line with histological diagnosis:for one case with radiologic diagnostic of Pilocystic astrocytoma based top diagnosis found to be ATRT and the other was had a radiologic diagnosticheamngioblastoma with top diagnosis and pathological found to be WHO III astrocytoma . Assessment of preoperative radiologicdiagnose and histopathology diagnosis showed, radiologic diagnosis was in line with histopathology diagnosis were 100% for Hemangioblastoma andMedullobastoma WHO IV. There was one case with radiologic diagnosticEpendymoma basedon topdiagnosis givenduring neuro-radiology joint session and histologicaldiagnosed to be epidermidcyst.

Table 6: Shows Pre- operative radiologic Top diagnoses and first differential given with histological correlation confirmed for intra-axial (N=34)

TOP DIAGNOSIS	DIFFERENTIALS DIAGNOSIS	HISTOLOGICAL DIAGNOSIS	CONCORDANCE
GLIOSARCOMA /DIG	SUPRATENTORIAL PENT	GLIAL TUMOR WHO IV	100%
ASTROCYTOMA LOW GRADE	ENCEPHALITIS/ INFRACTION	GLIAL TUMOR WHO II	83.3%
ASTROCYTOMA LOW GRADE	TUBERCULOSIS ABSCESS	GLIAL TUMOR WHO II	
ASTROCYTOMA LOW GRADE - OPTIC GLIOMA	CYSTIC SHEWANNOMA	GLIAL TUMOR WHO II	
ASTROCYTOMA LOW GRADE	OLIGEODENDROGLIOMA	GLIAL TUMOR WHO I	
ASTROCYTOMA LOW GRADE	OLIGEODENDROGLIOMA	GLIAL TUMOR WHO II	

GANGLIOGLIOMA	**ASTROCYTOMA LOW GRADE**	**GLIAL TUMOR WHO I**		
ASTROCYOMA HIGH GRADE	**NO**	**GLIAL TUMOR WHO IV**		**87.5%**
HEMANGIOBLASTOMA	**HIGH GRADE GLIOMA**	**GLIAL TUMOR WHO IV**		
ASTROCYOMA HIGH GRADE	**NO**	**GLIAL TUMOR WHO IV**		
ASTROCYOMA HIGH GRADE	**GANGLIOGLIOMA**	**GLIAL TUMOR WHO IV**		
ASTROCYOMA HIGH GRADE	**TUBERCOLOSIS ABSCESS**	**GLIAL TUMOR WHO IV**		
ASTROCYOMA HIGH GRADE	**TUBERCULOMA**	**GLIAL TUMOR WHO IV**		
ASTROCYOMA HIGH GRADE	**METASTASIS**	**GLIAL TUMOR WHO IV**		
ASTROCYOMA HIGH GRADE	**METASTASIS**	**GLIAL TUMOR WHO IV**		
PILOCYTIC ASTROCYTOMA	**GANGLIONEUROMA**	**ATRT GRADE IV**		
MALIGANET NEOPLASM	**NO**	**ROUND BLUE CELL TUMOR**	**100%**	
TUBERCULOMA	**GLIOBLASTOMAMOLTIFORME**	**TUBERCULOMA**		**100%**
TUBERCULOMA	**GLIOBLASTOMAMULTIFORME**	**TUBERCULOMA**		
METASTASIS	**ASTROCYTOM,LOW GRADE**	**HIGH GRADE SEROUS OVARIAN TUMOR**	**1100%**	
PILOCYTICASTOCYTOMA	**EPIDERMOID CYST**	**EPIDERMOID CYST**		
EPENDYMOMA	**MEDULLOBLASTOMA**	**EPNENDYMOMA WHO IV**		
HEMANGIOBLASTOMA	**NO**	**HEMANGIOBLASTOMA**		**100%**
HEMANGIOBLASTOMA	**PILOCYTICASTOCYTOMA**	**HEMANGIOBLASTOMA**		
HEMANGIOBLASTOMA	**MEDULLOBASTOMA**	**HEMANGIOBLASTOMA**		
MEDULLOBASTOMA	**EPENDYMOMA**	**MEDULLOBLASTOMA WHO IV**		**100%**

MEDULLOBASTOMA	**ATYPICATERATOIDRHABDIOD TUMOR**	**MEDULLOBLASTOMA WHO IV**		
Medullobastoma	**atypicalTeratoid/rhabdoid tumor**	**medulloblastoma who iv**		
Medullobastoma	**no**	**medulloblastoma who iv**		
Medullobastoma	**astrocytoma low grade**	**medulloblastoma who iv**		
Epnendymoma	**schwannoma**	**schwannoma**		

preoperative radiologic diagnosis was in line for 34 out of 39 (89%) cases of extra axal tumor Based on top diagnosis given . pre operative radiologic diagnosis was in line with histological diagnosis for 73% for Meningioma generally , 80% forWHO grade I Meningioma and 66.7% for WHO grade II Meningioma based on topdiagnosis givenpreoperative radiologic diagnosis was not in line with histological diagnosis for cases : The first case had a pre operative radiologic diagnosis , to rule out hydated cyst as top diagnosis and histological found to be WHO grade I Meningioma and other case had a diagnosis of spinal canal schwannoma based top diagnosis and found to have histological diagnosis of WHO grade I Meningioma.Assessment of preoperative radiologic diagnosis and histopathology diagnosis showed that , pre operative radiologic diagnosis was in line with histopathology diagnosis were 100% of cases for sellar/parasellar tumor , pituitarymacro adenoma and craniopharyngioma of based on top diagnosis given during neuro-radiology joint session discussions .

Table 7: Shows Pre- operative radiologic Top diagnoses and differential with the histological confirmed cases of Meningioma (N=15)

TOP DIAGNOSIS	DIFFERENTIALS DIAGNOSIS	HISTOLOGICAL DIAGNOSIS	CONCORDANCE	
MENINGIOMA	**NO**	**MENINGIOMA WHO I**		**80%**
MENINGIOMA	**NO**	**MENINGIOMA WHO I**		
FALX MENINGIOMA	**NO**	**MENINGIOMA WHO I**		
VERTEBRAL SCHWANNOMA	**MENINGIOMA**	**MENINGIOMA WHO I**		
ATYPICAL MENINGIOMA	**ATYPICAL MENINGIOMA**	**MENINGIOMA WHO I**		

R/O HYDATID CYST	ASTROCYTOMA LOW GRADE	MENINGIOMA WHO I		
MENINGIOMA TYPICAL	NO	MENINGIOMA WHO I		
MENINGIOMA	NO	MENINGIOMA WHO I		
MENINGIOMA TYPICAL	NO	MENINGIOMA WHO I		
MENINGIOMA	NO	MENINGIOMA WHO I		
ATYPICAL MENINGIONA	HEAMENGIOPERICYTOMA	MENINGIOMA WHO II		66.7%
ATYPICAL MENINGIONA	HEAMENGIOPERICYTOMA	MENINGIOMA WHO II		
HEAMENGIOPERICYTOMA	MENINGIOMA	MENINGIOMA WHO II		
MENINGIOMA	NO	MENINGIOMA WHO III		
ATYPICAL MENINGIOMA	HEMANGIOPERICYTOMA	MENINGIOMA WHO III		

Table 8: Shows Pre- operative radiologic Top diagnoses and differential with the histological confirmed cases of sellar/parasellar tumor.

TOP DIAGNOSIS	DIFFERENTIALS DIAGNOSIS	HISTOLOGIC DIAGNOSIS	CONCORDANCE	
PITUTARY MACROADENOMA	NO	PITUTARY MACROADENOMA		100%
PITUTARY MACROADENOMA	NO	PITUTARY MACROADENOMA		
PITUTARY MACROADENOMA	CRANIOPHARYNGIOMA	PITUTARY MACROADENOMA		
PITUTARY MACROADENOMA	NO	PITUTARY MACROADENOMA		
ATYPIAL MACROCIDENOMA	CHORDOMA	INVASIVE PITUITARY ADENOMA		
CRANIOPHARYNIGIOMA	ASTROCYTOMA LOW GRADE	ADAMANTIOUS CRANIOPHARIGIOMA		100%
CRANIOPHARYINGIDOMA	NO	ADAMANTIOUS CRANIOPHARIGIOMA		

CRANIOPHARYINGIOMA	NO	CRANIOPHARYINGIOMA		

The Glial tumor which accounted for 22 case out of intracranial masses have been commended to show heterogeneous hypo intense , and iso intense signal intensity on T1W sequence of 14(60.9%),8(34.8%), and 1 case (4.3%)respectively. On T2W a heterogeneous and hypo intense 14(60.9%), and 9(39.1%) respectively were commented. Among total of 22 case of Glial tumor cases which had post contrast on MRI imaging it was commented that faint , moderate , intense and absence /no enhancement were seen ; 1(4.3%), 13(56.5%) , 7(30.4%) and 2 (8.7%) cases respectively on post contrast imaging . Another post contrast imaging features which was commented on the pre-operative discussion on Glial tumor were a heterogeneous , ring like and homogenous pattern of enhancement which were seen in 15 (65.2%) ,7(30.4%) and 1(4.3%) cases respectively . purely cystic , cystic and solid and solid pattern of enhancement was also commented in 2(8.7%) , 13(56.5%) and 6(26.1%) pattern of enhancement respectively. there was one case of calcified mass (4.3%) .Peri-lesional edema was commented on 22 cases, outof which 15 cases showed effacement of the ventricular systems and 2 case had also bone erosion.

Table 9: Distribution of T1 and T2 signal intensity for Glial tumor by WHO grade (n=22)

GRADE	T1	T2		TOTAL
		HYPER INTENSE	HETEROGENEOUS	
GRADE I	HYPO INTENSE	4	0	4 (66.7%)
	HETEROGENEOUS	0	2	2 (22.3%)
	TOTAL	4	2	6
GRADE II	HYPO INTENSE	4	O	4 (66.7%)
	HETEROGENEOUS	0	3	3
	TOTAL	4	3	7
GRADE III	HETEROGENEOUS	0	1	1(100%)
			1	1
	TOTAL		1	2
GRADE IV	ISO- INTENSE	1	0	1
	HETEROGENEOUS	0	9	9(90%)
		1	9	10
	TOTAL			
TOTAL	HYPO INTENSE	8(88.8%	0	8
	ISO INTENSE	1(11.2%	0	1
	HETEROGENEOUS	0	13	13(56.5%)
	TOTAL	9	13	22

Table 10: shows distribution of enhancement pattern and degree of perilesional edema Glial tumor with WHO grade on post contrast MRI (n=22 , N=2 , no enhancement)

Grade	Pattern of enhancement	degree of edema			Total
		Mild	Moderate	severe	
Grade I	Homogenous	1	0	0	1
	Heterogeneous	1	0		1
	Ring	0	1		1
	Total	2	1		3
Grade II	Heterogeneous	1	1		2
	Ring	2	0	0	2
	Total	3	1		4
Grade III	Heterogeneous		1	0	1
	Total		1		1
Grade IV	Heterogeneous	1	4	1	6(60%)
	Ring	2(50%)	2	0	4
	Total	3	6(54.5%)	1	10
Total	Homogenous	1	0	0	1
	Heterogeneous	3	8(72.7%)	1	12
	Ring	4	3	0	7
	Total	8	11	1	20

For Meningioma the radiologic comment on Ct showed that hyper density and isodensity of on cases which had Ct scan only. on MRI it was commented that ; heterogeneous, iso intense , hypo intense and hyper intense signal intensity was seen in 3(20 %) , 8(53.3%) and 3(20%) and 1 (6.7%) of cases respectively onT1 w sequence. on T2w sequence ; 2 out of 15 case(13.2%) showed heterogeneous , 6(40%) showed iso intense and 7(46.7%)showed hyper intensity signal intensities.

on post contrast that 1 (6.7%) faint , 2(13.3%) of cases moderate and 12 (80%) intense enhancement respectively on post contrast imaging . A heterogeneous ,ring like and homogenous pattern of enhancement seen in 3 (20%) cases ,2(13.3%) and 10(66.7%) respectively . And also a purely cystic and solid pattern of enhancement was seen in 2(13.3%) cases and 13 (86.7%) respectively on post MRI imaging.

Peri-lesion edema was documented 11 case out of 15 Meningioma, out of which 8 case showed mild and 3cases showed moderate degree of the perilesional edema . Ventricular effacement was most common mass effect commented on joint session on meningioma which were seen case 8 case out of the 15 .out of 15 case adjacent bone erosion was commented 1 (6.7%) , sclerosis 1(6.7%) and hyperostosis 2(13.3%) cases out of the 15 cses .

The MRI comment for MedulLoblastoma showed , heterogeneous ,and iso intense signal intensities on T1 w and T2w sequence were seen for 3(60%) and 2(40%) cases respectively .on post contrast ; moderate degree of enhancement is seen in 4(80%) , solid and homogenous in 4(80%) .There was 1(20%) case with cystic and solid pattern of enhancement also commented in post contrast MRI .

The radiologic comment for pituitary Macroadenoma on MRI showed that , 2(40%) cases were iso intense and 3(60%) heterogeneous signal intensity on T1 w . 3(60%) cases heterogeneous, 1 (20%) case iso intense and 1 (20%) case hyper intense signal intensity onT2W sequence was commented.On postcontrast, intense andhomogenous enhancement was commented on 4(80%) cases. All pituitaryMacroadenoma commented to have a heterogeneous restriction on ADC/DWI sequences .

Out of the histological confirmed sellar and parasellartumor ,4 cases were commented to be pituitary macroadenoma and 1 caseof invasive pituitary Macroadenoma which were commented to show extension into the roof of the sphenoid sinus and clivus .There was two tubercuoma case commended have T1 hypo intense and T2 hyper intense signal , with no restriction and images ADC/DWI and ring like pattern enhancement on post contrast MRI was commented .MRS multi-voxal sampling and using CHO/NAA value < 2 was also commented on one case.

Over all out of 23 case Histologic confirmed supra tentorial intra-axial masses, Preoperative radiologic diagnosis were in line with the histologic diagnosis for 20(87%) based on top radiologic diagnosis. For Glial tumorGlial tumorpreoperative radiologic diagnosis was in line with the Histologic diagnosis87.5% based on top radiologic diagnosis. Preoperative radiologic diagnosis was not line with histological diagnosis: for one case with radiologic diagnostic of Pilocystic astrocytoma based top diagnosis found to be ATRT , the other was had a radiologic diagnosticHemangioblastoma with top diagnosis andhisto- pathological found to be WHO III astocytoma , and the third with radiologic diagnostic of hydated /giant cyst based top diagnosis histo- pathological found to be , WHO grade I glial tumor .

Table11: Shows Pre- operative radiologic Top diagnoses and first differential given with histological correlation for supratentorial intra axial tumor (N=23)

Top diagnosis	Differentials diagnosis	Histological diagnosis	concordance
ASTROCYTOMA LOW GRADE	ENCEPHALITIS/ INFRACTION	GLIAL TUMOR WHO II	
ASTROCYTOMA LOW GRADE	OLIGEODENDROGLIOMA	GLIAL TUMOR WHO II	87.5%
ASTROCYTOMA LOW GRADE	TUBERCULOSIS ABSCESS	GLIAL TUMOR WHO II	
ASTROCYTOMA LOW GRADE - OPTIC GLIOMA	CYSTIC SHEWANNOMA	GLIAL TUMOR WHO II	
GANGLIOGLIOMA	ASTROCYTOMA LOW GRADE	GLIAL TUMOR WHO I	
HYDATED /GIANT CYST	NEUROCYSTICERCOSIS	GLIAL TUMOR WHO I	
ASTROCYTOMA LOW GRADE	OLIGEODENDROGLIOMA	GLIAL TUMOR WHO I	
HEMANGIOBLASTOMA	OLIGEODENDROGLIOMA	GLIAL TUMOR WHO III	
GLIOSARCOMA /DIG	SUPRATENTORIAL PENT	GLIAL TUMOR WHO IV	
ASTROCYOMA HIGH GRADE	NO	GLIAL TUMOR WHO IV	
HEMANGIOBLASTOMA	HIGH GRADE GLIOMA	GLIAL TUMOR WHO IV	
ASTROCYOMA HIGH GRADE	NO	GLIAL TUMOR WHO IV	
ASTROCYOMA HIGH GRADE	GANGLIOGLIOMA	GLIAL TUMOR WHO IV	
ASTROCYOMA HIGH GRADE	TUBERCOLOSIS ABSCESS	GLIAL TUMOR WHO IV	
ASTROCYOMA HIGH GRADE	TUBERCULOMA	GLIAL TUMOR WHO IV	
ASTROCYOMA HIGH GRADE	METASTASIS	GLIAL TUMOR WHO IV	
ASTROCYOMA HIGH GRADE	METASTASIS	GLIAL TUMOR WHO IV	
PILOCYTIC ASTROCYTOMA	GANGLIONEUROMA	ATRT GRADE IV	
MALIGNANT NEOPLASM	NO	ROUND BLUE CELL TUMOR	**100%**
TUBERCULOMA	GLIOBLASTOMA MOLTIFORME	TUBERCULOMA/TUBERCULOSIS ABSCESS	**100%**
TUBERCULOMA	GLIOBLASTOMA MULTIFORME	TUBERCULOMA	

METASTASIS	ASTROCYTOMA ,LOW GRADE	HIGH GRADE SEROUS OVARIAN TUMOR	**100%**

preoperative radiologic diagnosis was in line for 24 out of 29 (82%) cases ofsupratentorial extra axal tumor Based on top diagnosis given . pre operative radiologic diagnosis was in line with histological diagnosis for 80% for Meningioma generally based on top diagnosis given.

preoperative radiologic diagnosis was not in line with histological diagnosis five cases in of supratentorial extra axal tumors : The first case had a pre operative radiologic diagnosis , to rule out hydated cyst as top diagnosis and histological found to be WHO grade I Meningioma and other case had a diagnosis of cavernous trigeminal schwannoma/ddx=cavernom found to have histological diagnosis ofcavernoushemangioma. .third case had pre operative radiologic diagnosis teratoma/ddx=craniopharynigioma found to have histological diagnosis WHO IV Glial Tumor . there wre two cases which had pre operative radiologic diagnosis of pilocytic cystic astrocytoma of optic pathway /low grad astrocytoma and choroid plexus papilloma /astrocytoma low grade found to have histological diagnosis WHO II Glial Tumo.Assessment of preoperative radiologic diagnosis and histopathology diagnosis showed that pre operative radiologic diagnosis was in line with histopathology diagnosis for 100% of sellar/parasellar tumor , pituitary macro adenoma and craniopharyngioma of based on top diagnosis given during neuro- radiology joint session discussions . There was one case with pre operative radiologic diagnosis of Atypical Neurocytoma/calcifiedmeningioma found to have histological diagnosis intraventricularHamartoma.

Table 12: Shows Pre- operative radiologic Top diagnoses and first differential given with histological in correlation for supratentorial extra axial tumors.

Top diagnosis	**Differentials diagnosis**	**Histological diagnosis**	**Concordance**	
FALX MENINGIOMA	NO	MENINGIOMA WHO I		80%
ATYPICAL MENINGIOMA	ATYPICAL MENINGIOMA	MENINGIOMA WHO I		

MENINGIOMA TYPICAL	NO	MENINGIOMA WHO I		
R/O HYDATID CYST	ASTROCYTOMA LOW GRADE	MENINGIOMA WHO I		
MENINGIOMA TYPICAL	NO	MENINGIOMA WHO I		
MENINGIOMA	NO	MENINGIOMA WHO I		
MENINGIOMA TYPICAL	NO	MENINGIOMA WHO I		
MENINGIOMA	NO	MENINGIOMA WHO I		
ATYPICAL MENINGIONA	HEAMENGIOPERICYTOMA	MENINGIOMA WHO II		
ATYPICAL MENINGIONA	HEAMENGIOPERICYTOMA	MENINGIOMA WHO II		
HEAMENGIOPERICYTOMA	MENINGIOMA	MENINGIOMA WHO II		
MENINGIOMA	NO	MENINGIOMA WHO III		
ATYPICAL MENINGIOMA	HEMANGIOPERICYTOMA	MENINGIOMA WHO III		
PITUTARY MACROADENOMA	NO	PITUITARY MACROADENOMA	100%	
PITUTARY MACROADENOMA	NO	PITUITARY MACROADENOMA		
PITUTARY MACROADENOMA	CRANIOPHARYNGIOMA	PITUITARY MACROADENOMA		
PITUTARY MACROADENOMA	NO	PITUITARY MACROADENOMA		
ATYPICAL MACROCIDENOMA	CHORDOMA	INVASIVE PITUITARY ADENOMA		
CRANIOPHARYNIGIOMA	ASTROCYTOMA LOW GRADE	ADAMANTIOUS CRANIOPHARIGIOMA	100%	
CRANIOPHARYINGIDOMA	NO	ADAMANTIOUS CRANIOPHARIGIOMA		
CRANIOPHARYINGIOMA	NO	CRANIOPHARYINGIOMA		
TRIGEMINAL SCHWANNOMA	MENINGIOMA	CAVERNOUS HAMNGIOMA	-	

MALIGNANT LACRIMAL GLAND TUMOR	METASTASIS	MALIGANT LACRIMAL GLAND TUMOR	
TRIGEMINAL L SCHWANNOMA OF CAVERNOUS SINUS	CAVERNOMA	CAVERNOUS SINUS HEMANGIOMA	
ASTROGTOMA PILOCYSTIC	TERATOMA, CRANIOPHARYNIGIOMA	GLIAL TUMOR WHO IV	
PILOCYTIC ASTROCYTOMA	LOW GRADE ASTROCYTOMA	GLIAL TUMOR WHO II	
CHOROID PLEXIS PAPILLOMA	ASTROCYTOMA LOW GRADE	GLIAL TUMOR WHO II	
ATYPICAL NEUROCYTOMA	CAALCIFIED MENINGIOMA	INTRAVENTRICULAR HAMARTOMA	
OSTEOBLASTOMA	NO	OSTEOBLASTOMA WITH ANEURYSMAL BONE CYST	
MALIGNANT LACRIMAL GLAND TUMOR	METASTASIS	BASAL CELL ADENOCYSTIC CARCINOMA	
METASTASIS	ATYPICAL MENINGIOMA	POORLY DIFFERENTIATED CARCINOMA	
METASTASIS	HEMANGIOPERICYTOMA	CARCINOMA POORLY DIFFERENTIATED	
SHWENNOMA	CAVERNOMA	CAVERNOUS HEAMANGIMA	

Assessment of preoperative radiologic decision and histopathology diagnosis showed, radiologic diagnosis was in line with histopathology diagnosis for 100% of Hemangioblastoma and Medulloblastoma WHO IV . There was one case with radiologic diagnostic epndyamoma based on topdiagnosis givenduring neuro- radiology joint session and histological diagnosed to be epidermidcyst .

Table 11: Shows Pre- operative radiologic Top diagnoses and first differential diagnosis in correlations with the histological diagnosis infra-tentorial intra axial tumor.

TOP DIAGNOSIS	DIFFERENTIALS DIAGNOSIS	HISTOLOGICAL DIAGNOSIS	CONCORDANCE
EPENDYMOMA	MEDULLOBASTOMA	EPNENDYMOMA WHO IV	100%
HEMANGIOBLASTOMA	NO	HEMANGIOBLASTOMA	100%
HEMANGIOBLASTOMA	PILOCYTIC ASTOCYTOMA	HEMANGIOBLASTOMA	

HEMANGIOBLASTOMA	MEDULLOBASTOMA	HEMANGIOBLASTOMA		
MEDULLOBASTOMA	EPENDYMOMA	MEDULLOBASTOMA WHO IV		100%
MEDULLOBASTOMA	ATYPICA TERATOID RHABDIOD TUMOR	MEDULLOBASTOMA WHO IV		
MEDULLOBASTOMA	ATYPICAL TERATOID RHABDOID TUMOR	MEDULLOBASTOMA WHO IV		
MEDULLOBASTOMA	NO	MEDULLOBASTOMA WHO IV		
MEDULLOBASTOMA	ASTOCYTOMA LOW GRADE	MEDULLOBASTOMA WHO IV		

Table 12: Shows Pre- operative radiologic Top diagnoses and first differential diagnosis in correlations with the histological diagnosis for infratentorialextraxial tumor .

TOP DIAGNOSIS	DIFFERENTIALS DIAGNOSIS	HISTOLOGICAL DIAGNOSIS	CONCORDANCE	
EPNENDYMOMA	SCHWANNOMA	PERIPHERALNERVE SHEATH SCHWANNOMA WHO I		
PILOCYTIC ASTOCYTOMA	EPIDERMOID CYST	EPIDERMOID CYST		
MENINGIOMA	NO	MENINGIOMA WHO I		75%
VERTEBRAL SCHWANNOMA	MENINGIOMA	MENINGIOMA WHO I		
ATYPICAL MENINGIOMA	ATYPICAL MENINGIOMA	MENINGIOMA WHO III		
MENINGIOMA	NO	MENINGIOMA WHO I		
COLLOID CYST	NO	COLLOID CYST		
SCHISTOSOMASIS/DURAL	T.MYELITIS	SCHISTOSOMASIS		

Table 13: Shows Pre- operative radiologic Top diagnoses and first differential diagnosis in correlations with the histological diagnosis for sellar /parasellar tumor

TOP DIAGNOSIS	DIFFERENTIALS DIAGNOSIS	HISTOLOGICAL DIAGNOSIS	Concordance
PITUITARY MACROADENOMA	NO	PITUTARY MACROADENOMA	100%
PITUITARY MACROADENOMA	NO	PITUTARY MACROADENOMA	
PITUITARY MACROADENOMA	CRANIO PHARNYNGIOMA	PITUTARY MACROADENOMA	
PITUITARY MACROADENOMA	NO	PITUTARY MACROADENOMA	
ATYPICAL MACROCIDENOMA	CHORDOMA	INVASIVE PITUITARY ADENOMA	
CRANIOPHARYNIGIOMA	ASTOCYTOMA LOW GRADE	ADAMANTIOUS CRANIOPHARNIGIOMA	100%
CRANIOPHARYINGIDOMA	NO	ADAMANTIOUS CRANIOPHARINGIOMA	
CRANIOPHARYINGIOMA	NO	CRANIOPHARYNINGIOMA	

11 .Discussion

In this study it was seen that the common intracranial tumor were Glial tumor and Meningioma, this results is consistent with most literature done on intracranial tumor. In this study 100% concordance was seen in localizing the tumors. this was comparable with study done by Ishita Pant et.al .with concordance for (100%) (2).

The preoperative radiologic diagnosis concordance was greater than 80% for Glial tumor and higher concordance was seen in the diagnosis of high grade Glial tumor than low grade Glial tumor in this study. This was comparable with study done by Ishita Pant et.al in which concordance was maximal for high-grade astrocytomas,(90%) and low-grade astrocytic tumors (85.1%)(2).

Preoperative radiologic diagnosis concordance was also greater than 80% for Meningioma : This was comparable with study done by Ishita Pant et.al .with concordance for meningeal tumors (97.7%) , versus in our study 73% to 80 % (**2).**
Preoperative radiologic diagnosis concordance was (100%) for seller/parasellar masses This was comparable with study done by Ishita Pant et.al which sellar region mass (100%)(2).

Limitation:

- Absence of uniform MRI imaging sequence for all of the cases to be suede as standard for describing or correlation Study
- Absence of uniform radiologic reporting for intracranial tumors which are based on standard WHO grading systems
- Small number of cases used in each anatomic compartment of the brain for comparison .
- Absence of patient chart for data collection.

12. Conclusions and Recommendations.

12.1 Conclusions

- Glial tumor and Meningioma were the most intracranial tumors
- Advanced imaging like, CT and conventional MRI imaging help to better characterize and diagnose intra cranial masses, which improves the treatment plan and outcome.
- By using imaging findings, such as the type of margins and signal, nature of contents (necrosis, hemorrhage, and calcification), pattern of enhancement, presence or absence of edema, mass effect, bony it possible to narrowed differential diagnosis and also give a specific diagnosis.
- There is higher accuracy of pre operative radiologic diagnosis for sellar region tumor and WHO grade I Meningioma and low accuracy was seen for tumor grading.

12.2. Recommendation

- Avoiding the traditional way of data archiving and build up modern way of data recording and archiving system should worked up on .
- Questionnaire should revised and edited based existing include modern MRI imaging.
- Radiologic Reporting and comment should include standard tumor grading system being used by WHO which solve difficulties of assessment of discordance in future studies.
- In addition to prioritizing specific research topics, the future research agenda for brain tumor requires more comprehensive communication and collaboration among the scientific community than has been achieved.
- Finally, further series of similar studies in a more intensified way are recommended to manipulate them for the general population.

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14. Annex I: Data Collection Format

A questionnaire designed to assess pre-op radiologic diagnosis cases in neuro-radologic joint session with pathologic correlation.

Questionnaire Name ; CT No; MRI No;

Are prepared to be filled from charts of patients at BLH

1. Hospital card no……
   - 1.1 age
   - 1.2 sex

2.Clinical feature

A. headache C. abnormal body movement

B. body weakness D.visual loss E.vomitingf.others specify

3. Imaging modality performed.

A. CT C. both

B. MRI

4. Location of the lesion A. intra axial _ 1. supratentorial 2. infratentorial

B. extra axial - 1. supratentorial 2. infratentorial 3. ventricle

5. Size of lesion (maximum dimention or long-axis……A.…<5cm B-5-10cm C. > or equal to 10cm

7. Specific location of lesion…….

7.1 Supratentorial- A. cerebral hemispheres 1. Frontal 2. temporal, 3. occipital/parietal

7.1 INFRATENTORIAL A. cerebellar hemisphere B. vermis

8. Was the mass crossing midline A. YES B. no

9. The lesion A. single B. multiple

10.CT density of lesion A. hypo dense B.iso dense

C. hyper dense D. heterogeneous

11. MRI intensity of lesion

A. T1 a. hypointense b. iso intense c. hyper intense d. heterogeneous

B. T2 a. hypo intense b. iso intense c. hyper intense d. heterogeneous

12. Other sequence : A. DWI /ADC 1. restriction 2.no restriction B. MRS 1.CHO/NAA RATION >2 2. CHO/NAA RATION <2 3. high lactate peak 4. highaminoacid C. FLAIR .1 showed suppression 2. Not showed suppression

13. Post contrast enhancement A. yes B. no

14. If yes, A. degree of enhancement a. no b. faint c. moderate d. intense

B. pattern of enhancement a. homogenous b. heterogeneous c. ring d. enhancement of solid component

E. Other specify .1. dural tail sign 2. ----------3. ----------4.---------.

15. Components of lesion as seen on imaging A. purely cystic B. cystic with solid component

C. solid D. calcification E. fat containing

16. Is there perilessional edema A. yes B. no

17. If yes degree of edema A. mild B.moderate C. severe

18. Mass effect on surrounding structures

A. ventricular dilatation B. effacement of ventricles

C. herniationc1.Subfalcine 2.Uncal herniation 3.Medial temporal 4. Trans-tentorial/hiatal

5.Trans foramen magnum

D. bone change a) erosion b) sclerosis c)hyperostosis E. other specify

19.Radiological diagnosis as to CT finding A. Top diagnosis……..

B. Differential diagnosis…….

20. Radiological diagnosis as to MRI .A Top diagnosis……

B. Differential diagnosis……

21.Histopathological diagnosis……..

22. Intra operative remarks ….