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Original Research Article

Clinicopathological Correlation of CNS Tumours

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ABSTRACT

Central nervous system (CNS) tumours constitute 1-2% of all neoplasms. They represent the second most common and overall the most common solid tumour of paediatric age group. Approximately 25% of all cancer related mortalities in paediatric population can occur because of CNS tumours. Aim of the study to determine the incidence of various CNS tumours and correlate histopathological diagnosis with clinical diagnosis and frozen section in selective cases. This is a retrospective and prospective study evaluating 60 patients of CNS tumours in a tertiary level hospital in Navi Mumbai. Fresh specimens obtained in intraoperative cases and postoperatively in fixative were examined and stained.

Study of clinicopathological correlation gives the idea of distribution of brain tumour and demonstrates the changes in tumour spectrum in our population. High accuracy in frozen section diagnosis and its use can help in therapeutic approach which results in reduction in mortality and morbidity.

Keywords: CNS tumour, Frozen section, Clinicopathological correlation

INTRODUCTION

Central nervous system neoplasm represents a major public health problem. Since, the Central nervous system tumours may result in neurological deficits, and are associated with unfavourable prognosis accurate understanding of its epidemiology is required to facilitate early management. [1]

Central nervous system neoplasm constitutes 1-2% of all neoplasm, being classified according to site of origin, morphological features, growth potential and extent of invasion. [2] These represent the second most common tumours and overall the most common solid tumour of paediatric age group. [3]

The tumours comprise 2% to 5% of all tumours. [4] 80% involve the brain and 20% involve the spinal cord. [5] 60% to 80% of brains tumours are primary and rest 20% to 40% are metastatic. [6] In childhood 70% of primary brain tumours are infratentorial and involve cerebellum, midbrain, pons and medulla. [7]

Frozen section (FS) diagnosis provides useful information for surgery as it guides a surgeon with appropriate therapeutic decision-making on most occasions. In patients with central nervous system (CNS) lesions, rapid intraoperative diagnosis helps the surgeon to determine the best procedure and the endpoint of the operation. Many studies have confirmed the accuracy of FS diagnosis for assessment of the CNS lesions, with acceptable sensitivity. [8,9]

MATERIALS AND METHODS

This is a retrospective and prospective study (2014-2017) evaluating 60 patients of CNS tumours at tertiary care

centre. Fresh specimens obtained in cases intraoperatively and postoperatively with fixative (10% formalin) are examined grossly for size and consistency. After fixation, tissue is processed for dehydration, paraffin embedding, section cutting (3-5microns) and regressive haematoxylin and eosin staining. Specimens sent without fixative intraoperatively were taken for frozen sections in a cryostat at -20 to -24 degree Celsius and 6-7 microns sections were prepared and stained with haematoxylin and eosin.

RESULTS

Meningioma was commonest lesion followed by Astrocytoma. Commonest type of meningioma was Grade I While in Astrocytoma, GBM (Grade IV) was commonest subtype. Our study showed meningiomas were commoner in females as compared to males. Six cases were found in children. Age distribution revealed that tumours were common in fifth and sixth decade of life. Tumours had predilection for cerebellopontine angle followed by frontoparietal lobes. Commonest symptom of brain tumour was headache followed by vomiting and convulsion. Out of the cases clinicopathologically correlated majority were accordant as compared to discordant cases, while the percentage of accordant cases between frozen section and histopathological diagnosis was more as compared to discordant cases.

DISCUSSION

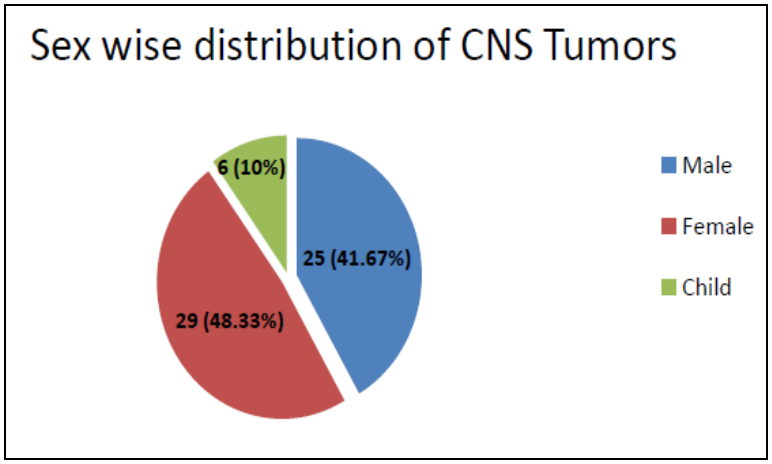
This is a retrospective and prospective study (2014-2017) evaluating 60 patients of CNS tumours at tertiary care centre.

Patient age ranged from 10 months to 73 years with mean age of 40.43 years and the peak incidence was seen between 41 to 60 years with majority of cases (43.33%) [Table no. 1] similar to Thambi et al, [10] Mondal et al, [11] and Masoodi et al. [4]

Table No. 1 Age (years) wise distribution of CNS Tumours

Histopathological Diagnosis	<1	1-10	11-20	21-30	31-40	41-50	51-60	61-70	>70	No. of cases	%
Meningothelial Meningioma	-	-	-	2	3	3	4	1	-	13	21.66%
Transitional cell Meningioma	-	-	-	-	1	-	1	-	-	2	3.33%
Psammomatous Meningioma	-	-	-	-	-	1	-	-	-	1	1.66%
Rhabdoid Meningioma	-	-	-	-	-	-	1	-	-	1	1.66%
Glioblastoma multiforme	-	-	-	-	1	2	2	2	1	8	13.33%
Schwannoma	-	-	-	1	2	6	2	-	-	11	18.33%
Astrocytoma	-	-	-	2	-	-	1	-	-	3	5.00%
Pilocytic Astrocytoma	-	1	1	-	-	-	-	-	-	2	3.33%
Oligoastrocytoma	-	-	1	2	1	-	1	-	-	5	8.33%
Medulloblastoma	-	1	2	-	-	1	-	-	-	4	6.66%
Anaplastic Astrocytoma	-	-	1	-	-	-	-	-	1	2	3.33%
Ependymoma	-	-	-	1	-	-	-	-	-	1	1.66%
High grade glioma	-	-	-	-	-	-	1	-	-	1	1.66%
Choroid Plexus Papilloma	1	-	-	-	-	-	-	-	-	1	1.66%
Oligodendroglioma	-	-	-	-	1	-	-	-	-	1	1.66%
Anaplastic Oligoastrocytoma	-	-	-	-	1	-	-	-	-	1	1.66%
Metastatic Adenocarcioma of Brain	-	-	-	1	-	-	-	1	-	2	3.33%
Epithelial Malignancy	-	-	1	-	-	-	-	-	-	1	1.66%
Total No of cases	1	2	6	9	10	13	13	4	2	60	100%

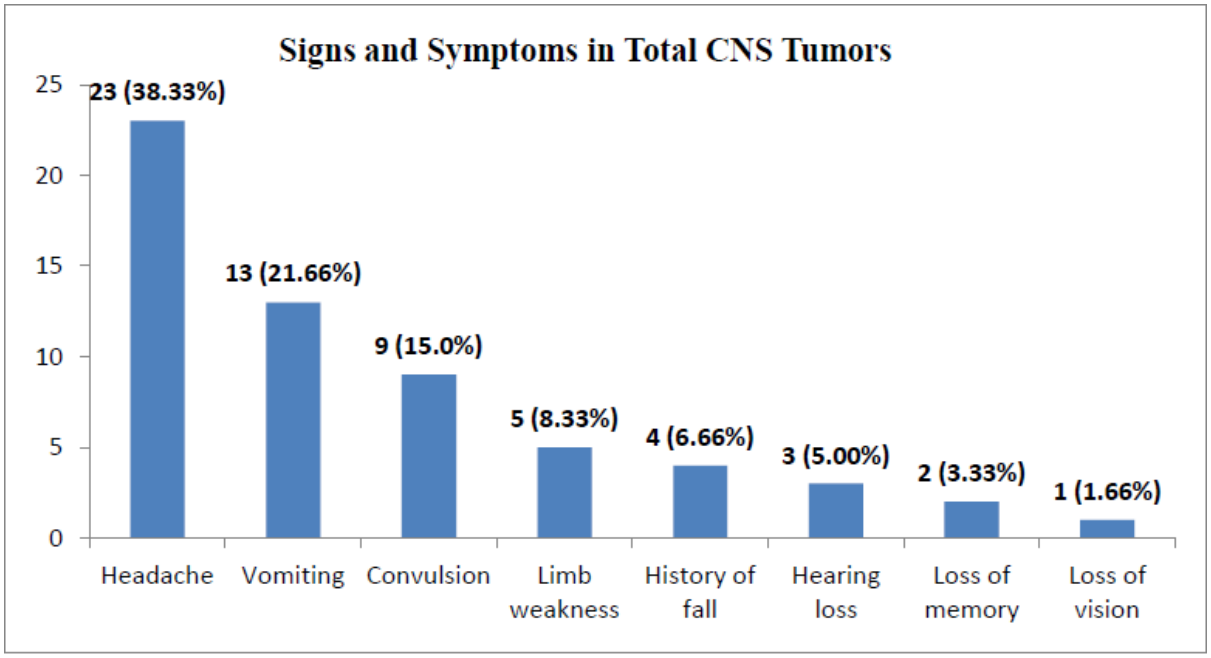
CNS tumours were more common in females compared to males and showed M: F (25:29) ratio of 0.86:1 which was consistent with Thambi R et al [10] and Das A et al. [12]



Among females the most common diagnosis was meningioma (31.03%) and in males it was Schwannoma (32%) [Table no.2]. Meningiomas were more common in females with a male to female ratio of 1:3.25 as observed by others Masoodi et al [4] and Thambi et al. [10]

Table No. 2 Sex wise distribution of CNS Tumours

Histopathological Diagnosis	Male	Female	Child	No. of cases	Percentage
Meningothelial Meningioma	4	9	-	13	21.66%
Transitional cell Meningioma	-	2	-	2	3.33%
Psammomatous Meningioma	-	1	-	1	1.66%
Rhabdoid Meningioma	-	1	-	1	1.66%
Glioblastoma multiforme	3	5	-	8	13.33%
Schwannoma	8	3	-	11	18.33%
Astrocytoma	1	2	-	3	5.00%
Pilocytic Astrocytoma	-	-	2	2	3.33%
Oligoastrocytoma	1	4	-	5	8.33%
Medulloblastoma	-	1	3	4	6.66%
Anaplastic Astrocytoma	2	-	-	2	3.33%
Ependymoma	1	-	-	1	1.66%
High grade glioma	1	-	-	1	1.66%
Choroid Plexus Papilloma	-	-	1	1	1.66%
Oligodendroglioma	1	-	-	1	1.66%
Anaplastic Oligoastrocytoma	1	-	-	1	1.66%
Metastatic Adenocarcinoma of Brain	1	1	-	2	3.33%
Epithelial Malignancy	1	-	-	1	1.66%
Total no. of cases	25	29	6	60	100%



The present study is a clinicopathological study of CNS tumour. Clinical presentation varies according to the site and type of brain tumour, although there are some common symptoms, namely headache, vomiting, seizure and sensorimotor defects and any of which can eventually be found in majority of patient. In this study, major complaints were headache (38.33%) followed by vomiting (21.66%), convulsion (15%), and limb weakness (8.33%) which was nearby similar to other studies by Mondal et al [11] and Monga et al. [6]

In our present study there were 37(61.67%) supratentorial cases and 23 (38.33%) infratentorial cases. [Table no. 3], which was similar to study done by Masoodi et al [4] and Monga et al. [6] Frontoparietal lobe was the commonest supratentorial site involved (15%) and CP angle was the commonest infratentorial site involved (23.33%). Among the CNS tumours in present study the most common site involved was the CP angle followed by frontoparietal lobes.

Table No. 3 Supratentorial and Infratentorial Distribution of CNS Tumours

Histopathological Diagnosis	Supratentorial	Infratentorial	Total
Meningioma	12	05	17
Schwannoma	0	11	11
Astrocytoma	14	01	15
Oligoastrocytoma	05	0	05
Anaplastic Oligoastrocytoma	01	0	01
High grade glioma	01	0	01
Medulloblastoma	01	03	04
Ependymoma	0	01	01
Choroid Plexus Papilloma	0	01	01
Oligodendroglioma	01	0	01
Metastatic Adenocarcinoma of Brain	02	0	02
Epithelial Malignancy	0	01	01
Total	37	23	60

In the present study among the histopathological diagnosis, Meningiomas were the commonest tumours 17 cases constituting 28.33% of all CNS tumours while, Astrocytomas were the second commonest tumours (15 cases) constituting 25.00% of all CNS tumours [Table no. 3] similar observations were made by Das A et al, [12] Ghanghoria S et al, [13] Thambi R et al [10] while in other studies like Masoodi et al, [4] Mondal et al [11] and Rathod et al [14] most common histopathological diagnosis was Astrocytomas followed by Meningiomas.

Among meningiomas, WHO Grade I were the commonest 16 cases (94.12%) and among the Astrocytoma, Glioblastoma Multiforme (grade IV) (Figure I,II) were the commonest 8 cases (53.33%) similar to the study done by Thambi R et al [11] and Masoodi T et al. [4]

In this study out of 60 cases, 45 cases (75%) of clinical diagnosis were correlated with histopathological diagnosis [Table no .4]. The majority of accordance between clinical and histopathological diagnoses was seen in 17 cases of meningiomas (37.78%), followed by 11 cases of Schwannomas (24.44%) and 10 cases of Astrocytoma (22.22%) out of 45 cases. Whereas 15 out of 60 clinical diagnoses (25%) were discordant with histopathological diagnosis. Majority of discrepancies were observed in 6 cases of Astrocytoma (40%) followed by 5 cases of Oligoastrocytoma (33.33%) out of 15 cases.

The reported diagnostic accuracy of CNS FS diagnosis is 79.07% agreement degree between final diagnosis with FS and the permanent section [Table no. 5]. The most accordant diagnoses were made in 9 cases of Schwannoma (100%) (Figure III, IV) followed by 10 cases of Meningioma (83.33%) (Figure V, VI) which was nearby similar to study done by Gohil R.P et al, [17] Ud Din N et al, [16] and Khoddami M et al. [18]

Table No. 4 Clinicopathological Correlation of Accordant CNS Tumours

Clinical Diagnosis	Histopathological Diagnosis	No.of cases (N=45)	Percentage
Meningioma	Meningothelial Meningioma	13	28.88%
Schwannoma	Schwannoma	11	24.44%
Glioblastoma Multiforme	Glioblastoma Multiforme	4	8.88%
Medulloblastoma	Medulloblastoma	3	6.66%
Meningioma	Transitional cell Meningioma	2	4.44%
Astrocytoma	Astrocytoma	2	4.44%
High grade lesion	Metastatic Adenocarcinoma of Brain	1	2.22%
Astrocytoma	Pilocytic Astrocytoma	1	2.22%
Metastatic lesion	Metastatic Adenocarcinoma of Brain	1	2.22%
High grade lesion	Glioblastoma Multiforme	1	2.22%
Ependymoma	Ependymoma	1	2.22%
Choroid plexus papilloma	Choroid plexus papilloma	1	2.22%
Glioma	Astrocytoma	1	2.22%
High grade glioma	High grade glioma	1	2.22%
Meningioma	Psammomatous Meningioma	1	2.22%
Meningioma	Rhabdoid Meningioma	1	2.22%

Table No.5 Correlation of Frozen section and Histopathological Diagnosis (Accordance)

Frozen Section Diagnosis	Histopathology Diagnosis	No.of cases n=34	Percentage
Meningioma	Meningothelial Meningioma-(6) Transitional cell Meningioma-(2) Rhabdoid Meningioma-(1) Psammomatous Meningioma-(1)	10	29.41%
Schwannoma	Schwannoma	9	26.47%
Medulloblastoma	Medulloblastoma	3	8.82%
High grade glioma	Glioblastoma Multiforme	3	8.82%
Glioblastoma Multiforme	Glioblastoma Multiforme	1	2.94%
Glioma	Oligoastrocytoma	1	2.94%
Pilocytic Astrocytoma	Pilocytic Astrocytoma	1	2.94%
Astrocytoma	Astrocytoma	1	2.94%
High grade glioma	High grade glioma	1	2.94%
Epithelial malignancy	Epithelial malignancy	1	2.94%
Metastasis in Brain	Metastatic Adenocarcinoma of Brain	1	2.94%
High grade anaplastic lesion	Metastatic Adenocarcinoma of Brain	1	2.94%
High grade glioma	Anaplastic Oligoastrocytoma	1	2.94%

Total 9 cases (20.93%) were discordant with frozen section and histopathological diagnosis out of 43 cases [Table no. 6] which was nearby similar to study done by Gohil R.P et al, [15] Ud Din N et al, [16] and Khoddami M et al [18] The majority of discordances between FS and the permanent diagnoses were seen in Astrocytoma, Oligoastrocytoma and Meningioma which were 4 cases of Astrocytic tumours (44.44%), followed by 2 cases of Oligoastrocytoma and Meningioma (22.22%) each.

Table No.6 Correlation of Frozen section and Histopathological Diagnosis (Discordant)

Frozen Section Diagnosis	Histopathology Diagnosis
High grade glioma	Meningothelial Meningioma
Pilocytic Astrocytoma	Anaplastic Astrocytoma
High grade ependymoma	Glioblastoma Multiforme
High grade glioma	Oligoastrocytoma
Astrocytoma	Glioblastoma Multiforme
Medulloblastoma	Pilocytic Astrocytoma
Neurocytoma	Oligodendroglioma
Low grade glioma	Meningothelial Meningioma
Low grade glioma	Oligoastrocytoma

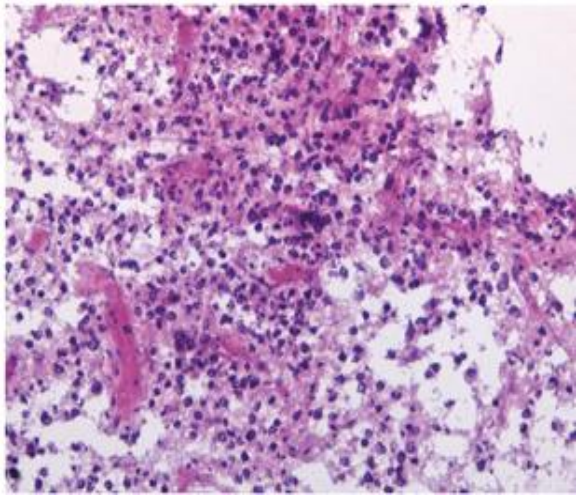


Figure I: Glioblastoma Multiforme (Frozen section 10X)- Smear show high cellularity comprising of tumor cells with areas of necrosis.

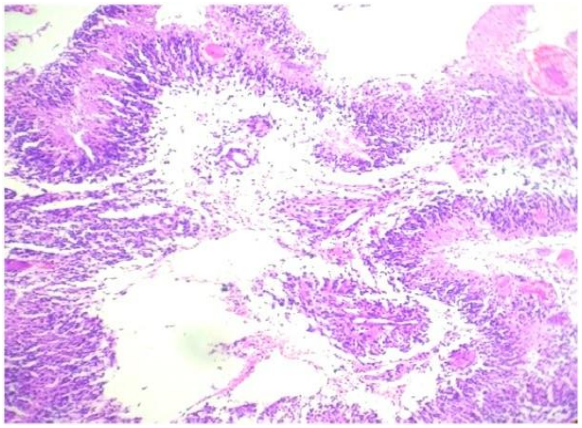


Figure II: Glioblastoma Multiforme (HE 10X)(WHO GRADE IV) –Section show high cellularity comprising of tumors cells with nuclear palisading and serpentine necrosis with areas of haemorrhage and mitotic activity.

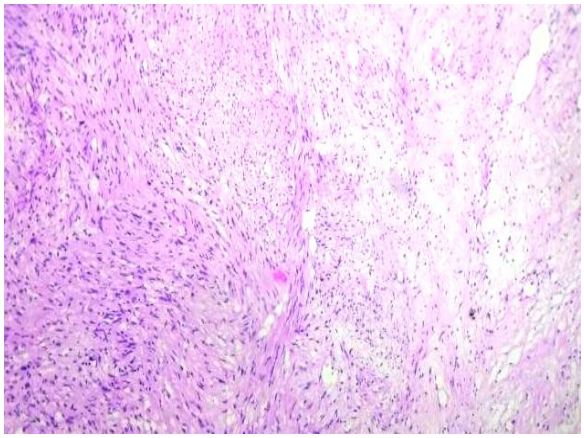


Figure III : Schwannoma (Frozen section 10X) - Smears studied shows neoplastic Schwann cells arranged in Antoni A areas as well as Antoni B areas.

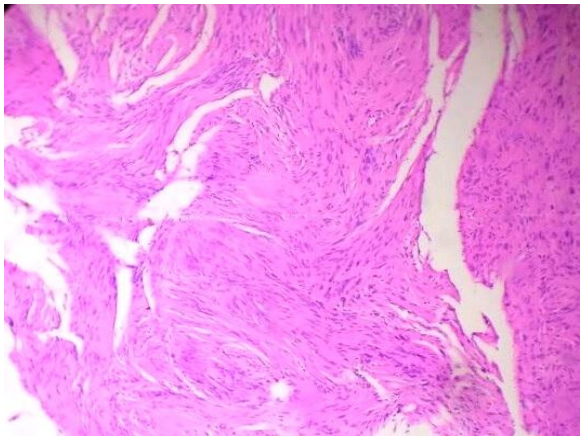


Figure IV : Schwannoma (HE 10X) (WHO GRADE I) – Section show biphasic pattern with cellular Antoni A and hypocellular Antoni B area.

CONCLUSION

Common histopathological diagnoses are Meningothelial Meningioma, Schwannoma and Glioblastoma Multiforme with overall female predominance. Histopathological diagnosis is necessary for the further management after neurosurgery.

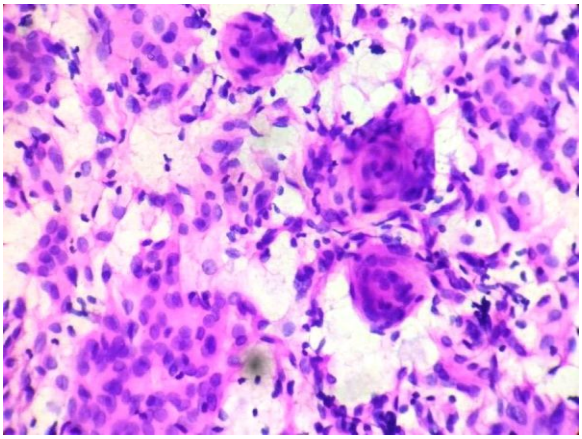


Figure V: Meningioma (Frozen Section 10X)- Smears studied shows meningothelial cells arranged in whorls and fascicles.

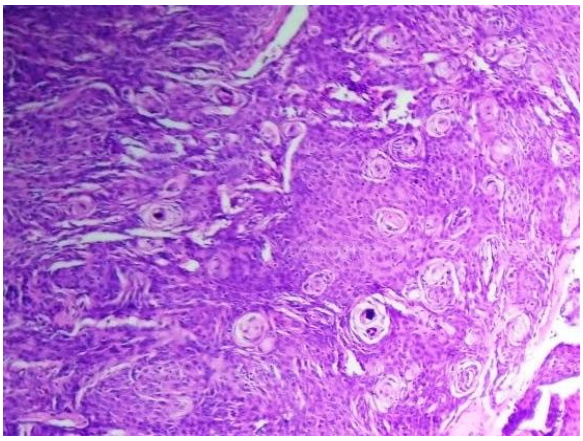


Figure VI: Meningothelial Meningioma (HE 10X)(WHO GRADE I)- Section show growth pattern of cells characterized by whorls while psammoma bodies and connective tissue component are lacking .

Study of clinicopathological correlation gives the idea of distribution of brain tumour and demonstrates the changes in tumour spectrum in our population. High accuracy in frozen section diagnosis and its use can help in therapeutic approach which results in reduction in mortality and morbidity.

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