

Spectrum of Brain Tumors in a Tertiary Care Hospital: A 5 Years Study

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Abstract-

Background- Tumor epidemiology is a significant part in case of intracranial tumor studies. Here, we discuss the features of intracranial tumor pathology in single centre. **Aims and Objective-** To analyze the age, sex and site wise distribution of different histological pattern of intracranial tumors seen in our centre. **Materials and Methods-** It is a retrospective study of cases of intracranial tumors seen over a period of 5 years. Altogether 160 CNS specimens were fixed in 10% Formalin and processed in automatic tissue processor. Routine Hematoxylin and Eosin stain and special stains were done and examined under the light microscope. The diagnosis is given on the basis of age, sex distribution using the WHO grading and the histological subtypes. **Results-** Out of total 160 cases of intracranial tumor 86 cases were of meningioma (53.75%). 30 cases were of astrocytoma (18.75%). 13 cases are of pituitary adenoma (8.125%). 11 cases were of schwannoma (6.875%), 5 cases were of glioblastoma grade 4 (3.125%), 5 cases were of oligodendroglioma grade 2 (3.125%), 2 cases were of each metastatic carcinoma, ependymoma, cerebellar hemangioblastoma and tuberculoma (1.25%), 1 case of each central neurocytoma and craniopharyngioma (0.625%). In this study meningioma is the most common intracranial tumor followed by astrocytoma. **Conclusion-** Meningiomas are commonest tumor and comprise more than half of all operated CNS tumors in our setup, followed by astrocytomas. Meningothelial Meningioma is the most common subtype. This study can help in observing CNS tumor trends and changing patterns.

Keywords: Astrocytoma, Meningioma, Glioblastoma.

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I. Introduction

Brain tumors can affect people of all ages [1]. Unfortunately, the incidence of brain tumors is on the rise for all age groups, especially older adults [2]. Brain tumors are a diverse group of primary CNS tumors and secondary neoplasms arising either from the brain or from haematogenous spread from distant sites. Each tumor has a distinctive biology, treatment and prognosis [3]. The annual, global, age standardized incidence of primary malignant intracranial tumors is approximately 3.7 per 100,000 for males and 2.6 per 100,000 for females [4]. Gliomas are common tumors in adults and paediatric age group. In the adult population, Anaplastic Astrocytoma and Glioblastoma Multiforme are the most common glial tumors with an annual incidence of 3 to 4 per 100,000 populations [5]. The aim of the study was to observe age, sex and site wise distribution of different histological pattern of intracranial tumors seen in our centre.

II. Materials And Methods-

This is a five years retrospective study done at a tertiary hospital in Kolkata, Altogether 160 CNS specimen was taken from patients who were diagnosed with CNS tumors and surgically treated between January 2009 and December 2014. The entire specimens were fixed in 10% Formalin overnight or more according to the nature and size of the specimens. They were processed in an Automatic tissue processor. The sections were prepared with microtome and routine Hematoxylin and Eosin stain and special stains were done when required. Sections were examined under the light microscope. The diagnosis was given according to age, sex distribution of tumors using the WHO grading and the histological subtypes (FIG 1,2,3,4) Analysis of data was done by Software Statistica version 6 [Tulsa, Oklahoma: StatSoft Inc., 2001]

III. Results

160 cases of intracranial tumors were seen. The male to female ratio (M: F) was approximately 1:1.5. The mean age of the patients was 40.10±16.163 (range 0.5 to 78) (TABLE1). Comparison of age shows it has a non-significant difference between various tumor types. Out of total 160 cases of intracranial tumor 86 cases were of meningioma (53.75%). 60 (69.77%) cases were in female so it is more common in female. Mean age is 42.46±15.913 yrs (range 0.5-67). The most common subtype is meningothelial (45=53.33%) followed by fibroblastic (18=20.94%) and transitional (11=6.875%). Most of the meningiomas (93.02%) are of grade 1 type. Most common site is frontoparietal (52.33%) followed by occipitoparietal (23.26%) followed by temporoparietal (10.47%) (TABLE 2). 30 cases were of astrocytomas (18.75%). 18 cases were of pilocytic astrocytoma (60%). 12 cases were of diffuse astrocytoma (40%). Mean age is 36.8±14.801 yrs (range 0.5 to 71). There is no sex predilection in this case. Mostly astrocytomas (13) were present in temporoparietal region (43.33%) followed by cerebellum (10=33.33%). 13 cases were of pituitary adenoma (8.125%). Mean age is 37.5±17.299 yrs (range 1-65yrs). 8 cases were in male (61.54%) so there is male preponderance. 11 cases were schwannoma (6.875%). Mean age is 40.18±17.526 yrs (range 19-78yrs). 8 cases were in female (73.73%). All cases were in cerebellopontine angle (100%). There is female preponderance among meningiomas and Schwannomas compared to other types. Overall proportion in females is 60% (95% CI 52.41% – 67.59%) (TABLE 3). 5 cases were of glioblastoma grade 4 (3.125%). 5 cases were of oligodendroglioma grade 2 (3.125%). 2 cases were of each metastatic carcinoma, ependymoma, cerebellar hemangioblastoma and tuberculoma (1.25%). 1 case of each central neurocytoma and craniopharyngioma (0.625%). In this study meningioma is the most common intracranial tumor followed by astrocytoma.

IV. Figures And Tables

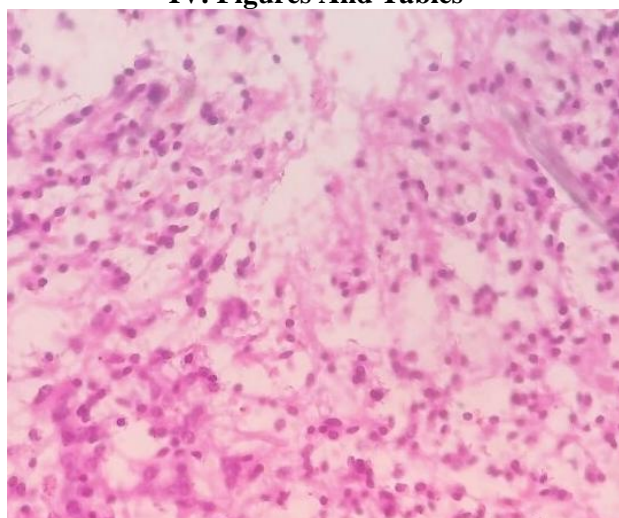


FIG 1 Photomicrograph showing moderately cellular tumor composed of uniform neoplastic fibrillary astrocytic cell(x100)

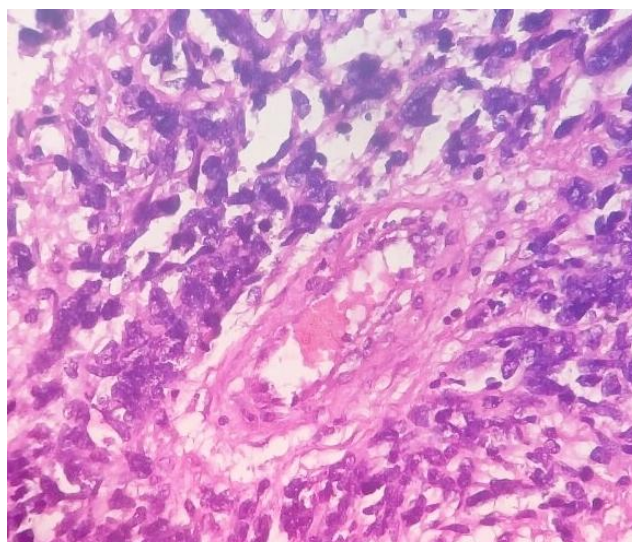


FIG 2 Photomicrograph showing pallisading tumor cells and hyalinized vessels(x400) in Glioblastoma

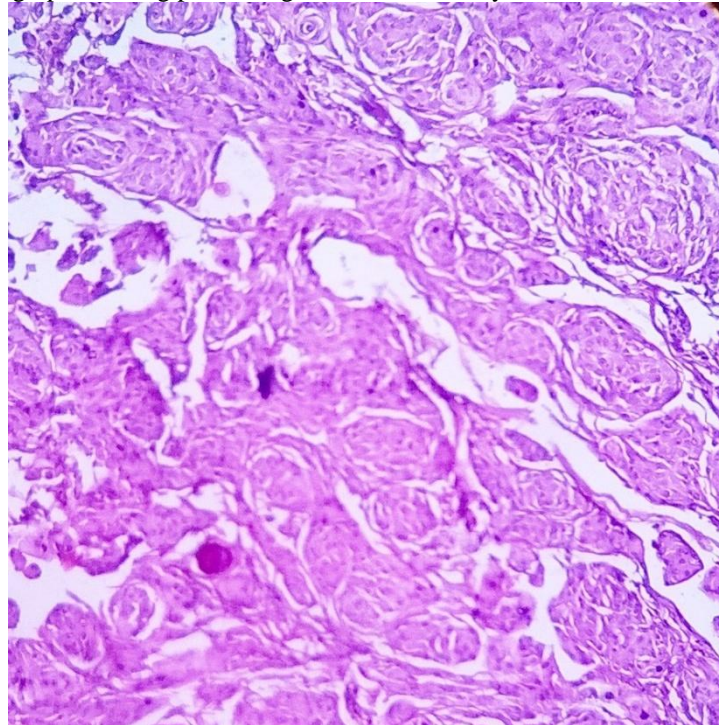


FIG 3 Photomicrograph showing whorling pattern in meningothelial meningioma grade I (x100)

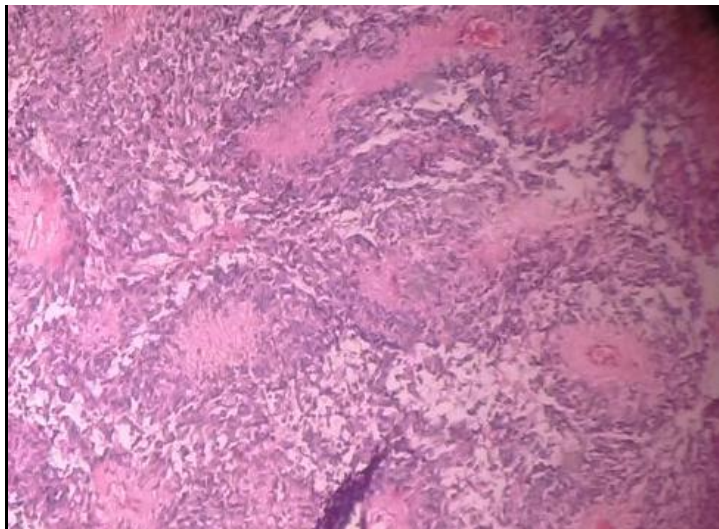


FIG 4 Photomicrograph showing ependymal rosette in ependymoma(100x)

Table: 1 Age profile and comparison between different tumor types.

Tumor Type	Mean age	Min Age	Max Age
Meningioma	42.46	0.50	67.00
Astrocytoma	36.58	0.50	71.00
Pitiutary Adenoma	37.54	1.00	65.00
Schwannoma	40.18	19.00	78.00
Others	36.85	8.00	62.00
All groups	40.10	0.50	78.00

Table: 2 Comparison of location between different tumor types.

Tumor Type	CP Angle %	Sphenoidal %	Spine %	Cerebellum %	Rathke's pouch %	Pituitary %	FP %	TP %	OP	Total
Meningioma	5 5.81	2 2.33	5 5.81	0 0.00	0 0.00	0 0.00	45 52.33	9 10.47	20 23.26	86
Astrocytoma	0	0	0	10	0	0	4	13	3	30

	0.00	0.00	0.00	33.33	0.00	0.00	13.33	43.33	10.00	
Pituitary Adenoma	0	0	0	0	0	13	0	0	0	13
	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	0.00	
Schwannoma	11	0	0	0	0	0	0	0	0	11
	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Others	0	0	2	3	1	0	6	8	0	20
	0.00	0.00	10.00	15.00	5.00	0.00	30.00	40.00	0.00	
Total	16	2	7	13	1	13	55	30	23	160

FP: Frontoparietal, TP: Temporoparietal, OP: Occipitoparietal

Table: 3 Comparison of gender between different tumor types.

Tumor Type	Sex (F)	Sex (M)	Total
Meningioma	60 (69.77%)	26 (30.23%)	86
Astrocytoma	15 (50.00%)	15 (50.00%)	30
Pituitary Adenoma	5 (38.46%)	8 (61.54%)	13
Schwannoma	8 (72.73%)	3 (27.27%)	11
Others	8 (40.00%)	12 (60.00%)	20

Chi-square *p* value 0.024

There is female preponderance among meningiomas and Schwannomas compared to other types
Overall proportion in females is 60% (95% CI 52.41%)

V. Discussion

A retrospective epidemiological review of brain tumors is particularly important for future research because it can demonstrate the changes in the tumor spectrum of a population, reveal possible risk factors, and indicating potential therapy methods. In this study male to female ratio was 1:1.5. with no significant gender difference. Other studies have also reported insignificant gender difference [3]. However in meningeal tumors females exceeded male patients, same seen in other studies[6]. Patients ages ranged from 0.5 year to 78 years with a mean age of 40 yrs. Most patients belonged to 5th to 7th decade, followed by 3rd to 5th decades of life, a similar age distribution is seen in other studies[7].

In our study meningeal tumors are the most common intracranial tumor (54%). However the distribution of tumor types in our study shows little difference with the other studies published worldwide. A single centre study in China revealed 36.5% for meningeal tumors[6]. whereas population based record from CBTRUS[8] showed 35.5% meningeal tumors Korean study (Lee CH et al)[9] showed meningeal tumor to be the most predominant type with 31.2% of all the tumors in the series. The reason for this variations remains a question and needs further investigations. This epidemiological variability may be indicative of environmental and racial factors. Meningiomas exhibit a wide range of histologic appearances [10]. Of the subtypes in the WHO classification, meningothelial, fibrous and transitional meningiomas are the most common. In our study we found meningothelial meningioma is the most common subtype (50%) followed by fibroblastic (20%) followed by transitional (13%). Out of total 86 cases of meningioma 80 cases (93.02%) were grade 1. Only 5 cases were of Grade 2 and only one case is of Grade 3 that is Papillary meningioma.

Tumors other than meningioma were 74 cases. Most patients belonged to 3rd to 4th decade followed by 5th to 6th decade. Patients age range from 0.5 year to 78 years with mean age of 38 yrs. The male to female ratio is 1:1 with no significant gender difference. Pilocytic Astrocytoma is most common (25%) followed by Pituitary Adenoma (17%) followed by diffuse Astrocytoma (16%). Pilocytic astrocytomas (grade I) and low-grade astrocytomas (grade II) are benign tumors that often form cysts or are enclosed in a cyst [11]. Astrocytomas arise from astrocytes, cells that play a role in nutrition and various cleanup functions within the central nervous system [12].

Pituitary adenoma constituted 8.125% of all tumours. This is less compared with similar studies done in Nigeria [13]. Vestibular schwannomas, formerly called acoustic neuromas, [1] are benign, slow-growing tumors that are intracranial or located on peripheral nerves. [14] They account for 10% of all intracranial tumors in adults and are most likely to occur in the third or fourth decade of life. In our study schwannomas account for 7% of all tumors. Oligodendrogliomas are primary brain tumors that arise from oligodendrocytes, the cells in the central nervous system that produce myelin. [11] Oligodendrogliomas are primarily found in the frontal lobes and are common in the third and fourth decades of life. In our study we found only 5 cases (3%) of oligodendroglioma.

Glioblastoma multiforme occurs most frequently in the fifth and sixth decades of life[11]. Glioblastoma multiforme is classified as a grade IV astrocytoma.[11] It is a rapidly growing, highly malignant tumor that is identified by the presence of dead tumor cells[11]. Men are affected more frequently than women[15]. In our study only 5 cases (3%) of Glioblastoma multiforme were present.

Metastatic brain tumors are intracranial tumors that originate from tissues outside of the brain[16]. and can occur as single or multiple tumors[1]. The most common source of metastatic brain tumors is lung cancer, with breast cancer being the second most common source[1]. The cancer cells spread to the brain through the cardiovascular system. In our study we found 2 cases of metastatic carcinoma. We also found 1 case of central neurocytoma, 2 cases of cerebellar hemangioblastoma, 1 case of craniopharyngioma, and 2 cases of ependymoma.

VI .Conclusion

Meningiomas are commonest tumours and comprise more than half of all operated CNS tumours in our setup, followed by Astrocytomas. Meningothelial Meningioma is the most common subtype. This study can help in observing CNS tumor trends and change pattern

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