ORIGINAL ARTICLE

Central Nervous System Tumours---- A Study of Frequency and Morphology

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ABSTRACT
Background: Owing to the confined space in the intra-cranial cavity,brain tumours even if benign can have life-threatening consequences. Malignant brain tumours can be widely invasive and infiltrative.
Objective: To study the incidence, frequency and morphological patterns of CNS tumours.
Method: A retrospective study of all cases of brain tumours received at Pathology Department PGMI was carried out from 1.1.2009 to 31.12.2010 .
Results: A total of 96 cases of CNS tumours were studied during a period of two years.The morphological distribution was as follows : meningioma 18 (18.8%), glioblastoma multiforme 8 (8.3%), anaplastic astrocytoma 16 (16.7%), astrocytoma 12 (12.5%), pilocytic astrocytoma 2 (2.1%), oligodendroglioma 6 (6.3%), ependymoma 4 (4.2%), mixed glioma 4 (4.2%), schwannoma 8 (8.3%), craniopharyngioma 6 (6.3%), pituitary adenoma 6 (6.3%),haemangioblastoma 2 (2.1%) and metastases 4 (4.2%).64 cases (66.7%) occurred in males and 32 cases (33.3%) in females.80 (83.3%) patients were adults while 16 (16.7%) were children.
Conclusion: CNS neoplasms are diverse in their morphology and grade.Histological examination of H&E stained sections enables diagnosis,classification and grading. In some cases, special stains and immunohistochemistry may be required. Correlation of histological examination with radiological findings (CT and MRI) and clinical data is essential.

Key words: central nervous system neoplasms.

INTRODUCTION
200,000 cases of brain tumours are diagnosed every year in the UnitedStates and 13,000 deaths are estimated to result therefrom.In 2005, brain tumours formed 1.4% of all cancers, 2.4% of all cancer deaths and 20-25% of cancers in children[1]. In our country , the exact figures are not known due to under-diagnosis and lack of data.

In adults, one half to three fourths are primary brain tumours, the remainder being metastatic. In children, however, brain neoplasms are the most common solid tumour. In adults, 70% tumours arise in the cerebral hemispheres, while in children the majority of CNS neoplasms arise in the posterior fossa[2]. Studies have found that for all age groups, survival is inversely proportional to age[3].

Location of CNS tumours can be the most important determinant of behaviour and outcome. A benign tumour in a critical location (e.g. craniopharyngioma) can have disastrous consequences[4].The majority of brain tumours arise de novo. Ionizing radiation, dietary factors, and occupational hazards have been postulated to play a role in some cases, but there is no conclusive evidence[5]. In about 5% of patients with CNS tumours , hereditary factors have been identified e.g. Neurofibromatosis 1 and 2,Von Hippel Lindau syndrome, Li Fraumenni syndrome and tuberous sclerosis. Imaging techniques like MRI are very useful since they outline characteristic features. The ultimate diagnosis is made by histological examination of neurosurgical material[2].

Brain tumours are morphologically diverse.The WHO Classification lists more than 100 varieties of CNS neoplasms.Clinical and radiological correlation helps to narrow down the differential diagnosis; histological diagnosis remains the gold standard[6] . Gliomas are the commonest primary brain tumours. Glioblastoma multiforme is the most frequent in adults and pilocytic astrocytoma is the commonest in children. A four tier grading system for astrocytoma has been devised by WHO and is utilized for other tumours as well.[7]

MATERIALS AND METHODS
A retrospective study of brain tumours received at the Department of Pathology, P G M I, Lahore was

carried out. Cases of CNS neoplasms received from 1.1.09 to 31.12.10 were studied.

Inclusion Criteria:

- Cases with complete and relevant clinical history
- Cases with appropriate radiological work up
- All age groups and both genders
- All kinds of CNS biopsies: open, burr hole and stereotactic

Exclusion Criteria:

- Cases with incomplete clinical history
- Cases without radiological findings
- Patients on chemotherapy and radiotherapy
- Non-neoplastic conditions

T his study comprised of 96 cases of CNS tumours. Histopathological evaluation was done by microscopic examination of H&E stained sect ions. The tumours were classified according to WHO classification. Clinical and radiological findings were retrieved from the case histories and correlated with the morphological findings.

RESULTS

Table 1: Morphological Distribution of CNS Neoplasms

Morphological Type	Number	Percentage
Meningioma	18	18.8%
Glioblastoma multiforme	8	8.3%
Anaplastic astrocytoma	16	16.7%
Astrocytoma	12	12.5%
Pilocytic astrocytoma	2	2.1%
Oligodendroglioma	6	6.3%
Ependymoma	4	4.2%
Mixed glioma	4	4.2%
Schwannoma	8	8.3%
Craniopharyngioma	6	6.3%
Pituitary adenoma	6	6.3%
Haemangioblastoma	2	2.1%
Metastases	4	4.2%
TOTAL	96	100.0%

Of the 96 cases in our study, 64(66.7 %) were male and 32(33.3%) were female. 80(83.3%) were older than 18 years of age and 16(16.7%) were 18 years and under.The morphological distribution was as follows: : meningioma 18 (18.8%), glioblastoma multiforme 8 (8.3%), anaplastic astrocytoma 16 (16.7%), astrocytoma 12 (12.5%), pilocytic astrocytoma 2 (2.1%), oligodendroglioma 6 (6.3%), ependymoma 4 (4.2%), mixed glioma 4 (4.2%), schwannoma 8 (8.3%), craniopharyngioma 6 (6.3%), pituitary adenoma 6 (6.3%),haemangioblastoma 2 (2.1%) and metastases 4 (4.2%).

Table 2: Incidence In Children & Adults

Morphological Type	Children	Adults
Meningioma	0	18 (100%)
Glioblastoma multiforme	0	8 (100%)
Anaplastic astrocytoma	2(12.5%)	14 (87.5%)
Astrocytoma	2(16.7%)	10 (83.3%)
Pilocytic astrocytoma	2(100 %)	0
Oligodendroglioma	6(100 %)	0
Ependymoma	2(50 %)	2 (50 %)
Mixed glioma	0	4(100%)
Schwannoma	0	8 (100%)
Craniopharyngioma	2(33.3%)	4 (66.7%)
Pituitary adenoma	0	6 (100%)
Haemangioblastoma	0	2 (100%)
Metastases	0	4 (100%)
TOTAL	16(16.7%)	80 (83.3%)

Table 3: Incidence In Males & Females

Morphological Type	Males	Females	M:F
Meningioma	4	14	1:3.9
Glioblastoma multiforme	6	2	1:0.3
Anaplastic astrocytoma	10	6	1:0.6
Astrocytoma	8	4	1:0.5
Pilocytic astrocytoma	2	0	2:0
Oligodendroglioma	4	2	1:0.5
Ependymoma	4	0	4:0
Mixed glioma	2	2	1:1
Schwannoma	8	0	8:0
Craniopharyngioma	6	0	6:0
Pituitary adenoma	4	2	1:0.5
Haemangioblastoma	4	0	4:0
Metastases	4	0	4:0
TOTAL	64	32	1:0.5

DISCUSSION

Taken as a whole the gliomas emerged as the most common tumours in our study with 52 gliomas forming 54.2% % of the total This is in accordance with the data of Ahmed et al.[8]

In our study the commonest glioma was anaplastic astrocytoma WHO grade3/4. This was at variance with the studies of Stevens[2] and Oligaki[3] who found gliobastoma multiforme WHO grade 4/4 to be more common.

The 6 cases of pilocytic astrocytoma WHO grade 1/4 included in our study occurred entirely in children. This was in agreement with the study of Rehman et al[9] who also found this tumour exclusively in the paediatric age group.

The frequency of meningioma in our study was 18.8% (18cases).The incidence of meningioma reported in the literature is 15-20%.[10] All these cases were WHO grade 2/4 . No atypical or anaplastic meningiomas were found.

Schwannoma formed 8.3% of our cases.This is almost the same as the reported incidence of 8% [11].

As far as gender is concerned, we found that the commonest tumour in females was meningioma , the M:F ratio being approximately 1:4 (actual 1:3.9). The reported M:F ratio varies from 2:3 for intra-cranial and 1:9 for spinal meningioma.[6] For all other brain tumours the incidence was higher in males than in females.

CONCLUSION

CNS neoplasms are diverse in their morphology and grade.Histological examination of an H&E stained section presents a good opportunity of diagnosis, classification and grading.In some cases , special stains and immunohistochemistry may be required. Correlation of histological examination with radiological findings (especially CT and MRI) and clinical data is essential.

REFERENCES

1. Wikipedia, the free encyclopedia:Brain tumour[on-line]. Available fromURL:http://en.wikipedia.org/wiki/Brain_tumour[cited2011,April 25].
2. Stevens G H J 2010. Brain Tumours:Meningiomas and Gliomas.Available fromURL:http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/haematology-onco.... [cited2011,April25].
3. Oligaki H, Kleihues P 2005. Population-based studies on incidence, survival rates, and genetic alterations in astrocytic and oligodendroglial gliomas. J Neuropathol Exp Neurol;64(6):479-89.
4. Frosch M P, Anthony D C, Girolami U D. The Central Nervous System. In: Kumar V, Abbas A K, Fausto N, Aster J C, editors 2009.Robbins and Cotran Pathologic Basis of Disease. 8th Ed.NewDelhi:Elsevier;1281-1344.
5. Gurney G G, Smith M A, Bunin G R. CNS and Miscellaneous Intracranial and Intraspinal Neoplasms. SEER Paediatric Monograph, National Cancer Institute. Available fromURL:http://seer.cancer.gov/publications/childhood/cns.pdf.
6. Patil S, Perry A.Central Nervous System: Brain, Spinal cord, and Meninges. In: The Washington Manual of Surgical Pathology. 1st Ed.NewDelhi:WoltersKluwer;508-540.
7. Meir E G V, Hadjipanayis C G, Norden A D, Shu H K, Wen P Y, Olsen J J 2010. Exciting New Advances In Neuro-Oncology:The Avenue to a Cure for Malignant Glioma.C A Cancer J Clin;60(3):166-193.
8. Ahmed Z, Muzaffar S, Kayani N, Pervez S, Husainy S, Hasan H 2001. Histological Pattern of Central Nervous System Neoplasms.JPMA ;1: 54.
9. Rehman A U, Lodhi S, Murad S 2009.Morphological Pattern of Posterior Cranial Fossa Tumours. Ann KEMU;15(2):57-59.
10. Ali N, Ikram M, Khan T S, Enam S A, Jangda A Q, Karsan F 2011. Extracranial Meningioma: an Unusual Presentation of a Mass Over Inner Canthus of Left Eye. J Col Phys Surg Pak;21(5):309-310.
11. Awan M S, Qureshi H U, Sheikh A A, Ali M M 2001. Vestibular Schwannomas:Clinical Presentation, Management and Outcome.JPMA;51:63.