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Histopathological spectrum of meningioma and its variants

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ABSTRACT

Background: Meningiomas are tumors that arise from the lepto meningeal covering of brain and spinal cord, accounting for upto 34% of all CNS tumors. Mostly meningiomas are slow growing and are generally considered benign tumors. Meningiomas usually clinically evident in middle aged. Histopathological examination and grading of meningiomas give valuable prognostic information. Known risk factors for recurrence include histological malignancy grade, sub total resection, young age, specific sub types, brain infiltration and high proliferative rate. **Aim**: To study histopathological spectrum of meningiomas and its variants. **Materials and methods:** It is a Prospective study of 19 cases with **meningiomas** have been studied for a period of 1 year . **Results** :.Most common age group between 40-60-yrs .Male:Female -1:4. Out of 121 CNS lesions during the study period 19 cases were reported as Meningiomas which accounts for 17% of CNS lesions. Out of 19 cases, majority were benign 89.6% , Atypical 5.2% and Anaplastic 5.2% of meningiomas.Atypical meningiomas comprise between 4.7% and 7.2% of meningiomas,although using more current definition it has been reported in up to 20%. **Conclusion:** Continuous revision of histopathological classification systems is required to improve the diagnostic accuracy.

Keywords: Meningioma, CNS(Central nervous system), Grading

Introduction

Meningioma comprises about one fourth of all primary tumors of the central nervous system (CNS). It is the most common primary intracranial neoplasm and the most diversified in histologic patterns among all primary tumors of the CNS. Meningiomas, as defined by the World Health Organization (WHO), are "meningothelial (arachnoid) cell neoplasms, typically attached to the inner surface of the dura mater," and these tumors fall into WHO grades I, II, and III. In clinical practice, however, the diagnosis is based on light microscopy of routinely stained Haematoxylin & Eosin sections with criteria given by World Health Organization (WHO)[1]. This classification scheme provides guidelines for tumour grading and subtypes. Meningiomas (benign) are recognised by their histologic subtype and lack of anaplastic features. Grade II meningiomas (atypical) are defined by one or more of the following four criteria: 1) chordoid or clear cell histologic subtype, 2) four to 19 mitoses per ten high-power field (HPFs), 3) brain infiltration, and 4) three or more of the following five histologic features: small cell change, increased cellularity, prominent nucleoli, sheet-like growth, or necrosis. Grade III meningiomas (anaplastic/malignant) are defined by rhabdoid or papillary subtypes, a histological picture of frank malignancy resembling that of carcinomas, melanomas, or high grade sarcomas, or 20 or more mitosis per ten HPFs[2].The histologic patterns and biologic spectrum of meningiomas partially reflect the aforementioned biologic functions and embryogenesis. Both non-neoplastic meningothelial cells and meningiomas possess mixed features of epithelial and

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mesenchymal cells. In meningiomas, one feature may be dominant over the other, and this phenomenon partly contributes to the rich diversification of histologic patterns in these tumorshe only change between the WHO 2007 and 2000 edition is that brain-infiltrative and otherwise benign meningiomas are classified as grade II [4]. Our aim of study is the incidence of Menigiomas and various Histomorphological variants in meningiomas .

Results

Materials and methods

It is a Prospective study for a duration of 1 year from August 2013 - July2014. Specimens received in department of Pathology,MIMS are immediately fixed in 10%buffered formalin. Specimens less than 2 cm are all embedded. All the specimens are subjected to routine processing.

Table 1: Age Distribution

Age group (yrs)	NO. OF CASES	%
1 - 10	--	--
11-20		
21-30	1	5.2
31-40	3	15.7
41-50	6	31.5
51-60	5	26.3
61-70	2	10.5
71-80	2	10.5
Total	19	99.9

Table 2: Sex Distribution

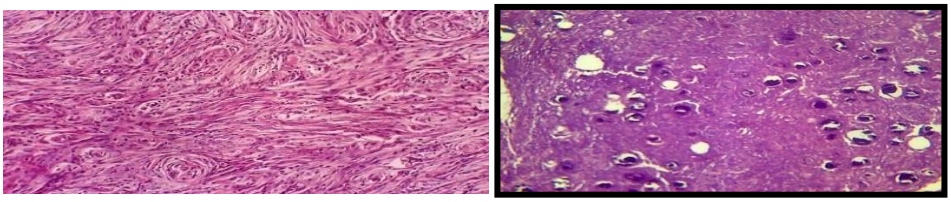
Sex	No.Of Cases	Percentage
Male	06	31.5%
Female	13	68.4%
Total	19	99.9%

Table 3:Histomorphological Patterns of Meningiomas

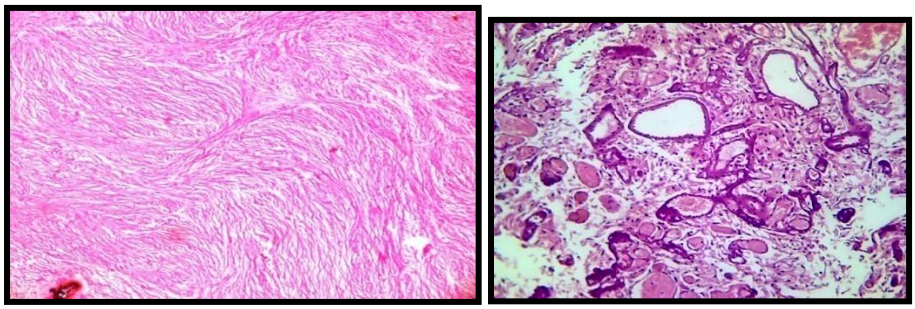
Variants	No.Of Cases	Percentage
Meningotheliomatous meninigioma	08	42.1%
Psamomatous meninigioma	05	26.3 %
Transitional meninigioma	02	10.5%
Angiobastic meninigioma	01	5.2%
Fibroblastic meninigioma	01	5.2%
Atypical meninigioma[Grade II]	01	5.2 %
Papillary meningioma[Grade III]	01	5.2 %
Total	19	100%

Meningotheliomatous meninigioma has highest incidence of 42.1%

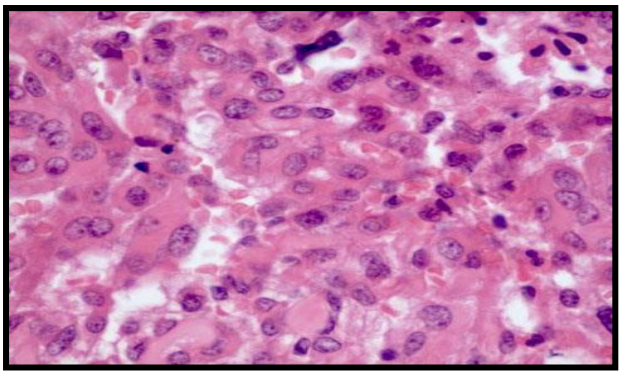
Histopathology slides in study



A)Meningotheliomatous Meningioma **B) Psammomatous Meningioma**



C)Fibroblastic Meningioma **D) Angiomatous Meningioma**



E)Atypical Meningioma

Figure: A) This variant shows arrangement of tumor cells in lobular nests, separated by collageneous septa. These cells are generally polygonal in shape with eosinophilic cytoplasm, nucleus is oval and is centrally placed. Prominent nucleoli. B)) This variant shows "abundant Psammoma bodies".C) This variant shows proliferation of spindled meningothelial cells arranged in interlacing bundles. The nuclei tend to be narrow and rod-shaped.D) This variant shows numerous small or large vascular channels predominate over its meningothelial elements. E)This variant shows Increased cellularity ,mitotic figures N:C ratio, prominent nucleoli

Discussion

In the present study 19 cases of meningiomas have been studied and classified according to the latest WHO classification of 2007,with the aim to study the incidence of menigiomas and various histomorphological variants in meningiomas. Most common age group between 40-60-yrsMedian age at surgery did not diverge between different WHO tumour grades in accordance with the literature [5,6].

We also confirmed the higher frequency of benign meningiomas in females compared to males, which may be explained by a progesterone-dependent tumour growth [7,8]. In addition, we recognized two peaks in the age-grouped distribution among female patients resembling a phenomenon named Clemmesen's hook. [9,10]Male:Female -1:4 with the higher frequency of benign meningiomas in females compared to males, which may be explained by a progesterone-dependent tumour growth [11].

Table 4: Comparative evaluation of Grade I Histological variants of the present study with other study

Authors	Total cases	Transitional	Fibroblastic	Meningothelial	Pssamomatous	Age of presentation
FF Cruz Sanchz *et al*[12]	41	3	8	**19**	0	40-60yrs
Present Study	19	**2**	03	08	05	40-60yrs

Out of total 19 cases, majority were benign(89.6%) meningiomas, 5.2% atypical and 5.2% papillary meningioma **.** Increased fibrosis or widespread collagen formation are commonly seen in meningiomas regardless of tumour grade, and this is probably linked to the meningothelial cells' proposed functions [13]. Psammoma bodies have been found as a protective factor for recurrence [14]. Similarly, we found a trend for psammoma bodies to occur more frequently in benign tumours and without relation to other atypical features. The presence of lymphocytes, plasma cells, and macrophages in the meningioma tissue may reflect various immune responses against the tumour[12]. In addition, the meningothelial cap cells may also exhibit monocyte-like functions

Table 5: Comparative Studies

Variants	Thomas Baker *et al* [15]	Present study
Grade I, Benign	69.9% (135)	89.6%(17)
Grade II, Atypical	29.1% (59)	5.2% (10)
Grade III, Anaplastic	1% (2)	5.2% (1)
Total no of cases	196	19

In 2007 WHO classification all brain infiltrative specimens are classified as grade II(Atypical).In the present study, cases with brain invasion were not reported. Whereas Thomas Backer *et al*[15] reported 30% of the meningiomas as atypical.

Conclusion

Meningiomas are extremely common intracranial brain tumors originating from meningeal coverings of the brain and spinal cord. The histological appearance of meningioma is associated with the tumour's behaviour , which in turn affects prognosis. Since the behaviour of a tumour also determines the management ,grading also provides a guide for the management of the varying subtypes.Out of 121 CNS lesions during the study period 19 cases were reported as Meningiomas which accounts for 17% of CNS lesions. Out of 19 cases, majority were benign 89.6% , Atypical 5.2% and Anaplastic 5.2% of meningiomas. Atypical meningiomas comprise between 4.7% and 7.2% of meningiomas,although using more current definition it has been reported in up to 20%.

References

1. Perry A, Louis DN, Scheithauer BW, Budka H and von Deimling A. The 2007 WHO classification of tumours of the central nervous system. In: Louis DN, Ohgaki H, Wiestler OD,

Cavenee WK, Burger PC, Jouvet A, Scheithauer BW, Kleihues P, editors. Acta Neuropathol 2007: 97 -109.

2. Claus EB, Bondy ML, Schildkraut JM, Wiemels JL, Wrensch M and Black PM. Epidemiology of intracranial meningioma. Neurosurgery 2005; 57: 1088-1095
3. Perry A, Brat, Daniel J. Meningiomas. In: Arie Perry DJB, editors. Practical Surgical Neuropathology: A Diagnostic Approch. Churchill Livingstone; 2010.
4. Rogers L, Gilbert M and Vogelbaum MA. Intracranial meningiomas of atypical (WHO grade II) histology. J Neurooncol 2010; 99: 393-405.
5. Willis J, Smith C, Ironside JW, Erridge S, Whittle IR and Everington D. The accuracy of meningioma grading: a 10-year retrospective audit. Neuropathol Appl Neurobiol 2005; 31: 141- 149.
6. Perry A, Scheithauer BW, Stafford SL, Lohse CM and Wollan PC. "Malignancy" in meningiomas: a clinicopathologic study of 116 patients, with grading implications. Cancer 1999; 85: 2046- 2056.
7. Wolfsberger S, Doostkam S, Boecher-Schwarz HG, Roessler K, van Trotsenburg M, Hainfellner JA and Knosp E. Progesterone-receptor index in meningiomas: correlation with clinicopathological parameters and review of the literature. Neurosurg Rev 2004; 27: 238-245.
8. Kane AJ, Sughrue ME, Rutkowski MJ, Shangari G, Fang S, McDermott MW, Berger MS and Parsa AT. Anatomic Location Is a Risk Factor for Atypical and Malignant Meningiomas. Cancer 2011; 117: 1272-1278.
9. Anderson WF, Pfeiffer RM, Dores GM and Sherman ME. Comparison of age distribution patterns for different histopathologic types of breast carcinoma. Cancer epidemiol Biomarkers Prev 2006; 15: 1899-1905.
10. Clemmesen J. Carcinoma of the breast; results from statistical research. The British journal of radiology 1948; 21: 583-590.
11. Perry A, Stafford SL, Scheithauer BW, Suman VJ and Lohse CM. Meningioma grading: an analysis of histologic parameters. Am J Surg Pathol 1997; 21: 1455-1465.
12. Rossi ML, Cruz Sanchez F, Hughes JT, Esiri MM and Coakham HB. Immunocytochemical study of the cellular immune response in meningiomas. Journal of clinical pathology 1988; 41: 314-319.
13. Perry A. Meningiomas. In: McLendon RE, Rosenblum MK, Bigner DD, editors. Russell & Rubinstein's Pathology of Tumors of the Nervous System. Seventh. Oxford University Press Inc; 2006. pp. 427–474.
14. Ruiz J, Martinez A, Hernandez S, Zimman H, Ferrer M, Fernandez C, Saez M, Lopez-Asenjo JA, Sanz-Ortega J. Clinicopathological variables, immunophenotype, chromosome 1p36 loss and tumour recurrence of 247 meningiomas grade I and II. Histol Histopathol. 2010;25:341–349.
15. Thomas Backer-GrøndahlThe histopathological spectrum of human meningiomas, Int J Clin Exp Pathol 2012;5(3):231-242

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