ORIGINAL RESEARCH PAPER

Volume-7 | Issue-7 | July-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

HISTOPATHOLOGICAL ANALYSIS OF MENINGIOMA AND ITS VARIANTS – A STUDY OF 50 CASES.

Pathology

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ABSTRACT

Background: The study was done to know the various histopathological variants of Meningiomas, the age incidence and sex ratio.

Materials and Methods: A retrospective and prospective analysis of all the samples sent for histopathology for a period of two years during June 2013 –May 2015 was done to diagnose meningioma and its variants. Cases were analyzed in detail about the complete clinical history,exact location ,clinical and radiological diagnosis.Majority of the cases were clinically and radiologically diagnosed as Meningioma.

Results: Out of 50 cases which were diagnosed as meningiomas , 21 were meningothelial variant, 15 were psammomatous, 8 were fibroblastic,4 were transitional and 1 case each of anaplastic and atypical variant. Commonest age group was between 41-50 years. Youngest age group was 16 years and oldest was 70. Male to female ratio was 1: 1.5.

Conclusion : Majority of the meningiomas has been observed between 41 – 50 years. Their proper recognition is therefore important to allow appropriate,treatment. Histopathological study plays a major role by which we can diagnose the lesion .Meningiomas typically develop in middle aged persons and occur more frequently in women than in men.These lesions may also occur in children.

KEYWORDS

Meningioma, Psammomatous, Fibroblastic, Meningothelial.

Introduction:

Meningiomas are the most common primary non-glial intracranial brain tumours and comprise 13-19% of all primary intracranial neoplasms.[1] Meningiomas are usually benign and arise from arachnoidal cells. In the recent WHO classification, meningiomas are regarded as a heterogeneous group of tumours and are histologically categorized into 14 distinct subgroups with three grades of malignancy.[2] Mostly they are nonmalignant or low grade tumors but some of them can be malignant. Mostly Meningiomas grow slowly some may grow more rapidly or have sudden growth spurts. They are graded from low to high. The lower the grade, the lower the risk of recurrence and aggressive growth.

Materials & Methods:

A retrospective and prospective study was done during a perod of 2 years .Biopsy samples were received from the Patients who underwent excision of brain tumours (clinicoradiologically diagnosed as Meningiomas) in the department of Neurosurgery. We received small bits of the tumour or sometimes a single soft tissue mass which are all embedded or partly embedded. Sections were taken and diagnosed as Meningioma microscopically.

Results:

Out of the total 50 cases we diagnosed as Meningiomas, meningothelial variant constituted highest number of cases followed by psammamotous and fibroblastic.Anaplastic and atypical variants were least common constituting one case each. Age group between 41-50 contributed highest number of cases.Youngest age group was 16 years and oldest was 70 in our study.Male to female ratio was 1:1.5.

Discussion:

Meningiomas account for approximately 24% of primary CNS tumours. Meningimas are usually slow growing lesions that present either with vague nonlocalizing symptoms or with focal findings referable to compression of underlying brain.Common sites of involvement are the parasaggital aspect of the brain convexity,dura over the lateral convexity,wing of the sphenoid,olfactory groove,sella turcica and foramen magnum.They are uncommon in children and show a moderate (3:2) female predominance,although the ratio becomes 10:1 among patients with spinal meningiomas.

Lesions are usually solitary ,and their presence at multiple sites,especially in association with acoustic neuromas or glial tumours,suggest a diagnosis of neurofibromatosis type2. These tumours often express progesterone receptors,and rapid growth during pregnancy has been reported.While WHO grade is a strong predictor of clinical course, proliferation index as assessed by MIB – 1 labeling is an independent factor among grade ¼ meningiomas.

The most common cytogenetic abnormality is loss of chromosome 22,especially the long arm (22q).The deletions include the region of 22q12 that harbors the NF2 gene .Indeed 50% to 60% of meningiomas not associated with neurofibromatosis type 2 have mutations in the NF2 gene;the majority of these mutations are predicted to result in absence of functional protein.These genetic abnormalities are more common in meningiomas with fibroblastic or transitional histologic appearance[3].

Meningiomas have been recognized as a tumour entity for nearly 200 years.[4] They are usually considered as benign. Jaaskelainen et al[5] and later Rohringer et al [6] attempted to classify these tumours by using a numerical grading system. Their grading criteria, however, were not elucidated completely and thus remained only subjective. Secondly, this could not be applied on a prospective manner. The recent WHO classification provides a broad criteria for differentiating benign and atypical meningioma. Skullerud et al [7] regarded high cellularity as one of the indicators of recurrence of these tumours. Jellinger et al [8] felt high cellularity and increased mitotic index might account for recurrence. Necrosis,[9] mitotic Figures and focal necrosis has been regarded as indicators of recurrence. Numbers of macrophages and T and CD8 lymphocytes in meningiomas have been related to atypical histology. The grading system proposed by Mahmood et al appears to be the most appropriate one and these criteria include increase in mitotic rate, high cellularity, sheeting of tumour cells with loss of typical histological pattern, prominent nucleoli, focal necrosis, tumour invasion into cortex or bone.

Radiographically ,meningiomas are typically isointense or hyperintense to the cerebral cortex in MR images and show homogeneous contrast enhancement in both CT and MR images [Figure 1]. An extension of contrast enhancing tissue along the dura (dure tail) is a useful diagnostic finding.

Meningothelial meningiomas are composed of solid lobules of meningothelial cells with ill defined membranes. The tumour cells closely resemble the cells covering the arachnoid villi – the so called arachnoid cap cells[Figure 2]. In fibroblastic type spindle shaped cells somewhat reminiscent of fibroblasts predominate, parallel and interlacing bundles of these cells with abundant intercellular collagen and reticulin are distinctive features [Figure 3].

Transitional meningiomas have features of both the meningothelial and fibroblastic type [Figure 4]. Psammamatous type include plenty of psammoma bodies[Figure 5]. The most recent WHO classification defines atypical meningioma as a lesion with increased mitotic activity or with increased cellularity ,increased N:C ratio, prominent nucleoli, uninterrupted or patternless or sheet like growth ,and foci of geographic necrosis. Anaplastic meningiomas express features of frank malignancy.

Both the progesterone and the glucocorticoid receptors in meningiomas are functional and support the concept that progestins

and glucocorticoids may play an important role in the growth of meningiomas. Nearly all meningiomas have progesterone receprtors and the absence of progesterone receptors may be a poor prognostic indicator.

The immunohistochemical profile of meningiomas includes positive staining with antibodies to Vimentin ,desmoplakin and epithelial membrane antigen.About 28% of meningiomas stain positively with antibodies to S-100 protien, and 12-32% express cytokeratin. Rarely those tumours can also express GFAP.

Surgical excision is the treatment of choice. They may recur even after a complete excision of the tumour. Presumably ,tiny residual or satellite foci of tumour account for these recurrences. The major clinical factor in recurrence is the extent of resection.

Table 1: showing variants of Meningiomas

Meningioma variant	No.of cases
Meningothelial	21
Psammamotous	15
Fibroblastic	8
Transitional	4
Anaplastic	1
Atypical	1
Total	50

Table 2: showing age incidence

Age group in years	Male	Female	Total
1-10	Males	Females	Total
11-20	01	03	04
21-30	02	03	05
31-40	03	05	08
41-50	07	11	18
51-60	03	07	10
61-70	01	04	05
Total	17	33	50

Table 3: showing various locations of meningioma.

Location	No.of cases
Parasagital	19
Spheoid	16
Parietal	05
Frontal	02
Suprasellar	04
CP angle	04
Total	50

Figure legends :

Figure 1: Radiological pictures showing isointense or hyperintense areas in the cerebral cortex

Figure 2: Gross showing tumour tissue (Fig a).Section showing tumour tissue with neoplastic cells having meningothelial appearance with round to oval nuclei,dispersed chromatin,inconspicuous nucleloli and eosinophilic cytoplasm (Fig b,H&E, x40) – Meningothelail variant.

Figure 3: Gross showing tumour tissue (Fig a).Section showing tumour tissue with elongated spindle cells resembling fibroblasts and form intersecting fascicles in a collagen rich and reticulin rich matrix (Fig b,H&E x10) – Fibroblastic variant.

Figure 4: Section showing tumour tissue arranged in syncitial pattern with tumour cells that have indistinct cell borders with moderate amount of cytoplasm (H&E,x10,x40) – Transitional variant.

Figure 5: Section showing tumour tissue arranged diffusely with tumour cells having Uniform round to oval bland nuclei, indistinct cell margins and whirling pattern..Psammomatous calcifications and intranuclear pseudoinclusions are common (H&E,x10,x40) – Psammomatous variant.

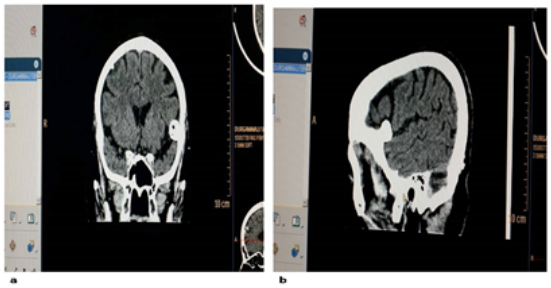

Figure 1

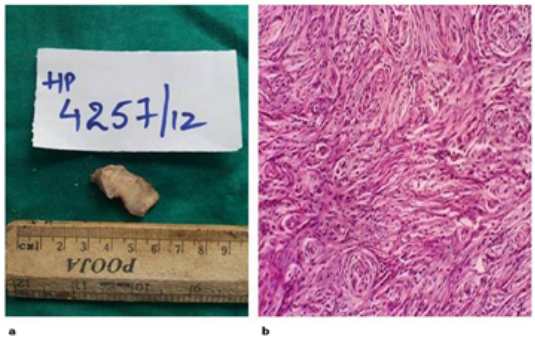

Figure 2

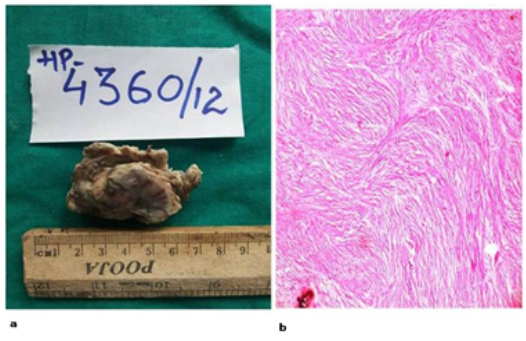

Figure 3

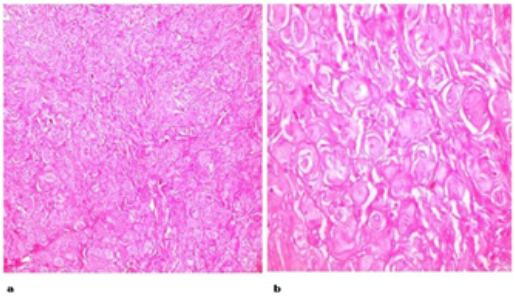

Figure 4

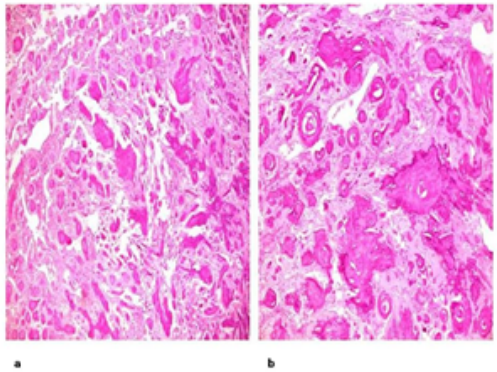

Figure 5

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