SAS Journal of Surgery ISSN 2454-5104
SAS J. Surg., Volume-3; Issue-1 (Jan, 2017); p-25-29
Available online at http://sassociety.com/sasjs/

Original Research Article

Histopathological analysis of meningiomas- A retrospective study

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Abstract: Meningioma, so named by Harvey Cushing in 1922, is a group of heterogeneous tumors that arise from meningothelial cells. Meningiomas are predominantly benign tumors usually attached to the duramater that arise from the meningothelial cells of the arachnoids. Meningioma may be found along any of the external surface of the brain as well as within the ventricular system, where they arise from the stromal arachnoid cells of the choroid plexus. The objective is to evaluate the incidence of various histopathological variants of meningioma its, frequency in various parts of the brain, and its age and sex distribution. This is a retrospective study of 38 cases conducted in Yashoda Hospital, Malakpet for the period of 2 years from August 2013 to July 2015. A total of 38 cases of meningioma were studied. Most common variant is meningothelial meningioma, 16 cases (42%), grade I consisting of 36 (94.7%) cases and the most common site is intracranial. Female predominance is seen in meningioma.
Keywords: Brain Tumors, Diagnosis, Grading, Classification.

INTRODUCTION

Meningiomas account for approximately 13–19% of all primary intracranial tumors and their prognosis is generally favorable. The incidence increases with increasing age, peak during 6th and 7th decades of life; these tumors are very rare in children. The incidence in women is approximately twice that in men**.** The vast majority of meningiomas are considered histologically benign (90%). Meningiomas may produce seizures, headache, confusion drowsiness, vomiting due to their effects on underlying cerebral cortex. However, meningiomas may also remain asymptomatic and be identified as an incidental finding on imaging.1

WHO [2007] GRADING OF MENINGIOMA

Grade I: Based on histologic sub type and lack of anaplastic features.

Grade II: Defined by one or more of the following 4 criteria.

- Chordoid or clear cell histologic sub type
- 4 to 19 mitoses/10HPFs
- Brain infiltration

Three or more of the following five histologic features

- Small cell change
- Increased cellularity
- Prominent nucleoli
- Sheet like growth
- Necrosis

Grade III: 20 or more mitosis/10HPFs

Table-1: WHO Grades and Histomorphological Variants

Benign (Grade I) -90%	Meningothelial , Fibrous, Transitional, Psammomatous, Angioblastic
Atypical (Grade II)- 7% includes brain invasion.	Chordoid, clear cell, atypical
Anaplastic / Malignant (Grade III)-2%	Papillary , Rhabdoid , anaplastic
GRADE	RECURRENCE
GRADE I	7-25%
GRADE II	29-52%
GRADE III	50-94%

WHO GRADES AND HISTOMORPHOLOGICAL VARIANTS

Meningotheliomatous Meningioma: Most common variant of meningioma. Syncytial and epithelial cells, indistinct cell borders and classic whorls, May have sparse Psammoma bodies

Transitional meningioma: Coexistence of

meningothelial and fibrous pattern, associated with psammoma bodies.

Psammomatous meningioma: Found in spinal region. Numerous psammoma bodies (more than 50%)

Fibroblastic meningioma: Shows proliferation of spindled meningothelial cells arranged in interlacing bundles, nuclear features are characterstic, Psammoma bodies infrequent.

Angiomatous Meningioma: Accounts for 2% of all meningiomas. Vascular component should exceed 50% of total tumor area. meningothelial cells are wrapped around small blood vessels also has large vessels. Do not recur if entirely resected.

Atypical Meningioma: Increased cellularity, mitotic activity, high N:C ratio, prominent nucleoli .

Papillary Meningiomas: Are rare meningeal tumors

Presence of perivascular psuedopapillary pattern, associated with aggressive clinical behavior.

The number of grade II meningiomas increased when using the WHO 2007 classification (30%) compared with previous editions, mainly due to the definition of brain infiltrating meningiomas as atypical (grade II). 1

AIMS & OBJECTIVES

- To study the incidence of Menigiomas.
- To study various Histomorphological variants in meningiomas.

MATERIALS & METHODS

This is a retospective study of 38 cases of meningioma, conducted in department of pathology, Yashoda Hospital, malakpet, for the period of 2 years from August 2013 to July 2015.

Specimens received in department of Pathology, Yashoda Hospital, Malakpet are immediately fixed in 10%buffered formalin. Specimens less than 2 cm are all embedded. All the specimens are subjected to routine processing.

RESULTS

The most common affected age group was 41-50 years -12 cases (31.6%) (Table 1).

Females 30cases (79%) were most commonly affected compared to males (Table 2).

The most common location was intracranial 32 cases (84%) with para sagittal being commonly involved in 12 cases (31.6%) (Table 3).

The most common histological type was meningothelial 16 cases (42%) (Table 4).

Among the benign meningiomas relatively very rare variant is angiomatous 2 cases (5.3%) grade I meningiomas were 36 cases (94.7%) . Grade II Meningiomas Were 2 Cases (5.3%).

Table-2: Age Distribution

Age group (years)	No. Of Cases	%
1-10 years	-	-
11-20 years	-	-
21-30 years	2	5.3
31-40years	6	15.8
41-50years	12	31.6
51-60years	10	26.4
61-70years	4	10.5
71-80years	4	10.5
Total	38	100

Table-2: Gender distribution

Gender	No.of cases	%
Females	30	79
Males	8	21

Table-3: Location of meningioma

No. Of. Cases	Location	%
12	Para sagital	31.6
8	Sphenoid	21
6	Spinal	15.8
4	Frontal	10.5
4	Supra sellar	10.5
2	CP Angle	5.3
2	Parietal	5.3
Total = 38		100

Table-4: Histomorphological Patterns of Meningioma

S. No	Variants	No. Of Cases	Percentage
1	Meningothelial	16	42
2	Psammomatous	10	26.4
3	Transitional	4	10.5
4	Angioblastic	2	5.3
5	Fibroblastic	4	10.5
6	Atypical (Grade II)	2	5.3
7	Papillary(Grade III)	-	-
	Total	38	100

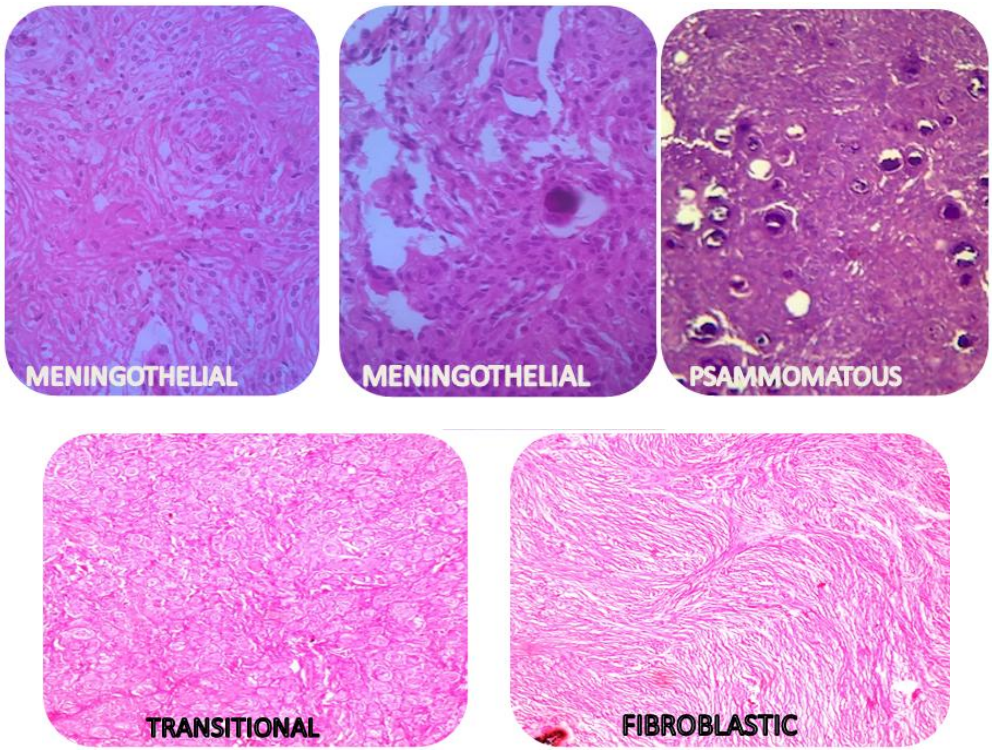

Fig-1: Histomorphological Patterns of Meningioma

DISCUSSION

Meningiomas account for 25 - 30% of all CNS tumours and are the most common tumours arising from the meninges [1-3]. Most benign meningiomas occur in adult women, but atypical and anaplastic forms seem to be more common in men and the younger age group. Childhood meningiomas are less common [4, 5].

Most meningiomas are intracranial.190% is supratentorial; the anterior cranial fossa is involved far more frequently than the posterior. Most of the intracranial tumors occur in the convexities. Intraspinal Meningiomas constitute 25-46% of all tumors occurring in the spinal cord and are more common in the thoracic region [6, 7].

Extracranial location is rare. Histologically meningiomas are of three grades.

Grade I meningiomas comprise 90%, Grade II Atypical meningiomas comprise between 4.7% to 7.2% of meningiomas, whereas Grade III malignant meningiomas comprise between 1.0% to 2.8% [1-3]. Majority are positive for EMA and 100% for Vimentin. High grade types may be negative or weakly reactive for both [1]. Irrespective of the sex of the patient progesterone receptors are expressed by many and lack of its expression is associated with poor outcome [1-3].

Recurrence is not limited to meningiomas with malignant histological features. Benign meningiomas can also recur following incomplete resection, if large and associated with monosomy14 and del (1p36)[8]. The extent of surgical resection depends on the site, size of the tumor and its relation to vital structures. Higher rates of recurrence are seen in younger age, male sex, parasagittal location and an aggressive histologic type. Reported recurrence rates of grade I, II, and III meningiomas are 7- 25%, 29-52%, 50-94%, respectively [9, 10].

The treatment in grade I tumors is total resection [3, 9]. Surgery and adjuvant radiotherapy are the treatment of choice in grade II and grade III meningiomas [9-10].

Extent of surgical resection is one of the most important factors in predicting recurrence along with histological grading. Subtotal resections were associated with more recurrence or re growth.

The most common age group involved was the 41- 50year was similar to studies done by A B Shah *et al*. [11], Ruberti *et al*. [12], Intisar SH Patty *et al*. [13], and J amjoom *et al*. [14].

The most common location was parasagittal area similar to the various studies.

The classical type is the Meningothelial variant cases were 16 (42%) in the present study being the most common histological type seen in all the studies by

Sangamithra *et al*. [15], Nasrin Samadi *et al*. [16] , S Babu *et al*. [17] and Thomas Backer *et al*. [10].

The rare variant angiomatous type 2 cases (5.3%) and Angiomatous meningiomas are rare and comprise 2.1% of all the types of meningioma.

Meningiomas are graded into Grade I and Grade II with incidence in a ratio of 94.70%:5.3% in this study similar to a studies done by Nasrin Samadi *et al*. [16] (86.1%: 8%: 5.9%) and Konstantinos Violaris *et al*. [8] (89.82%:5.82%:4.36%).

Grade I meningiomas are benign and rarely recur. Grade II and Grade III meningiomas tend to recur more frequently. In all the reference studies Grade I tumors were more Common. Higher incidence of Grade II tumors was noted in the studies done by S Babu *et al*. [17], (26%) and Thomas Backer *et al*. [9] (30.1%). Grade III tumors were less common in all the studies and in our study cases with brain invasion were not reported. Whereas Thomas Backer *et al*. [9] reported 30% of the meningiomas as atypical, due to the inclusion of 9 cases with brain invasion and with otherwise benign histology.

Table-5: Comparative Evaluation of Gradei Histological Variants of the Present Study with Other Study

Authors	Total cases	Meningothelial	Transitional	Fibroblastic	Psammomatous	Age of presentation
FF Cruz Sanch *et al*. [18]	41	19	3	8	0	40-60 years
Our study	38	16	4	2	10	40-60 years

Variants of meningioma	**Thomas Baker *et al*. [9]**	**Our study**
Meningothelial	17.00%	42.00%
Transitional	40.00%	10.50%
Psammomatous	0.50%	26.40%
Fibroblastic	7.00%	10.50%
Angiomatous	1.50%	5.30%
Total	196	38
Variants	Thomas Baker *et al*. [9]	Our study
Benign (Grade I)	135 (69.9%)	36 (94 .7)
Atypical (Grade II)	59 (30%)	2 (5.3)
Anaplastic (GradeIII)	2 (1%)	0
Total number of cases	196	38

CONCLUSION

In this study the prevalence of tumor location, histologic subtypes and grades as well as age and sex distribution were similar to other studies.

From our study, we can conclude that most common histopathological variants of meningioma are meningothelial meningioma followed by psammomatous meningioma, and least common is angiomatous meningioma. Most common WHO grade is grade 1. Benign meningiomas are most common meningioma. Intracranial location is the most common location for meningioma. Most common age group for presentation is 41–50 years.

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