

Clinicopathological Analysis of Aggressive Meningiomas In A Tertiary Care Centre

¹Dr Nitika Yadav, PG Resident, Dept. of Pathology, Mahatma Gandhi Medical College, Jaipur

²Dr. Surabhi Tyagi, Professor, MD, Dept of Pathology, Mahatma Gandhi Medical College, Jaipur

Corresponding Author: Dr Nitika Yadav, PG Resident, Dept. of Pathology, Mahatma Gandhi Medical College, Jaipur

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Abstract

Introduction: Meningiomas are derived from meningeothelial cells of the arachnoid layer and are categorized into 3 grades according to the WHO 2016 Classification. Aggressive meningiomas includes WHO Grade II & III, which have been included in our study. The aim of our study was to study the relevance of immunohistochemistry in the diagnosis of various types of aggressive meningiomas and to study about the relation of various subtypes of aggressive meningiomas with respect to age, sex and regional distribution in the brain.

Material & Methods: Total of 90 cases of aggressive meningiomas were included. The specimens were received and processed as per the standard protocols stained with H & E & appropriate IHC guidelines.

Result: Total WHO Grade II cases were 77 out of which 71 cases were of atypical meningiomas with high MIB -1 activity, 2 cases were of clear cell meningiomas and 3 cases were of chordoid meningiomas.

1 case was of lymphoplasmocytic rich meningioma with brain invasion and marginally increased MIB 1.

Total WHO Grade III cases were 13 (Rhabdoid-5 cases, Anaplastic- 6 cases, Papillary- 2 cases).

In our study WHO Grade II was more common in females, while WHO Grade III was more common in males, 5th decade & cerebral convexity had higher predilection for aggressive meningiomas followed by spinal.

Conclusion: The aggressive WHO Grade II & III meningiomas have a poor prognosis and the post operative treatment and follow up is affected by the grade. Therefore it is important to classify meningiomas according to their grades even if they may look benign on first look careful inspection of the sections is advised.

Keywords: Atypical Meningiomas, Chordoid, Clear Cell, Papillary, Rhabdoid, MIB-1 Labelling Index.

Introduction

Aggressive meningiomas includes WHO Grade II and III which have been included in our study. The peak incidence is in younger age group, more common in males. Histological grading has a significant impact on prognosis, risk of recurrence and need for adjuvant radiation or chemotherapy.

Aggressive meningiomas grow at a faster rate than benign meningiomas and are often characterized by high mitosis, brain invasion & necrosis. Certain histopathological variants – chordoid meningioma, clear cell meningioma, rhabdoid meningioma and papillary meningioma, have

been found to predict more aggressive, treatment-resistant behavior.

Material And Methods

It was a 5-year retrospective study conducted from year 2018 to 2022. Total 90 cases of aggressive meningiomas have been included in our study and diagnosed according to 2016 WHO classification. The specimens received were fixed in 10% buffer formalin. Multiple serial sections of 4-5 microns thickness were taken, stained with H &E and appropriate IHCs were applied.

Results And Discussion

In this study, 90 cases reported as Aggressive meningiomas were included. The tumors were diagnosed and classified as per WHO 2016 CNS classification on H&E and then were analysed on CNS IHC panel.

Total WHO Grade II cases were 77(85.55%) similar to study by Perry A et al ^[1] out of which 71 cases (78.88%) were of atypical meningiomas with high MIB -1 activity which was similar to stud by G. Poulen et al. ^[2]

In our study, 2 cases (2.22%) were of clear cell meningiomas similar to study by Pranay Soni et al^[3] and 3 cases (3.33%) were of chordoid meningiomas similar to study by Danyang Jie et al ^[4]

In our study 1 (1.11%) case of lymphoplasmocytic rich meningioma with brain invasion and marginally increased MIB-1 was seen which can be classified as WHO grade II similar to study by Wang, Han BS ^[5]

Total WHO Grade III cases were 13 (5.99%) which were similar in incidence in a study by Perry A et al^[1] out of which 5 cases were Rhabdoid (5.55%) similar to study by Sajeeb Mondal et al ^[6], 6 were Anaplastic (6.66%) similar to study by Cao et al ^[7] and 2 cases were Papillary (2.22%) similar to study by Dai Jun Wang et al ^[8] on HPE.

Incidence of Aggressive Meningioma occurrence ranged from 12 years to 70 years with most common age group

being 41-50 years which was similar to study by Kristin et al ^[9] and Ruio fei liang et al. ^[10]

In our study most common site for both grades was cerebral convexity (28.69%) followed by intraspinal (18.03%) similar to study by Ruio fei liang et al ^[10]

In our study 1 case of clear cell meningioma was located at lumbar spine similar to study by JiuHong Li et al ^[11] and Zhang Xiaolei et al ^[12] where it was studied that most common location for clear cell meningiomas was lumbar region, posterior fossa and CP angle.

In our study other case of clear cell meningioma was located at foramen magnum which is a rare site for meningiomas similar to study by AR Bhat et al . ^[13]

In our study 1 case of anaplastic meningioma was situated in optic nerve sheath tumour which is a rare site for anaplastic meningiomas similar to study by AR Bhat et al^[13] where most common locations for anplastic meningiomas were sphenoid ridge and CP angle.

In our study 1 case of papillary meningioma was in lumbar spine which is a rare site for papillary meningiomas similar to study by Liang Wuin et al ^[14] and M. Meinsma-v.d. Tuin ^[15] where it was in the spine, though in cervical region.

In our study overall aggressive meningiomas were more common in females (57.77%) than males (42.22%). In our study WHO Grade II were more common in females whereas study by Modha et al ^[16] showed WHO grade II to be more common in males. WHO Grade III independently was more common in males than females whereas study conducted by Kristin et al ^[9] and Ruio fei liang et al ^[10] showed male preponderance in all aggressive meningiomas.

In our study 34 cases of atypical meningiomas had MIB-1 >7% on IHC. It showed correlation with proliferative activity in higher grade cases which was similar to the

study done by Devprasath et al^[17] which confirmed that the MIB-1 has highest validity at 7%.

All cases were positive for SSTR2, EMA and Vimentin. In our study we used SSTR-2 for differentiating the meningioma from its histological mimics. It was found to be more sensitive and specific diagnostic marker for meningioma than epithelial membrane antigen. In our study MIB-1 $\geq 7-20$ in WHO Grade II and MIB-1 >20 in WHO Grade III.

Conclusion

In this 5 year retrospective study it was studied that peak incidence of Grade II and Grade III meningiomas was in 5th decade with overall aggressive meningiomas more common in females than males. WHO Grade II showed female preponderance whereas WHO Grade III meningiomas were more common in males. Overall most common location of meningiomas were supratentorial than infratentorial. In supratentorial common location for aggressive meningiomas was cerebral convexity. MIB-1 showed correlation with proliferative activity in higher grades with MIB-1 \geq to 7-20 in WHO Grade II and MIB-1 >20 in WHO Grade III. Therefore, it is crucial to be vigilant while grading meningiomas as they affect the post operative treatment and follow up.

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Legend Figures and Tables

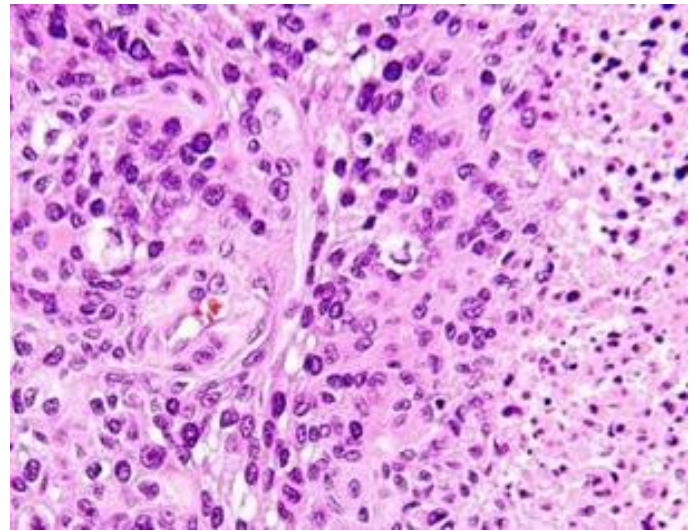


Figure 1: H&E Atypical Meningioma

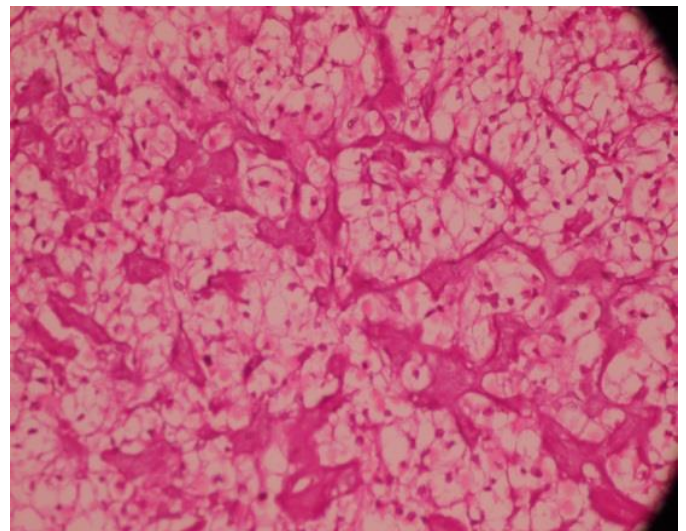


Figure: 2 H&E Clear cell meningioma

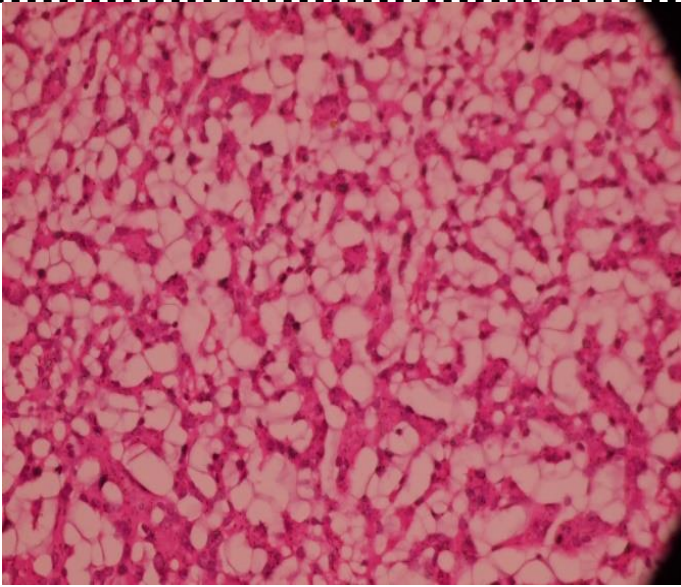


Figure 3: H &E - Chordoid meningioma

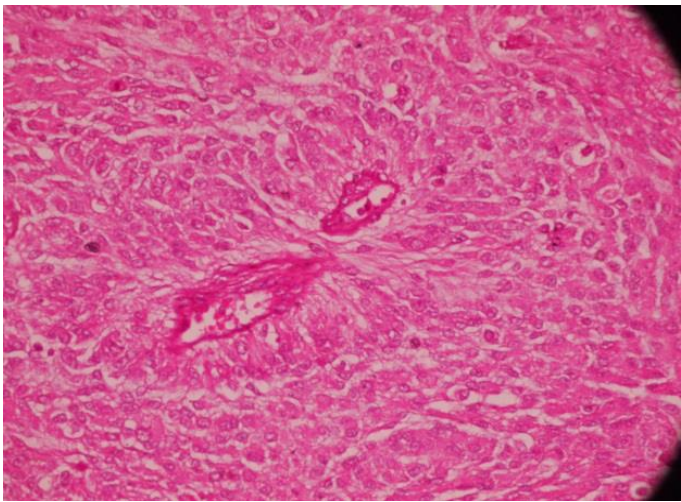


Figure 4: H&E Papillary meningioma.

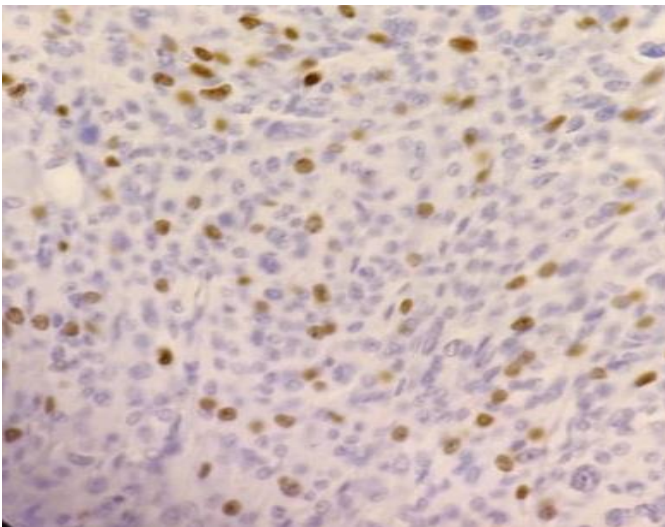


Figure 5: Anaplastic meningioma MIB-1 LI = 20 to 25%

Table 1: Distributing meningiomas according to its types.

Type of meningioma	Number	Percentage
Atypical meningioma	71	78.88
Clear cell meningioma	2	2.22
Chordoid meningioma	3	3.33
Lymphoplasmocytic rich meningioma	1	1.11
Anaplastic meningioma	6	6.66
Rhabdoid meningioma	5	5.55
Papillary meningioma	2	2.22
Total	90	100

Table 2: Total no. Of meningiomas according to who grades.

Who grade	Number	Percentage
Who grade 2	77	85.55
Who grade 3	13	14.44
Total	90	100

Table 3: Number of study subjects according to age groups

Age (years)	Number	Percentage
0-10 years	0	0
11-20 years	1	0.92
21-30 years	10	79.67
31-40 years	14	14.04
41-50 years	24	26.44
51-60 years	17	26.44
61-70 years	11	18.18
71-80 years	13	7.43
81-90 years	0	0
Total	90	100

Table 4: Meningiomas in relation to gender

Type	Females		Males	
	Number	%	Number	%
Atypical meningioma	45	86.53	26	68.42
Chordoid meningioma	1	1.92	2	5.26
Clear cell meningioma	2	3.84	0	0.00
Lymphoplasmocytic rich meningioma	0	0.00	1	2.63
Rhabdoid meningioma	2	3.84	3	7.89
Papillary meningioma	0	0.00	2	5.26
Anaplastic meningioma	2	3.84	4	10.52
Total	52	100	38	100

Table 5: Gender distribution of study subjects

Gender	Number	Percentage
Female	52	57.77
Male	38	42.22
Total	90	100

Table 6 : Gender wise grading of meningiomas

Who grade	Female		Male	
	Number	%	Number	%
Who grade 2	48	92.30	29	55.76
Who grade 3	4	7.69	9	17.30
Total	52	100	38	100

Table 7: Distribution of study subjects according to mib-1

Mib-1	Number	Percentage
7-20%	77	15.57
>20%	13	4.10
Total	90	100

Table 8: Distribution According To Location Of

Meningioma

Location	Number	Percentage
Anterior cranial fossa	9	8.20
Posterior cranial fossa	8	2.46
Cerebral convexity	22	28.69
CP Angle	3	3.28
Falx¶falcine	4	1.64
Intraventricular	4	1.64
Parasagittal	5	9.02
Skull base	8	8.20
Sphenoid	3	10.66
Tentorial	5	4.92
Brainstem	4	3.28
Spinal	15	18.03
Total	90	100