HISTOPATHOLOGICAL ANALYSIS OF MENINGIOMAS- A RETROSPECTIVE STUDY

Pathology

Dr. Parita Patel	Third year Resident, Department of pathology, Geetanjali Medical College and Hospital, Udaipur, Rajasthan
Dr. Kathan Patel	M.D Radiology, Udaipur, Rajasthan

ABSTRACT

Background: Meningioma is the most common primary intracranial neoplasm and the most diversified in histologic patterns among all primary tumors of the CNS. 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). The World Health Organization (WHO) classification recognizes several variants of meningioma. **Aim and objectives:** To study the incidence, location, sex, age predilection, histological variants, and grading of meningiomas based on WHO 2016 classification. **Methods and Material:** A Retrospective study was conducted from January 2019 to June 2020 of 28 cases of meningioma received in Pathology department, GMCH, Udaipur. Grading of meningiomas was done as per the WHO 2016 classification of Meningiomas. Biopsy slides stained with H&E and case history were retrieved from archival material and were studied in detail with respect to site, age and sex distribution, histomorphological features and WHO grade of tumour. **Results:** Total 28 cases studied in which 11 were male and 17 were female (M: F = 1:1.5). Most common age group to be involved was 41-50 years with 17 cases (60.71%). Mean age of presentation was 47.7 years. Most common site for meningioma was convexities. Meningothelial meningioma was the most common meningioma. In our study 25 cases (89.29%) were WHO grade I meningiomas. **Conclusion:** Meningiomas are slow growing tumors arising from the meningothelial cells accounting with a wide variety of histological patterns. The incidence, sex predilection, histological types and behaviour of meningiomas in our study and other studies are similar.

KEYWORDS

Meningioma, WHO, CNS tumors, Meningothelial meningioma

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.[1] These cells have both epithelial and mesenchymal characteristics, which are shown by meningiomas in a spectrum of diverse histologic appearances. 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). The World Health Organization (WHO) classification recognizes several variants of meningioma.

Variants Of Meningioma With Who Grade [2]

WHO GRADE I MENINGIOMA
Meningothelial
Fibrous (fibroblastic)
Transitional (mixed)
Psammomatous
Angiomatous
Microcystic
Secretory
Lymphoplasmacyte-rich
Metaplastic
WHO GRADE II MENINGIOMA
Atypical
Chordoid
Clear cell
WHO GRADE III MENINGIOMA
Anaplastic
Papillary
Rhabdoid

Who Criteria For Grading Of Meningioma [2],[3]

Grade I	Grade II	Grade III
0–3 mitoses/10 hpf **Absence of brain invasion**	4–19 mitoses/10 hpf **OR** Three or more of necrosis, macronucleoli, loss of architecture, small cell change, **OR** hypercellularity **OR** Brain invasion **OR** Clear cell or chordoid pattern	≥20 mitoses/10 hpf **OR** Papillary or rhabdoid pattern **OR** Otherwise overtly sarcoma- or carcinoma-like

AIM AND OBJECTIVES

To study the incidence, location, sex, age predilection, histological variants and grading of meningiomas based on WHO 2016 classification.

MATERIAL AND METHODS

A Retrospective study was conducted from January 2019 to June 2020 of 28 cases of meningioma received in Pathology department, GMCH, Udaipur. Grading of meningiomas was done as per the WHO 2016 classification of Meningiomas. Age, Sex incidence, Location of meningiomas were studied. Biopsy slides stained with H&E and case history were retrieved from archival material and were studied in detail with respect to site, age and sex distribution, histomorphological features and WHO grade of tumour.

RESULTS

Gender Distribution-
Among the 28 cases of meningioma, 17 (60.72%) were females and 11(39.28%) were males. Male to female ratio was 1:1.5.

Age Distribution-
- Most common age group to be involved was 41-50 years with 17 cases (60.71%).
- Mean age of presentation was 47.7 years.

Table 1: Age distribution of cases

Age group	No. of cases
1-10 years	0
11-20 years	0
21-30 years	0
31-40 years	05 (17.85%)
41-50 years	17 (60.71%)
51-60 years	04 (14.29%)
>61 years	02 (7.15%)
Total	28 (100%)

Location-
Most common site for meningioma was convexities 16 (57.14%) cases, followed by thoracic spine 04 (14.28%).

Table 2: Distribution of cases according to location

Location	No. of cases
Convexities	16 (57.14%)
Thoracic spine	04 (14.3%)
Parasagittal	03 (10.71%)
Sphenoidal	03 (10.71%)

| Parafalcine | 02 (7.14%) |
| Total | 28 (100%) |

Variants Of Meningioma-
Meningothelial meningioma was the most common meningioma (35.72%), followed by transitional meningioma (25%).

Table 3: Distribution of cases according to histopathological variants

Histopathological variants	No. of cases
Meningothelilal meningioma	10 (35.72%)
Transitional meningioma	07 (25%)
Fibrous meningioma	05 (17.86%)
Angiomatous meningioma	02 (7.14%)
Psammomatous meningioma	01 (3.57%)
Atypical meningioma	01 (3.57%)
Clear cell meningioma	01 (3.57%)
Chordoid meningioma	01 (3.57%)
Total	28 (100%)

WHO grades of meningioma-
In our study 25 cases (89.29%) were WHO grade I meningiomas while 3 cases (10.71%) were WHO grade II. There was no case of WHO grade III in our study.

Table 4: Distribution of cases according to WHO grades

WHO grades	No. of cases
Grade I	25 (89.29%)
Grade II	03 (10.71%)
Grade III	00
Total	28 (100%)

(a)   (b)

(c)   (d)

(e)   (f)

(g)   (h)
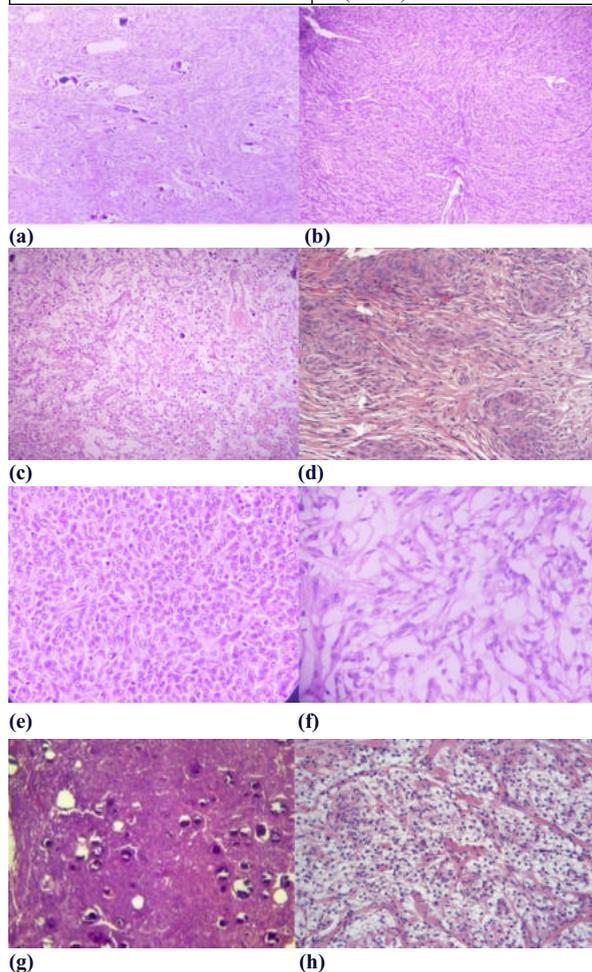
[Figures (a): Meningothelial meningioma, grade I. Psammoma bodies also seen (H&E X100), (b): Fibrous meningioma, grade I (H&EX100), (c): Angiomatous meningioma, grade I. (H&E X400), (d): Transitional meningioma, grade I combination of whorling and fascicular patterns. (H&E X400), (e): Atypical meningioma, grade II.

>4 mitotic figures/10HPF seen. (H&E X400), (f): Chordoid meningioma, grade II. Cells are arranged in cord and trabeculae with eosiniophilic cytoplasm in the mucoid matrix background. (H&E X400), (g): Psammomatous Meningioma, grade I. Many psammoma bodies are seen. (H&E X400), (h): Clear cell meningioma, grade II. Groups of clear cells are divided by fibrous septa. (H&E X400)]

DISCUSSION
Females were more commonly affected in our study which was also observed in studies done by Lakshmi et al [4] and Backer-Grøndahl et al.[5] Most commonly affected age group in our study was 41-50 years, which was in concordance with studies done by Reddy et al [6] and Laksmi et al.[4]

Convexities were the most common sites of meningioma which was observed by Backer-Grøndahl et al [5] and Reddy et al. [6] Meningothelial meningioma was the most common type of meningioma which was in concordance with study done by Lakshmi et al [4] and Reddy et al. [6] However, Backer-Grøndahl et al [5] reported transitional meningioma as the most common meningioma variant.

Grade I meningiomas were the most common grade of meningiomas in our study which was in concordance with studies done by Lakshmi et al [4], Jat et al [7] and Reddy et al. [6]

WHO grade is the most useful morphological predictor of recurrence. Benign meningiomas have recurrence rates of about 7-25%, whereas atypical meningiomas recur in 29-52% of cases, and anaplastic meningiomas at rates of 50-94%. Malignant histological features are associated with shorter survival times of 2-5 years depending largely on the extent of resection. [8]

CONCLUSION
Meningiomas are slow growing tumors arising from the meningothelial cells accounting with a wide variety of histological patterns. These tumors are more common in women and Grade I tumors are predominant, Grade II and Grade III tumors are less frequent. Recurrence of tumors depends on histological grade and extent of surgery. The incidence, sex predilection, histological types and behavior of meningiomas in our study and other studies are similar.

REFERENCES
1. Karthikeyan, K., & Ganesan, R. V. (2013, April 1). Dumb-bell skull base meningioma. ResearchGate.https://www.researchgate.net/publication/259744944_Dumbbell_skull _base_meningioma
2. Bi WL, Zhang M, Wu WW, Mei Y, Dunn IF. Meningioma Genomics: Diagnostic, Prognostic, and Therapeutic Applications. Front Surg [Internet]. 2016 Jul 6 [cited 2023 Mar 13];3. Available from: http://journal.frontiersin.org/Article/10.3389/fsurg.2016.00040/abstract
3. Louis DN, Perry A, Reifenberger G, von Deimling A, Figarella-Branger D, Cavenee WK et al. The 2016 World Health Organization Classification of Tumors of the Central Nervous System: a summary. Acta Neuropathol. 2016;131(6):803-20.
4. Lakshmi SS. Meningiomas: a clinicopathological study. International Journal of Medical Research & Health Sciences. 2015;4(4):827-31.
5. Backer-Grøndahl T, Moen BH, Torp SH. The histopathological spectrum of human meningiomas. International journal of clinical and experimental pathology. 2012;5(3):231.
6. Reddy RK, Singh R. Histopathological spectrum of meningioma and its variants.Asian Pac. J. Health Sci.,2016; 3(1):151-5.
7. Jat KC, Vyas SP, Bihari NA, Mehra K. Central nervous system tumors: a histopathological study. International Journal of Research in Medical Sciences. 2016;4(5):1539-45.
8. Marciscano AE, Stemmer-Rachamimov AO, Niemierko A, Larvie M, Curry WT, Barker FG et al. Benign meningiomas (WHO Grade I) with atypical histological features: correlation of histopathological features with clinical outcomes. Journal of neurosurgery. 2016;124(1):106-14.