e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(2); 1221-1226

Original Research Article

A Retrospective Observational Clinicopathological Evaluation of Meningioma from Rural Setup

Ashish Kumar Jha[1], Poonam Mishra[2], Hari Shankar Mishra[3]

[1]Assistant Professor, Department of Pathology, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India
[2]Associate Professor and HOD, Department of Pathology, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India
[3]Associate Professor, Department of Pathology, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India

Received: 25-12-2022 / Revised: 21-01-2023 / Accepted: 08-02-2023
Corresponding author: Dr. Ashish Kumar Jha
Conflict of interest: Nil

Abstract

Aim: The aim of this study was to determine the incidence of Meningioma among all CNS tumors occurring in the study period, age and sex predilection, location, and site preference for a population in a rural setup of Bihar region.

Methods: This study was retrospective observational study at Department of Pathology, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India for the period of 2 years. Out of 200 cases of CNS tumors operated, meningioma consists of 50 cases (25%). Ethical board permission was taken.

Results: The average age of presentation was 44.1 years. Most common affected age group was 30-50 years comprising 26 cases (52%). Out of 50 cases 42 (84%) were intracranial menigioma and 8 (16%) were spinal meningioma. The most common clinical symptoms for intracranial cases were headaches followed by seizures and vomiting. Among intracranial meningioma, the most common location was convexity meningioma (40%) followed by parasagittal (12%). Meningothelial meningioma 20 (40%) was the commonest subtype followed by transitional 12 (24%), psammomatous, 5 (10%), fibroblastic 2 (4%), metaplastic 1 (2%) and others. Grade II meningiomas included atypical 2 (4%), clear cell 1 (2%) whereas grade III included all the cases of papillary 1(2 %) and anaplastic 2 (4%) meningiomas.

Conclusion: The descriptive epidemiology of meningioma in our rural setup roughly correlates with the epidemiology elsewhere in India apart from the male to female ratio; which could be due to lack of seeking medical care among females in our society.

Keywords: CNS Tumor, Meningioma, Epidemiology of Meningioma.

Introduction

Meningiomas are the most common primary central nervous system (CNS) tumors.1 They are usually benign, slow growing neoplasms that are thought to arise from meningothelial (arachnoid) cells (MECs). [1-3] Despite having a reputation of a benign disease, these dural-based tumors can lead to morbidity, presenting with a variety of non-specific, location dependent symptoms. MECs are a cellular component of the pia mater, arachnoid mater, and the trabeculae and septae of the

subarachnoidal space. [4] They make up a monolayer covering of the meninges and are connected via tight junctions, gap junctions, and desmosomes, providing an interface between neuronal tissue and the cerebrospinal fluid (CSF). [5] Aside from providing a physical barrier to the CNS and protecting it from mechanical damage, MECs also play a significant role in immunological processes and the maintenance of homeostasis and host defense in the CSF. [6-8]

Cerebral convexities, sphenoid ridge, parasagittal, olfactory groove, tuberculum sella and cerebellopontine angle are some of the favourite sites of intracranial meningioma. Spinal meningiomas occur more commonly in the thoracic region. Intraventricular and epidural meningiomas are rare. Pediatric meningiomas tend to occur at unusual locations, including the ventricles, posterior fossa and spinal dural regions. [9] Meningiomas are generally solitary, slowly growing tumours producing neurological signs and symptoms due to compression of surrounding structures; specific deficits depend upon the location of tumour. Imaging has an important role in characterizing these lesions and helping in presurgical differential diagnosis, which is essential for optimizing treatment strategies. The CT scan and MRI evaluate the lesion with respect to the following points: Location (supra/infratentorial) and site, periregional edema, intensity compared to grey matter, contrast enhancement and type of enhancement, presence of extra axial signs viz, CSF cleft, displaced subarachnoid vessels, buckling of cortical grey matter between the mass and the white matter, displaced and expanded subarachnoid space, broad dural base and bony reaction, presence of mass effect, presence of signal voids on T1WI and T2WI (calcification or fibrosis or vessels), presence of haemorrhage, heterogeneity, presence of necrosis or cystic change, presence of calcifications, margins: Sharp & well defined or ill-defined On MRI, meningiomas are typically isodense, contrast-enhancing dural masses. “Dural tail” is a distinctive although non-specific feature of meningioma. Angiography often displays a characteristic tumour blush, reflecting their high vascularity. [10]

The aim of this study was to determine the incidence of Meningioma among all CNS tumors occurring in the study period, age and sex predilection, location, site preference for a population in a rural setup of Bihar region.

Materials and Methods

This study was retrospective observational at Department of Pathology, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India for the period of 2 years. Out of 200 cases of CNS tumors operated, meningioma consists of 50 cases (25%). Ethical board permission was taken. Inclusion criteria consist of all the histopathological proven cases of meningioma. Rest of the CNS tumors was excluded from the study.

The details of the each patient were taken from medical records i.e. age, gender; clinical presentation, radiological evaluation (MRI and/or CT scan), location, brain infiltration and recurrence were noted. Intra operative consultation was done by squash smears for which sample was received in isotonic normal saline. Squash diagnosis was noted and was correlated with final histological diagnosis which was considered as gold standard for diagnosis of meningioma. The histological sections were viewed and all tumours were subtyped graded by experienced pathologist according to WHO 2007 criteria.

In all cases, the specimens received following surgery were fixed in 10% buffered neutral formalin for 24 hours. If the resected tissue was received as fragmented bits, all the tissues were submitted for processing. If the tumour was removed in toto and exceeded 4-5

cms, representative sections were taken. These tissue blocks were processed and embedded in paraffin wax. The paraffin embedded blocks were cut into 4-5 micron sections and stained with routine Haematoxylin and Eosin stain (H&E).

Results

Table 1: Age and sex incidence of meningioma

Age	Male	Female	Total	%
<20	1	0	1	2
20-30	4	4	8	16
31-40	3	8	12	24
41-50	6	8	14	28
51-60	4	4	8	16
>60	4	3	7	14

The average age of presentation was 44.1 years. Most common affected age group was 30-50 years comprising 26 cases (52%).

Table 2: Types of meningioma and presenting complaints

Types of meningioma	N%
Intracranial menigioma	42 (84)
Spinal meningioma	8 (16)
Symptoms	
Headache	23
Seizure	15
Vomiting	8
Paresis	7
Visual Disturbance	5
Alt. Consiousness	4

Out of 50 cases 42 (84%) were intracranial menigioma and 8 (16%) were spinal meningioma. The most common clinical symptoms for intracranial cases were headache followed by seizures and vomiting.

Table 3: Distribution of patients according to location of meningioma

Location	N%
Convexity	20 (40)
Parasaggital	6 (12)
Sphenoid wing	4 (8)
Suprasellar	3 (6)
C.P angle	3 (6)
Others	14 (28)

Among intracranial meningioma, the most common location was convexity meningioma (40%) followed by parasagittal (12%).

Table 4: Histological sub-types of meningioma

Type	N%
Meningothelial	20 (40)
Transitional	12 (24)
Fibrous	2 (4)
Psammomatous	5 (10)

Microcystic	1 (2)
Secretory	1 (2)
Lipomatous& secretory	1 (2)
Metaplastic	1 (2)
Chordoid	1 (2)
Clear cell	1 (2)
Atypical	2 (4)
Papillary	1 (2)
Anaplastic	2 (4)

Meningothelial meningioma 20 (40%) was the commonest subtype followed by transitional 12 (24%), psammomatous, 5 (10%), fibroblastic 2 (4%), metaplastic 1 (2%) and others. Grade II meningiomas included atypical 2 (4%), clear cell 1 (2%) whereas grade III included all the cases of papillary 1(2 %) and anaplastic 2 (4%) meningiomas.

Discussion

In 1922, Harvey Cushing proposed the term meningioma [11] for the tumours arising from the arachnoid cells present in arachnoid villi and granulations and in stroma of perivascular spaces and choroid plexus. [12] Meningiomas constitute about 28–30% of primary Central Nervous System (CNS) tumours. They exhibit typical dural attachment and account for 15 % of intracranial tumours and about 25% of intraspinal tumours. [13]

Meningioma accounts for 33.8 percent of brain tumor. [14] In our study it consists of 25% of brain tumor similar to the studies by Ruberti RF et al [15] and AB shah et al.16 Most common affected age group was 30-50 years comprising 26 cases (52%) which was similar to the study by Ruberti R.F. [15] Spinal meningiomas comprised of 16% of total meningiomas in our study. In study done by Solero CL et al spinal meningiomas consist of 7.5-1 2.7% of all CNS meningiomas. Dorsal spine is reported as the most common location for spinal meningioma. [17-19]

Meningiomas are graded into Grade I, Grade II and Grade III with incidence in a ratio of 89%, 6%, 5% in this study. Nasrin Samadi et al [20] reported as 86.1%, 8%, 5.9% while Konstantinos Violaris et al [21] as 89.82%, 5.82%, 4.36% for Grade I, Grade II and Grade III tumours respectively. MECs also protect against infection and neurodegeneration via phagocytosis of bacteria and apoptotic bodies, as well as macropinocytosis of neurotoxic peptides and proteins, respectively. [6-8] MECs have different embryologic origins depending on their anatomic locations. MECs found at the skull base and cerebral convexity have mesoderm and neural crest origins, respectively. This difference affects the predominating histological subtypes of meningiomas that arise from these cells and the distribution of recurrent somatic mutations. [22] Arachnoid cap cells make up the outer layer of the arachnoid mater and arachnoid villi and with cytological similarities to meningiomas cells, it is likely their cell of origin. [23] Meningiomas are tumors of the meninges but they also occur rarely as primary tumors in the ventricles of the CNS and extracranial organs such as the lungs, presumably from aberrant MECs. [24,25]

Conclusion

We conclude that most common histopathological variants of meningioma are meningothelial meningioma, followed by psammomatous meningioma. Most common WHO grade is grade 1. The most common age group for presentation of meningioma is third to fifth decade of life, and it is least common among children. It could be due to less reporting of female for medical care in rural setup. Meningiomas

are slow growing tumours arising from the meningothelial cells with a wide variety of histological patterns. These tumours are more common in women and Grade I tumours are predominant; Grade II and Grade III tumours are less frequent. Recurrence of tumours depends on histological grade and extent of surgery. Radiological localization helps in preoperative diagnosis while squash cytology is simple, cost effective and reasonably accurate method for intraoperative rapid diagnosis of meningioma.

References

1. Ostrom QT, Cioffi G, Gittleman H, Patil N, Waite K, Kruchko C, Barnholtz-Sloan JS. CBTRUS statistical report: primary brain and other central nervous system tumors diagnosed in the United States in 2012–2016. Neuro-oncology. 2019 Oct;21(Supplement_5): v1-00.
2. Huntoon K, Toland AM, Dahiya S. Meningioma: a review of clinicopathological and molecular aspects. Frontiers in Oncology. 2020 Oct 23; 10:579599.
3. Louis DN, editor. WHO classification of tumours of the central nervous system. WHO; 2007.
4. Weller RO. Microscopic morphology and histology of the human meninges. Morphologie. 2005 Mar 1;89(284):22-34.
5. Nabeshima S, Reese TS, Landis DM, Brightman MW. Junctions in the meninges and marginal glia. Journal of Comparative Neurology. 1975 Nov 15; 164(2):127-69.
6. Li J, Fang L, Meyer P, Killer HE, Flammer J, Neutzner A. Anti-inflammatory response following uptake of apoptotic bodies by meningothelial cells. Journal of neuroinflammation. 2014 Dec;11(1):1-3.
7. Li J, Fang L, Killer HE, Flammer J, Meyer P, Neutzner A. Meningothelial cells as part of the central nervous system host defence. Biology of the Cell. 2013 Jul;105(7):304-15.
8. Hemion C, Li J, Kohler C, Scholl HP, Meyer P, Killer HE, Neutzner A. Clearance of neurotoxic peptides and proteins by meningothelial cells. Experimental Cell Research. 2020 Nov 15;396(2):112322.
9. Perry A, Dehner LP. Meningeal tumors of childhood and infancy. An update and literature review. Brain Pathol. 2003 Jul;13(3):386-408.
10. Gandhkar K, Santosh D, Fatterpekar GM. Imaging features of intracranial meningiomas with histopathological correlation: A relook into old disease. Nepalese Journal of Radiology. Jan – June, 2013; 3(4,1): 14 - 32.
11. Okonkwo DO, Laws ER. Meningiomas: Historical perspective, in Meningiomas: Diagnosis, Treatment, and Outcome, Ed. Joung H. Lee, Springer-Verlag, London, 2009; 3-10.
12. Russell D S, Rubinstein L J. Meningiomas, In: Pathology of tumours of the nervous system. 5th ed. Edward Arnold. London. 1989; 452-506.
13. A Perry, D. N. Louis, B. W. Scheithauer. H. Budka, A. von Deimling: Meningiomas in WHO Classification of Tumours of the Central Nervous System, 4th Edition, IARC press, Lyon 2007; 1:164-72.
14. Wiemels J, Wrensch M, Claus EB. Epidemiology and etiology of meningioma. J Neurooncol. 2010;99 (3):307–314.
15. Ruberti RF. The surgery of Meningiomas: A review of 215 cases. Afr J Neurol Sci. 1995; 14:1.
16. Shah AB, Muzumdar GA, Chitale AR. Meningiomas: A Report of a hospital-based registry. Indian J Pathol Microbiol. 2005;48(4):468– 471.
17. Solero CL, Fornari M, Giombini S, Lasio G, Oliveri G, Cimino C, Pluchino F. Spinal meningiomas:

review of 174 operated cases. Neurosurgery. 1989 Aug 1;25(2):153-60.
18. Roux FX, Nataf F, Pinaudeau M, Borne G, Devaux B, Meder JF. Intraspinal meningiomas: review of 54 cases with discussion of poor prognosis factors and modern therapeutic management. Surgical neurology. 1996 Nov 1;46(5):458-64.
19. King AT, Sharr MM, Gullan RW, Bartlett JR. Spinal meningiomas: a 20-year review. British journal of neurosurgery. 1998 Jan 1;12(6):521-6.
20. Samadi N, Ahmadi SA. Meningioma: a clinicopathological evaluation. The Malaysian journal of medical sciences: MJMS. 2007 Jan;14(1):46.
21. Violaris K, Katsarides V, Karakyriou M, Sakellariou P. Surgical outcome of treating grades II and III meningiomas: a report of 32 cases. Neuroscience Journal. 2013;2013.
22. Kalamarides M, Stemmer-Rachamimov AO, Niwa-Kawakita M, Chareyre F, Taranchon E, Han ZY, Martinelli C, Lusis EA, Hegedus B, Gutmann DH, Giovannini M. Identification of a progenitor cell of origin capable of generating diverse meningioma histological subtypes. Oncogene. 2011 May;30(20):2333-44.
23. Perry A, Gutmann DH, Reifenberger G. Molecular pathogenesis of meningiomas. Journal of neuro-oncology. 2004 Nov; 70:183-202.
24. Preusser M, Brastianos PK, Mawrin C. Advances in meningioma genetics: novel therapeutic opportunities. Nature Reviews Neurology. 2018 Feb;14(2): 106-15.
25. Kafaji M. S. A. A., & Alsaadi Z. H. Pinworms Infection: Review. Journal of Medical Research and Health Sciences. 2022; 5(8): 2182–2189.