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Original Research Paper

Pathology

STUDY OF MENINGIOMAS WITH HISTOPATHOLOGICAL AND RADIOLOGICAL CORRELATION

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ABSTRACT

Background: Meningiomas are tumours originating from meningothelial cells. They are commonly located at intracranial, intraspinal or occasionally ectopic site. They show histological diversity and are categorized into three grades by WHO 2007 Classification. This grading helps in predicting their behaviour and deciding treatment strategy. **Aims and Objective:** To study the frequency, clinical details, histological typing and grading of 50 cases of meningiomas. To evaluate diagnostic accuracy of radio-imaging and there correlation with histopathological diagnosis is made **Methods:** Total 50 cases of histopathologically confirmed cases of meningiomas were studied with above mentioned aims and objectives. Analysis of histological features, typing and grading of all cases were done. **Result:** Meningioma are the most common extra-axial tumour. Obvious female predominance was observed. The most common histological subtype was meningothelial followed by fibroblastic. In all cases radiological diagnosis correlated with histopathological diagnosis **Conclusion:** Meningiomas are slow growing extra-axial tumours majority being intracranial, benign grade I followed by grade II and rarely grade III neoplasms occurring most commonly in elderly females

KEYWORDS : Meningioma, Intracranial, Tumour, Extra axial, Grading

INTRODUCTION:

Meningiomas are the tumours arising from the arachnoid cells present in arachnoid villi,stroma of perivascular spaces and choroid plexus [2]. Meningiomas constitute about 28–30% of primary Central Nervous System (CNS) tumours [3].

When occur in middle-aged patients, there is a marked female predominance with the approximate female: male ratio being 1.7:1[4]; the ratio peaks at 3.5:1 in the patients 40–44 years of age [5].

Atypical and particularly anaplastic meningiomas are somewhat more frequently encountered in males [6]. Few genetic as well as environmental risk factors are described for development of meningioma [7,8,9].

Cerebral convexities, sphenoid ridge, parasagittal, olfactory groove, tuberculum sella and cerebellopontine angle are some of the favourite sites of intracranial meningioma. Pediatric meningiomas tend to occur at unusual locations, including the ventricles, posterior fossa and spinal dural regions [10].

Imaging has an important role in characterizing these lesions and helping in presurgical differential diagnosis, which is essential for optimizing treatment strategies [11].

On MRI, meningiomas are typically iso dense, 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 [11].

As meningiomas show microscopic diversity, various histological variants are described. WHO 2007 classification of meningioma takes an account of different histological variants of meningioma and categorise them into three grades, Grade I (benign), II (atypical) and III (malignant). Higher Grade meningiomas tend to behave more aggressively and recur [12]. Hence grade of meningioma is key factor in deciding treatment policy [12].

The present study was undertaken in a tertiary referral centre. This study was done over two years to determine the frequency of meningiomas, to study clinical aspects of presentation, age and sex correlation, histological subtyping, grading of meningiomas and radiological diagnosis was correlated with histopathological diagnosis.

MATERIALS AND METHODS:

This was a prospective study of 50 cases with primary intracranial meningiomas operated at Government general hospital in Kurnool medical college, Kurnool. Only cases of clinically and radiologically suspected meningiomas which were confirmed on histopathology in the Department of Pathology during the period from Jan 2020-Jan 2022 were enrolled in the study.

The details of each patient were taken from medical records, radiological evaluation (MRI and/or CT scan), location, brain infiltration and recurrence were noted. In all cases, the specimens received following surgery were fixed in 10% buffered neutral formalin for 24 hours. These tissue blocks were processed and embedded in paraffin wax. The paraffin embedded blocks were cut into 4-5micron sections and stained with routine Haematoxylin and Eosin stain (H&E).

RESULTS:

Out of 50 meningioma cases studied, the most common age group involved is 61 – 70 years with female predominance (64%) followed by male (36%). In all age groups females were more commonly involved. Meningiomas were less common in the younger age with 2 cases in the 1-10 age group and 2 cases in the 11-20 age group and 6 cases in the 71-80 age group

The most common location was intracranial 47(94%) cases with the convexities being commonly involved in 41 (82%) cases. Intraspinal meningiomas were 3 (6%) cases with thoracic spine being most commonly involved in 2 (4%) cases.

The most common histologic types were the fibroblastic and meningothelial types together comprising 76% of all meningiomas other histologic variants observed are Transitional (7%), Psammomatous (8%), Microcystic (2%) and Secretory (2%) types.

Grade I meningiomas were 45(90%), Grade II meningiomas were 3(6%) and Grade III meningiomas were 2 (4%). Grade I tumors were more frequently seen in females. Recurrences were more in Grade II and Grade III tumors mostly involving the parasagittal location.

Table 1: Location of meningiomas:

Intracranial region		Total (%)
Cerebral convexity	Frontal	15(30%)
	Fronto-Temporal	4(8%)
	Temporal	5(10%)
	Parito-temporal	3(6%)
	Parietal	11(22%)
	Parieto-occipital	3(6%)
Tentorium		2(4%)
Sphenoid wing		4(8%)
Spinal region	Thoracic	2(4%)
	Lumbar	1(2%)

Table 2: Histological subtypes:

Type	Total (%)
Meningothelial	23(46%)
Fibroblastic	14(28%)
Transitional	7(14%)
Psammomatous	4(8%)
Secretory	1(2%)
Microcystic	1(2%)

Radiological images:

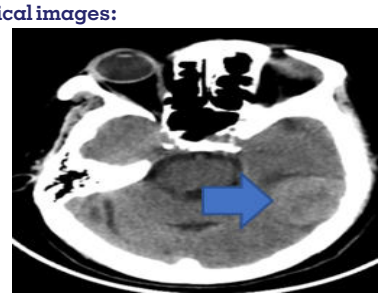

Figure 1: A well-defined hyper dense extra axial lesion in the left temporal convexity

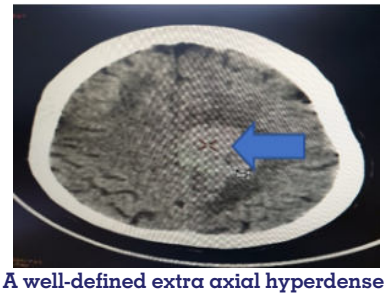

Figure 2: A well-defined extra axial hyperdense lesion with perilesional edema in left parietal lobe

Histopathological images:

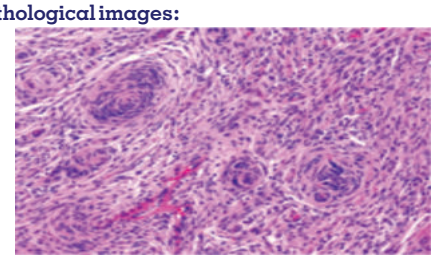

Figure 3: Meningothelial Meningioma- Composed Of Meningothelial Cells, packed Together In Fascicles And Whorls With Bland Nuclei And Inconspicuous Nucleoli

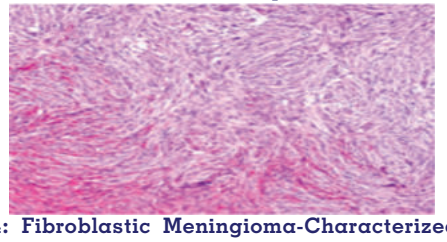

Figure 4: Fibroblastic Meningioma-Characterized By Spindle Cells Arranged In Fascicles With Interspersed Collagen

DISCUSSION:

Though Harvey Cushing used the term "meningioma" in 1922 for the first time, this tumour was known under various names since the 17th century. Actually it was Felix Plater, a professor of medicine who described the earliest known case of meningioma in the literature in 1614[1]. John Cleland in 1864 was first to hypothesize the origin of meningiomas.

Symptomatic meningiomas observed two to three times more frequently in female patients, especially those in the middle age (40-60 years) group and generally slow growing benign neoplasms [3] presenting with signs and symptoms of raised intracranial tension. Radio imaging has important role in characterizing these tumours in terms of location and helping in presurgical differential diagnosis. The most common patterns of growth are meningothelial, fibrous and transitional meningiomas [2].

There are three types of meningiomas according to malignancy grades: benign (WHO grade I), atypical (WHO grade II), and anaplastic or malignant (WHO grade III) meningiomas. Surgical resection is treatment of choice in benign meningioma while higher grade tumours need additional radiotherapy. Recurrence occurs in higher grade tumours as well as benign tumours when incompletely resected.

Table 3: Comparison of incidence of histological subtypes of meningioma:

Study	Meningothelial	Fibroblastic	Transitional	Psammomatous
Smita Shah et al[14]	37%	16%	-	19%
Haradhan et al[15]	32%	20%	20%	-
Shri Lakshmi S. et al [13]	23.44%	23.44%	15.63%	21.88%
Present study	46%	28%	14%	8%

In present study, 50 cases of meningioma we found in which, 52% cases were in age group 31-60 years which were similar to Smita Shah et al[14] found 59% and Haradhan et al[15] found 60% cases in 40-59 years. Low frequency of meningiomas[4%] in pediatric age group which was in the similar range as noted by ShriLaxmi et al[13]. Our study confirmed preponderance of female sex which may be explained by progesterone dependent tumour growth. The male: female ratio was 1:1.7 and females constituted about 64 % cases. This figure approximately matches with all of the studies [13,14,15].

Incidence of intracranial meningiomas was 94% which was comparable with Smita Shah et al[14] and Akyildiz EU et al[16] in which it was 90.2 % and 96% respectively. The present study supported usual sites of predilection of meningiomas as about 74% cases were convexity meningiomas followed by sphenoid meningioma (8%).

This was in accordance with studies done by Smita et al[14] in which convexity meningioma constituted 51%. 2 out of 3 (75%) spinal meningiomas were located at thoracic spinal level. The study of Chamberlain et al[17] had similar observations suggesting thoracic segment as commonest spinal site.

We also got rare cases of secretory and microcystic variants of meningioma histological subtypes. There was an obvious predominance of Grade I meningiomas.

2 out of 50 cases were recurrent, contributing to 4% of the total, which is lower than the recurrent rate of 5.46 % observed by Shri Laxmi et al [13]. In present study MRI and / CT scan findings were noted in all cases which shows complete correlation with final histological diagnosis.

CONCLUSION:

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 and histopathological correlation play very important role on treatment strategy.

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