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Original Research Article

A Hospital Based Clinicopathological Profile of Meningiomas: An Observational Study

Rajeev Ranjan Raman[1], Anurag Sahu[2]

[1]Senior Resident, Department of Neurosurgery, Institute of Medical Sciences, Banaras Hindu University [IMS-BHU], Varanasi, India

[2]Associate Professor, Department of Neurosurgery, Institute of Medical Sciences, Banaras Hindu University [IMS-BHU], Varanasi, India

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Corresponding author: Dr. Rajeev Ranjan Raman
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Abstract

Aim: The aim of the present study was to access the clinic-pathological characteristics of meningiomas.

Methods: This was a retrospective study conducted in the Department of Neurosurgery . The study period was of 3 years. All the patients diagnosed as meningiomas in our department were included in the study. A total of 100 patients were included in the study.

Results: In total, we had 70 females and 30 males, with 60% brain and 40% spinal meningiomas. Transitional, psammomatous, and meningothelial meningiomas were prevalent histological types. 90% of patients had WHO Grade I tumours, 5% had Grade II, and 5% had Grade III. Statistically, Simpson grade of excision was associated with recurrence. The 100 patients were 70% female and 30% male. Females outnumbered males in the 4th, 5th, and 6th decades, but this was less pronounced in elderly and paediatric patients. Parasagittal meningioma was second most common after convexity. Males are more likely to have WHO Grade II and III meningiomas than females, and the difference is statistically significant.

Conclusion: Meningiomas are noncancerous growths that occur more often in females. Meningiomas located above the tentorium are more often seen than those located below it. In paediatric cases, meningiomas tend to be aggressive. The likelihood of meningioma recurrence is influenced by both the histological grade and the Simpson grade of excision.

Keywords: Meningioma, recurrence, Simpson grade, WHO grading

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Introduction

Harvey Cushing introduced the word "meningioma" in 1922. Meningiomas are mostly benign neoplasms, with an approximate incidence of 95%. [1,2] They typically constitute 33.8% of all central nervous system tumours. [3,4] In men, it represents around 20% of all intracranial tumours, whereas in females it represents 38%. Most studies indicate a higher prevalence of meningioma in females. The ratio of females to males is around 2:1. [5]

The prevalence of intracranial meningiomas is as follows in the majority of cases: cerebral convexity (35%), parasagittal (20%), sphenoid wing (20%), infra-tentorial (13%), interventricular (5%), tuberculum sella (3%), and other locations (4%). [6] The tumour has several subtypes, such as meningotheliomatous, fibrous, transitional, secretory, Chordoid, clear cell, papillary, rhabdoid, psammomatous, microcystic, lymphoplasma cell rich, and metaplastic forms. [7] The relationship between the clinical behaviour and histologic grading of meningiomas has garnered significant attention in recent years. Multiple grading methods have been used to assess the severity of menjngioma. Mahmood established a very objective approach by modifying the original WHO grading system via the use of numeric scoring. [8] In the updated WHO grading system of 2000, many criteria have been modified compared to its original form. [9] Several characteristics are deemed to have prognostic importance, including sheeting, hyper cellularity, cytologic atypia, higher mitotic index, necrosis, small cell change, brain invasion, and raised proliferative index of MIB-l.6.

Nevertheless, some tumours exhibit a more aggressive behaviour, leading to the occurrence of local recurrence or metastasis in individuals. Meningiomas are presently classified into three categories based on histopathological characteristics: benign (ordinary) meningioma, atypical meningioma, and anaplastic (malignant)

meningioma. These grades aim to indicate the clinical behaviour of the tumours. [10]

The objective of the current research was to evaluate the clinic-pathological features of meningiomas.

Materials and Methods

This was a retrospective study conducted in the Department of Neurosurgery at Institute of Medical Sciences,Banaras Hindu University [IMS-BHU], Varanasi, India The study period was of 3 years. All the patients diagnosed as meningiomas in our department were included in the study. A total of 100 patients were included in the study. All the patients diagnosed as meningiomas in our department were included in the study. The parameters analyzed included age, gender, location of tumor on imaging, histopathological subtype, and grade of tumor according to the 2007 WHO classification. [10]

All the cases were reviewed histologically by a single neuropathologist. In doubtful and high-grade lesions, special stains such as reticulin, phosphotungistic acid hematoxylin, and immunohistochemistry were used. Patients were followed up on outpatient basis in the Department of Neurosurgery. As per the departmental protocol, serial contrast computed tomography (CT) scans were performed at 1, 2, 5, and 10 years of surgery. Other than this, patients who presented with raised intracranial pressure symptoms or new onset neurodeficits were also subjected to contrast CT.

Results

Table 1: Clinico-demographic profile

Gender	N	%	Total
Male	30	15	30
Female	70	70	70
	Location		200
Histopathological subtype	Cranial	Spinal	
1.Anaplastic	3	0	3
2. Angioblastic	1	0	1
3. Angiomatous	3	1	4
4. Atypical	5	0	5
5. Clear cell	1	0	1
6. Chordoid	1	0	1
7. Fibroblastic	9	1	10
8.Lymphoplasmacytic	1	0	1
9.Meningothelial	20	10	30
10.Metaplastic	1	0	1
11.Papillary	2	0	2
12.Psammomatous	5	5	10
13.Rhabdoid	1	0	1
14.Secretory	1	0	1
15.Syncytial	3	1	4
16.Transitional	3	2	5

Overall, we had 70 females and 30 males; 60 (60%) were brain meningiomas and 40 (40%) were spinal. Meningothelial meningioma was most common histological type, followed by transitional and psamommatous.

Table 2: WHO grade of tumor

	Brain	Spinal	Total
I	50	40	90
II	5	0	5
III	5	0	5
Relation of recurrence with Simpsons grade of tumor excision			
I	43	1	44
II	50	4	54
III	1	1	2

The WHO Grade I was seen in 90 (90%) patients, 5 (5%) had Grade II, and 5 (5%) had Grade III tumors. On analyzing cases of recurrence, we noticed a statistically significant relation with Simpson grade of excision.

Table 3: Location of tumors on imaging

Location	Gender		Total
	Female	Male	
Parasagittal	6	4	10
Intraventricular	1	0	1
Falcotentorial	1	0	1
Sellar/suprasellar	10	4	14
Convexity	24	10	34
Spinal	14	2	16
Falcine	4	2	6
Posterior fossa	3	1	4
ACF base	4	2	6
Sphenoid	1	1	2
CP angle	2	1	4
Primary intraosseous meningioma	0	2	2
Total	70	30	100

Of 100 patients, 70 (70%) were female and 30 (30%) were male. On the correlation of gender ratio with age, we found that females predominated males in the 4th, 5th, and 6th decade and this predominance is less pronounced in elderly and pediatric patients. Convexity meningioma was the most common subtype of meningioma, followed by parasagittal.

Table 4: Relation of gender with WHO grade of tumor

Grading	Gender		Total
	Female	Male	
WHO-I	66	26	92
WHO-II	2	2	4
WHO-III	2	2	4
Total	70	30	100

We found that higher grade WHO Grade II and III meningiomas are more common in males as opposed to Grade I lesions which are more common in females, and the difference was statistically significan

Discussion

Meningiomas are the most often encountered non-glial tumours that originate in the central nervous system. They make up about 20% of all primary brain tumours. [11] Intraspinal meningiomas have a higher prevalence in females compared to males, with a ratio of around 4:1 in some studies. [12] The majority of intracranial meningiomas are distributed as follows: 35% in the cerebral convexity, 20% in the parasagittal region, 20% in the sphenoid wing, 13% in the infra-tentorial region, 5% in the interventricular region, 3% in the tuberculum sella, and 4% in other regions. [10] Meningiomas, which are brain tumours, have been recognised for about two centuries. [13] At first, all of them were regarded as harmless. Some researchers have classified them based on their histology due to the acknowledgment of their frequent and cancerous nature. Although the WHO grading system has introduced new subtypes such as clear cell, chordoid (assumed to be atypical), and rhabdoid (assumed to be malignant), there was only disagreement with Mahmood's system in three cases. These cases had mild nuclear pleomorphism, which placed them in the "atypical" group according to Mahmood's system. However, according to the WHO system, which only considers prominent nucleoli as significant, these tumours were classified as "benign". [14]

In all, there were 70 girls and 30 males. Among them, 60 individuals (60%) had brain meningiomas, whereas 40 individuals (40%) had spinal meningiomas. The most prevalent histological form of meningioma was meningothelial, followed by transitional and psammomatous. The intracranial meningiomas have a female to male ratio of 2:1. [15-18] The higher occurrence of meningioma in women may be attributed to the influence of both endogenous hormone levels and exogenous hormone replacement treatment. This correlation is particularly evident in postmenopausal women, where the prevalence of meningioma is greater in those who have had hormone replacement therapy compared to those who have not. [19,20]

Out of the total number of patients, 90% were diagnosed with WHO Grade I tumours, while 5% had Grade II tumours and another 5% had Grade III tumours. Upon analysing instances of recurrence,

we observed a statistically significant correlation with the Simpson grade of excision. Out of a total of 100 patients, 70 (70%) were identified as female, while the remaining 30 (30%) were identified as male. Regarding the relationship between gender ratio and age, our findings indicate that females outnumbered men in the age groups spanning the fourth, fifth, and sixth decades. However, this dominance is less noticeable among geriatric and paediatric patients. The subtype of meningioma known as convexity meningioma was the most prevalent, with parasagittal meningioma being the second most frequent. Our analysis revealed a greater prevalence of WHO Grade II and III meningiomas in males compared to Grade I lesions, which are more prevalent in females. This disparity was shown to be statistically significant. Meningiomas may originate from the dura mater, with the most frequent locations being inside the skull and at areas where the dura mater folds (such as the falx cerebri, tentorium cerebelli, and venous sinuses).[21] = Less often seen locations include the optic nerve sheath and choroid plexus, while about 10 percent originate in the spine. Occasionally, meningiomas may develop in locations outside the duramater. [22] The symptoms of a meningioma are influenced by the specific location of the tumour and the duration of its development. Meningiomas often have a very sluggish growth rate and usually do not manifest any symptoms. A significant number of meningiomas do not show any symptoms or only show very mild symptoms. They are often found by chance during a neuroimaging scan or after death. [23-25] Subsequent investigations on individuals with asymptomatic meningiomas indicate that the majority of these tumours either maintain their size or experience gradual growth over extended periods of time. [24,25] On computed tomography (CT), the typical meningioma appears as a distinct mass located outside the brain, causing displacement of the normal brain tissue. Their shape is smooth, and they are located next to dural structures. Occasionally, they may be calcified or have many lobes. The presence of iso-intensity, where the intensity of a particular area is similar to that of the surrounding brain, might make it challenging to diagnose a non-contrasted scan. However, the use of intravenous contrast injection leads to a consistent and brilliant enhancement across the scan. Convexity meningiomas seldom exhibit secondary involvement of nearby bone, such as reactive sclerosis, invasion, or erosion. However, this happens in up to 50% of skull base tumours. [26]

Conclusion

Meningiomas are noncancerous growths that have a higher prevalence in females. Meningiomas located above the tentorium are more prevalent than those located below it. In pediatric cases, meningiomas tend to be more aggressive. The likelihood of meningioma recurrence is influenced by both the histological grade and the Simpson grade of excision.

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