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THE CORRELATION BETWEEN MENINGIOMA TUMOR SITE, SIZE, AND WHO GRADING

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ABSTRACT

Introduction: 30% of initial intracranial tumors begin in the leptomeningeal layers of the brain and spinal cord. meningioma's are the most prevalent extra axial tumor in neurosurgical practice, although they're rising. Meningioma is diagnosed by MRI. Larger tumor's likely to be of a higher grade, thus we made this assumption. We did a retrospective analysis to see if tumor size affected grade. **Method:** A cross sectional study of 150 patients with meningioma tumor, all cases of meningioma available in the archive between 2019-2022 in all cases of meningioma available in the archive between 2019-2022, all patients take age, gender, site and size of tumor and grade of tumor. No excluded criteria**.** **Results:** Mean of age of patients (50 ± 13) years old. [43.3%] of patients at age group 46-60 years old, [76%] of patients are females, [68%] of patients have supratentorial tumor, [49%] of patients the tumor size 3-6 mm, and [87.3%] of patients in grade I, the site of tumor as the following; 27 patient's frontal, 17 patient's parietal, 15 patients spinal cord and 12 patients sphenoid ring. There is no significant association between grades of tumor and age groups, gender, site of tumor, size of tumor. **Conclusion**: meningioma's are frequent between 46 and 60. Women get most meningioma's. Most supratentorial meningioma's are 3-6 millimeters in size. Most details are in the frontal and parietal areas. Grade I meningioma's predominate.

KEYWORDS: The correlation, meningioma tumor, site, size, WHO, grading.

INTRODUCTION

Thirty percent of all primary intracranial tumors[1] originate in the leptomeningeal layers of the brain and spinal cord, where they are known as meningioma's. Meningioma's are increasing in frequency, despite being the most common extra axial tumor seen in neurosurgical practice. Currently, MRI is the gold standard for diagnosing meningioma's.[2] Although most meningioma's are benign[3], both the impact of the tumor and the side effects of treatment[4,5] can lead to serious complications.[6,7] Patients with meningioma who also show signs of peritumoral edema (Figure 1A) and mass effect (Figure 1B) are said to have a higher risk of complications and poor clinical outcomes.[7,8] In addition, the edema-to-tumor volume ratio is an independent predictor of poor survival.[8] For this reason, it is essential to establish a method of prognostication on MR diagnosis of meningioma that would provide guidance for follow-up surveillance and surgical decision-making. Previous studies examining the correlations between poor prognostic markers such perilesional edoema and MRI morphology of tumour parameters including tumour size, location, and vascularity have produced contradictory findings. The works of Lobato[10] and Simis[11] observed that larger tumors are associated with a higher probability of related perilesional edema on MRI, Gawlitza et al.[9] found no relationships between peritumoral edema indices and the tumor size. Simis also noted a lack of edema in the peritumoral space around tentorial meningioma's. Tumors in the frontal convexity and the middle third of the falx were shown to have the highest odds of peritumoral edema[10], while tentorial lesions were found to only moderately increase the risk of edema. However, another investigation using CT scans also found no correlation between the severity of edema and its location.[12] Higher-grade meningiomas may be associated with a lack of a skull base location, advanced age (defined as 65 years), and being male. However, other researchers could not discover any links between localization and histological characteristics.

These topics are still up for discussion, and comparing series is tricky due to methodological differences. Even so, it is still crucial to validate risk factors, especially when looking at less intrusive treatment options. The literature led us to propose a retrospective study of a large surgical series (n=1,663) from a single centre to look for links between anatomical localization, WHO grade, histological subtype, patient age, and gender.[13,14] We made this supposition based on our past knowledge and the fact that larger tumors tend to be of a higher grade. Therefore, we conducted a retrospective analysis to determine if tumor size was related to tumor grade.

METHOD

A cross sectional study of 150 patients with meningioma tumor, all cases of meningioma available in the archive between 2019-2022 in all cases of meningioma available in the archive between 2019-2022, all patients take age, gender, site and size of tumor and grade of tumor. No excluded criteria. SPSS 22 was used to conduct the statistical analysis, which included the calculation of means, medians, and standard deviations for numerical variables. While the chi-square test is used to determine whether or not two variables are statistically significantly associated, the person correlation test reveals the degree of similarity between two sets of numerical data. There is statistical significance when the p-value is less than or equal to 0.05.

RESULTS

Mean of age of patients (50 ± 13) years old. [43.3%] of patients at age group 46-60 years old, [76%] of patients are females, [68%] of patients have supratentorial tumor, [49%] of patients the tumor size 3-6 mm, and [87.3%] of patients in grade I. as show in table 1.

Table 1: distribution of patients according to age groups, gender, site of tumor, size of tumor and grades of tumor.

variables		frequency	percentage
Age groups (years)	***<20***	4	2.7
	20-45	47	31.3
	46-60	65	43.3
	>60	34	22.7
Gender	***Female***	114	76.0
	Male	36	24.0
Site	***infratentorial***	32	21.3
	spinal cord	16	10.7
	supratentorial	102	68.0
Size	***<3***	31	20.7
	>6	45	30.0
	3--6	74	49.3
Grade	***I***	131	87.3
	II	17	11.3
	III	2	1.3

According to fig 1, the site of tumor as the following; 27 patient's frontal, 17 patients parietal, 15 patients spinal cord and 12 patients sphenoid ring.

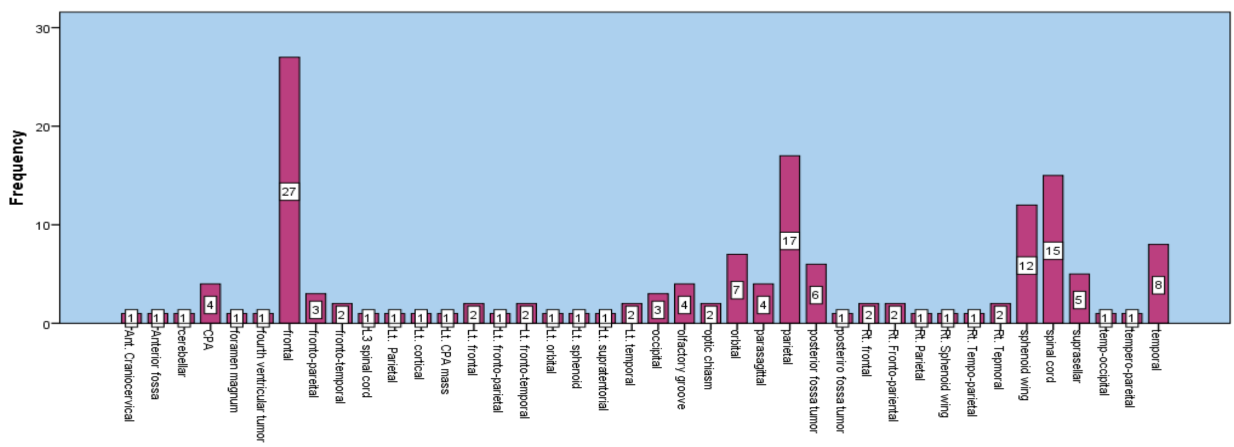

Fig 1: distribution of patients according to histopathological diagnosis in details.

There is no significant association between grades of tumor and age groups, gender, site of tumor, size of tumor, as show in table 2.

Table 2: association between grades of tumor and age groups, gender, site of tumor, size of tumor.

variables		Grade				P-value
		I	II	III	Total	
Age groups (years)	***<20***	4	0	0	4	
		100.0%	0.0%	0.0%	100.0%	
	20-45	41	6	0	47	
		87.2%	12.8%	0.0%	100.0%	0.7
	46-60	57	6	2	65	
		87.7%	9.2%	3.1%	100.0%	
	>60	29	5	0	34	
		85.3%	14.7%	0.0%	100.0%	
Gender	***Female***	100	13	1	114	
		87.7%	11.4%	0.9%	100.0%	0.7
	Male	31	4	1	36	
		86.1%	11.1%	2.8%	100.0%	
Site	***infratentorial***	29	3	0	32	
		90.6%	9.4%	0.0%	100.0%	
	spinal cord	14	2	0	16	0.9
		87.5%	12.5%	0.0%	100.0%	
	supratentorial	88	12	2	102	
		86.3%	11.8%	2.0%	100.0%	
Size	***<3***	26	5	0	31	
		83.9%	16.1%	0.0%	100.0%	0.8
	>6	39	5	1	45	
		86.7%	11.1%	2.2%	100.0%	
	3--6	66	7	1	74	
		89.2%	9.5%	1.4%	100.0%	

P-value ≤0.05 (significant).

DISCUSSION

Meningiomas are tumors of the meninges, and because of their benign nature, most incidentally discovered lesions are treated with extreme caution. Because of this, MRI is sometimes the sole method available for diagnosing meningioma and detecting problems in the early stages of follow-up.

In current study the mean of age of patients (50 ± 13) years old. [43.3%] of patients at age group 46-60 years old, [76%] of patients are females, [68%] of patients have supratentorial tumor, [49%] of patients the tumor size 3-6 mm, and [87.3%] of patients in grade I. This is compatible to other study done in Sri Lanka that state 5.8 females for every male. Their ages ranged from 18 to 80. There was a median age of 50 (interquartile range [IQR] = 42-64) among the participants. One hundred and one patients had isolated meningiomas, whereas the remaining nine had clusters of them.[15] Most meningiomas (n = 78) were found only in the supratentorial region, while 15 were found only in the infratentorial region. The meningiomas, numbering five, had spread to both halves of the brain. Meningiomas were seen in both the supratentorial and infratentorial regions of the brain in two of the instances. The most common supratentorial location was the parieto-sagittal region (n = 16), followed by the frontal region (n = 10) and the frontoparietal region (n = 10). The cerebellopontine angle was found to be the most frequent infratentorial location (n = 9). Single meningiomas (n = 91) were distributed fairly evenly around the head, with 43 cases on the right side, 40 on the left, and 8 in the middle. Maximum meningioma diameters were from 2.9 to 4.1 centimetres, with 3.9 centimetres being the median. In our sample, the largest meningioma measured 9.1 cm in diameter, while the smallest measured 1.1 cm.[15] Another study done in USA state that 1113 patients from the EMR (mean age 55.7 years, range 8-90 years, 73.9% female) (Table 1). The most common presenting complaints were headaches and cranial nerve dysfunction. The WHO grade was based on the condition of the patient at the time of resection. Patients with WHO grade I tumours accounted for 81% of all cases, whereas patients with WHO grade II tumours accounted for 19%. Tumors typically ranged between 3.6 and 3.8 centimeters in diameter, with a mean size of 3.8 centimeters and a standard deviation of 1.8 centimeters (range 0.2–13 cm). Meningiomas were discovered in the skull base in almost half of the patients in our study, in the falx/parasagittal or convexity area in about 40% of the patients, and in other locations in 10% of the patients.[16] Larger meningiomas tend to be WHO grade II tumours. This connection remained independent after crossover with tumour site and male sex in a multivariate analysis. Skull base tumors are less likely to be high-grade than convexity and falx/parasagittal meningiomas.[17,18] Male sex is another known risk factor for atypical meningioma.[19-21] Age wasn't associated to WHO grade, as in previous investigations. Among size, sex, and location, tumour size was the most important differentiating factor between WHO grades I and II. It also detected high-risk male individuals with big tumours. 20% of big meningiomas (> 5 cm) are WHO grade II or III, according to a report.[22] Tumor site also affected recurrence-free survival in that research. Another retrospective study linked tumor size to disease-free survival for radiotherapy-treated atypical meningioma patients.[23, 24] Grade II cancers may grow faster and be larger than grade I tumours. If that were the case, a faster-growing tumour may present early, since they often become symptomatic at a lower size. Once a slow-growing tumour reaches a considerable size, a microenvironment (possibly driven by hypoxia) may accelerate its change to an aggressive phenotype. Next, we'll need to identify what mechanisms promote meningioma growth and grading.[16]

CONCLUSION

Meningiomas are most common in patients between the ages of 46 and 60. Most meningiomas also affect women. The majority of meningiomas range in size from 3-6 millimetres and are found in the supratentorial region. The frontal and parietal regions are the most common locations for details. The majority of meningiomas are grade I.

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