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MENINGIOMA LOCATION, WHO AND SIMPSON GRADE CORRELATION: AN INSTITUTIONAL EXPERIENCE

Neurosurgery

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ABSTRACT

Objective: Many studies have been done to show the pre-operative risk factors for meningioma, including WHO grade, CLASS grade, Simpson grade, tumor size and location. The objective of this study is to evaluate the relationship between, meningioma location, its WHO and simpson grade in a single centre study of patients undergoing meningioma resection.

Material and Methods: It is a retrospective study with a sample size of 100 who underwent meningioma resection, conducted in the Institute Of Neurosurgery, MMC & RGGGH, Chennai, India. Relevant data was collected from history, examination, investigations, operative notes and histopathology reports.

Result: Out of 100 patients, 53 were females and 47 were males. 46 belonged to ASA grade II. Most common presenting feature was headache which was seen in 54 patients. Of 100 patients 21 belonged to GOS grade III, 54 belonged to GOS grade IV and 25 belonged to GOS grade V. Most common site was frontal region (33 %) followed by parasagittal (10%). 85 were of WHO grade I and rest 15 belonged to WHO grade II. Out of 100 patients 70 belonged to Simpson grade I and rest 30 were in Simpson grade III.

Conclusion: From our study we could see that there is a significant relationship between the tumor location, WHO grade and Simpson grade. Predicting tumor grade (WHO and Simpson) from imaging features like location can impact surgical decision making, operative planning, and treatment strategies. Further studies are needed.

KEYWORDS

Meningioma, WHO grade, Simpson grade.

Introduction

The most common primary intracranial neoplasm are meningiomas. Meningiomas are more common in women than men and their incidence increases with increasing age.[1,2,3]They are categorized into 3 histopathological grades by the WHO, with 70%–95% of meningiomas being classified as WHO grade I.[4,5,6,7]Symptomatic tumors are treated primarily with surgery or radiotherapy. The WHO grade II and III meningiomas are more aggressive, with higher rates of mitosis, and are more likely to recur after surgery and require adjuvant treatment with radiotherapy.[28]

Objective

The objective of this study is to evaluate the relationship between meningioma location, WHO and Simpson grade of the meningioma.

Study Design

It is a retrospective study with a sample size of 100 who underwent meningioma resection, conducted in the Institute Of Neurosurgery, MMC & RGGGH, Chennai, India. Study included all patients admitted and operated between Oct 2016 and Dec 2018.Patients with extra-cranial meningiomas and those younger than 20 years and older than 70 years were excluded from the study. Relevant data was collected from history, examination, investigations, operative notes and histopathology reports.

Statistical Analysis

The collected data were analysed with IBM.SPSS statistics software 23.0 Version. To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find the significance in categorical data Chi-Square test was used. In the above statistical tools the probability value .05 is considered as significant level.

Results

ASA		
	Frequency	Percent
1.0	11	11.0
2.0	46	46.0
3.0	43	43.0
Total	100	100.0

(Figure 1)

SEX			
		Frequency	Percent
	F	53	53.0
	M	47	47.0
	Total	100	100.0

(Figure 2)

CLINICAL FEATURES		
	Frequency	Percent
ALTERED SENSORIUM	2	2.0
BACK PAIN	1	1.0
CEREBELLAR SIGNS	4	4.0
GTCS	4	4.0
HEADACHE	54	54.0
HEADACHE, DIPLOPIA	2	2.0
HEADACHE, SEIZURES	6	6.0
HEADACHE, VISUAL DISTURBANCE	4	4.0
HEARING LOSS	2	2.0
PROPTOSIS, VISION LOSS	2	2.0
SEIZURES	12	12.0
SWELLING	5	5.0
VISUAL LOSS	2	2.0
Total	100	100.0

(Figure 3)

SITE		
	Frequency	Percent
ACF	2	2.0
FALX AND TENTORIAL	2	2.0
FRONTAL	33	33.0
IDEM	1	1.0
Left CLINOID	2	2.0
Left PARIETAL	5	5.0
OCCIPITAL SOL	9	9.0
OLFACTORY GROOVE	2	2.0
OPTIC NERVE SHEATH	2	2.0
PARASAGGITAL	10	10.0
POSTERIOR FOSSA SOL	6	6.0
Right CP ANGLE	6	6.0
Right FALCINE	4	4.0

Right LATERAL VENTRICLE	3	3.0
Right PARIETAL CONVEXITY	2	2.0
SPHENOID WING	2	2.0
SUPRASELLAR SOL	2	2.0
TEMPORAL	7	7.0
Total	100	100.0

(Figure 4)

WHO GRADE		
	Frequency	Percent
1	85	85.0
2	15	15.0
Total	100	100.0

(Figure 5)

Simpson		
	Frequency	Percent
1.0	70	70.0
3.0	30	30.0
Total	100	100.0

(Figure 6)

GOS		
	Frequency	Percent
3	21	21.0
4	54	54.0
5	21	21.0
Dead	4	4.0
Total	100	100.0

(Figure 7)

SITE * GRADE Crosstab Count				
		GRADE		Total
		1	2	
SITE	ACF	2	0	2
	FALX AND TENTORIAL	2	0	2
	FRONTAL	31	2	33
	IDEM	1	0	1
	L CLINOID	0	2	2
	L PARIETAL	4	1	5
	OCCIPITAL SOL	7	2	9
	OLFACTORY GROOVE	0	2	2
	OPTIC NERVE SHEATH	2	0	2
	PARASAGGITAL	8	2	10
	POSTERIOR FOSSA SOL	6	0	6
	R CP ANGLE	6	0	6
	R FALCINE	4	0	4
	R LATERAL VENTRICLE	3	0	3
	R PARIETAL CONVEXITY	2	0	2
	SPHENOID WING	2	0	2
	SUPRASELLAR SOL	2	0	2
	TEMPOROL	3	4	7
Total		85	15	100

(Figure 8)

Chi-Square Tests

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	40.795a	17	.001
Likelihood Ratio	35.345	17	.006
N of Valid Cases	100		
a. 30 cells (83.3%) have expected count less than 5. The minimum expected count is .15 (Figure 9)			

SITE * Simpson Crosstab Count				
		Simpson		Total
		1.0	3.0	
SITE	ACF	2	0	2
	FALX AND TENTORIAL	0	2	2
	FRONTAL	33	0	33
	IDEM	0	1	1
	L CLINOID	0	2	2
	L PARIETAL	5	0	5
	OCCIPITAL SOL	8	1	9
	OLFACTORY GROOVE	0	2	2
	OPTIC NERVE SHEATH	2	0	2
	PARASAGGITAL	0	10	10
	POSTERIOR FOSSA SOL	4	2	6
	R CP ANGLE	4	2	6
	R FALCINE	0	4	4
	R LATERAL VENTRICLE	0	3	3
	R PARIETAL CONVEXITY	2	0	2
	SPHENOID WING	2	0	2
	SUPRASELLAR SOL	2	0	2
	TEMPOROL	6	1	7
Total		70	30	100

(Figure 10)

Chi-Square Tests			
	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	78.987a	17	.001
Likelihood Ratio	94.876	17	.000
N of Valid Cases	100		
a. 32 cells (88.9%) have expected count less than 5. The minimum expected count is .30 (Figure 11)			

DISCUSSION

There are studies which have looked into the relationship between size, grade and WHO grade. Here we planned to look into the relationship between location, WHO and Simpson grade.

Out of 100 patients, 53 were females and 47 were males. Of 100 patients 46 belonged to ASA grade II (Figure 1 & 2). Most common presenting feature was headache which was seen in 54 patients (Figure 3). Of 100 patients 21 belonged to GOS grade III, 54 belonged to GOS grade IV and 25 belonged to GOS grade V (Figure 7).

As per our study most common site was frontal region (33 %) followed by parasagittal (10%) (Figure 4). Of 100 patients 85 were of WHO grade I and rest 15 belonged to WHO grade II (Figure 5). Out of 100 patients 70 belonged to Simpson grade I and rest 30 were in Simpson grade III (Figure 6).

To correlate between the location and grade, out of 33 frontal meningiomas, 31 were of WHO grade I and 2 belonged to WHO grade II. And of 10 parasagittal meningiomas 8 were in WHO grade I and WHO 2 were in grade II (Figure 8). p-value was highly significant at P ≤ .01, with Pearson Chi-Square value of 40.975 and likelihood ratio of 35.345 (Figure 9).

Relationship between tumor location, size, and WHO grade in meningioma by Stephen T. Magill et al., showed that tumor convexity/falx/parasagittal location (OR 1.90, 95% CI 1.38–2.63,p<0.001) and other location (OR 1.71, 95% CI1.02–2.86,p=0.03)werealsosignificantlyassociatedwithmeningioma being WHO grade II compared to skull base meningiomas. But in our study the convexity/falx/parasagittal were mostly grade I tumors[9].

To correlate between location and Simpson grade, out of all 33 meningiomas in the frontal region belonged to Simpson grade I. Parasagittal being second most common in this study, all 10 meningiomas belonged to Simpson grade III (Figure 10). p-value was highly significant at P ≤ .01, with Pearson Chi-Square value of 78.987 and likelihood ratio of 94.876 (Figure 11).

Long-term prognosis for atypical and malignant meningiomas: a study of 71 surgical cases by Luciopalma et al., the prognostic significance of the Simpson grade of surgical resection and tumor location was also considered. Survival at 5 and 10 years was recorded in 95% and 79%, respectively, of patients with atypical meningioma and in 64.3% and 34.5% of patients with malignant meningioma (p = 0.001). Simpson Grade I resection and location in the cerebral convexity, which were closely related, were found to be associated with a significantly better clinical course in the entire series (p ≤ 0.0016)[10].

Study Limitations

The study was a retrospective one with small sample size. Also the follow- up was of shorter duration without taking recurrence into consideration. Extremes of age were excluded from the study.

CONCLUSION

From our study we could see that there is a significant relationship between the tumor location, WHO grade and Simpson grade. Predicting tumor grade (WHO and Simpson) from imaging features like location can impact surgical decision making, operative planning, and treatment strategies. Further studies are needed.

Abbreviations: GOS- Glasgow outcome scale, ASA- American society of anaesthesiologists.

REFERENCES

1. Baumgartner JE, Sorenson JM: Meningioma in the pediatric population. J Neurooncol 29:223–228,1996.
2. Bondy M, LigonBL: Epidemiology and etiology of intracra- nialmeningiomas: a review. J Neurooncol29:197–205,1996
3. Claus EB, Bondy ML, Schildkraut JM, Wiemels JL, Wrensch M, Black PM: Epidemiology of intracranial meningioma. Neurosurgery 57:1088–1095, 2005.
4. HasseleidBF, Meling TR, RønningP, ScheieD, Helseth E: Surgery for convexity meningioma: Simpson Grade I resec- tion as the goal: clinical article. J Neurosurg 117:999–1006, 2012.
5. KleihuesP, Louis DN, ScheithauerBW, Rorke LB, Reif- enbergerG, Burger PC, et al: The WHO classification of tumors of the nervous system. J Neuropathol Exp Neurol61:215-25–229, 2002.
6. Kshettry VR, OstromQT, Kruchko C, Al-MeftyO, Barnett GH, Barnholtz-Sloan JS: Descriptive epidemiology of World Health Organization grades II and III intracranial meningio- mas in the United States. NeuroOncol17:1166–1173,2015.
7. Louis DN, Ohgaki H, WiestlerOD, Cavenee WK, Burger PC, JouvetA, et al: The 2007 WHO classification of tumours of the central nervous system. Acta Neuropathol 114:97–109, 2007.
8. Rogers L, Barani I, Chamberlain M, Kaley TJ, McDermott M, RaizerJ, et al: Meningiomas: knowledge base, treatment outcomes, and uncertainties. A RANO review. J Neurosurg 122:4–23,2015.
9. Palma L, Celli P, Franco C, Cervoni L, Cantore G. Long-term prognosis for atypical and malignant meningiomas: a study of 71 surgical cases. Journal of Neurosurgery. 1997;86(5):793-800.
10. Magill S, Young J, Chae R, Aghi M, Theodosopoulos P, McDermott M. Relationship between tumor location, size, and WHO grade in meningioma. Neurosurgical Focus. 2018;44(4):E4.