



ANALYTICAL STUDY OF PRESENTATION AND TREATMENT OPTIONS OF INTRACRANIAL MENINGIOMAS

Neurosurgery

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ABSTRACT

Meningiomas are one of the most common extraaxial neoplasms constituting 13-25% of all intracranial neoplasms. It is imperative that proper assessment of the risk and benefit ratio of surgery for patients with meningiomas is done. The analysis was done on patients who were admitted during the period 2010-2013 and were diagnosed as having meningiomas on the basis of clinical and radiological features. Meningiomas are more common in the age group of 40-49 with a female preponderance. Headache was the most common symptom (86%) and convexity meningiomas were the most common accounting for about 30%. A viable alternative for preoperative standardization and stratification of meningiomas and thus helps in effective risk factor analysis and in helping to predict the risk benefit ratio in patients with meningiomas and in eventual identification of those subjects who would benefit the most in relation to the preoperative characteristics and the patient associated morbidities.

KEYWORDS

Meningiomas, Simpson resection, Glasgow Outcome Scale

INTRODUCTION

Meningiomas are one of the most common extraaxial neoplasms of intracranial nature constituting 13-25% of all intracranial neoplasms. Recent advances in neuroimaging has increased the incidence of asymptomatic meningiomas. Arising from arachnoid cap cells meningiomas are present in varied locations and are of diverse histopathological types primarily stratified by the WHO classification into three grades with the majority being of benign grade.

Treatment options for meningiomas have varied historically from mere observation to surgery to radiation therapy to combined modalities of treatment. Most meningiomas being benign and slow growing proper planned treatment is possible thus providing higher chances of complete extirpation of these tumours. The degree of complete surgical removal essentially depends on the location of the tumour and the presence of nearby vital neurovascular structures and eloquent brain matter. The success or otherwise of the surgical modality of treatment offered rests on the completeness of resection as graded by Simpson grading which primarily correlates the degree of extirpation of the meningioma and associated dura with the probability of recurrence.

The varying and heterogenous nature of presentation of the various types of meningiomas and the commonality of occurrence has sparked efforts to primarily predict the success of surgical outcomes in meningioma surgery. It is imperative that proper assessment of the risk and benefit ratio of surgery for individual patients with meningiomas is done keeping with the basic tenet of benefits to far outweigh the risks involved.

AIM OF THE STUDY

Aim of the study is,

- 1) To analyze the various epidemiological and risk factors associated with and influencing surgical outcome in the treatment of meningiomas.
- 2) To assess the validity of the treatment of patients diagnosed with meningiomas and subject to surgical treatment.

The stratification of outcome is done using the GOS and the attendant neurological, post-operative and medical complications are factored in the compartmentalization of the patients undergoing surgical treatment of meningiomas and the risk benefit ratio assessment thereof.

MATERIALS AND METHODS

The analysis was done after proper approval from the IRB/IEC of Government Rajaji Hospital, Madurai on patients who were admitted in the Department of Neurosurgery, Government Rajaji Hospital during the three year period and were diagnosed as having

meningiomas on the basis of clinical and radiological features.

The variables studied included the age, sex and presenting symptoms of the patient with stratification of the patients with regard to their comorbidities and pre-existing medical and chronic disorders and the clinical profile and placed as per the ASA (American Society of Anaesthesiologists) grading from I to IV.

The radiological picture was recorded and the parameters studied were the cross sectional size of the lesion in its maximum extent as reported by the radiologist using standard protocol. Other parameters studied were the anatomical location of the lesion with respect to the normal anatomical disposition of the tumour and the degree of proximity to the vital neural and the vascular entities present in that area and the degree of secondary effects caused by the lesion to the internal milieu of the brain and intracranial compartments.

The inclusion criteria for the patients were categorized as those who were offered the surgical alternative and were willing for surgery as well as amenable and accessible to regular follow up.

The patients who underwent surgery were studied with regard to the degree of extirpation that was done based on the Simpson grading of meningioma resection. The postoperative course was monitored and the patients were assessed at the end of the first week of convalescence and after six weeks following surgery based on the GOS (Glasgow Outcome Scale) between 1-5 (worst- best).

Based on the outcome as assessed by the GOS and the presence of complications (neurological and medical) the outcome evaluation of surgery results were analyzed with regard to the success and otherwise of the surgery for the various types of meningiomas and the observations are presented.

The information collected regarding all the selected cases were recorded in a Master Chart and data analysis was done.

RESULTS

The study encompasses the analysis of the evaluation done of about forty six patients who underwent surgery for meningiomas during the period 2013 to 2016.

The demographic epidemiology of the forty six patients is as follows. The grouping of patient with respect to the age wise break up is age range of (<29-13%, 30-39-22%, 40-49-39%, the highest, 50-59 -17%, >60-9%). The sex based incidence showed a female preponderance of about 76% in females and 24% in males.

With regard to the symptomatology of presentation the findings were as follows

Headache and vomiting	-	38
Headache alone	-	2

Seizures	-	9
Hemiparesis/Deficits	-	3
Behavioural disturbances	-	2
Diminution of vision	-	7
Papilledema	-	3

The location of the lesion and the radiological correlate were found to be

Left sided lesions	-	46%
Right sided lesions	-	39%
Midline structures	-	15%

The anatomical location of the meningiomas as radiologically diagnosed and the findings were (Table 1)

Table 1- Parameters of CLASS algorithm

Location of the lesion	Percentage
Convexity	30
Parasagittal	15
Tentorial	13.5
Sphenoid wing	13.5
Falcine	7
Olfactory groove/Basifrontal	7
Suprasellar	4
Cerebellopontine angle	4
Petroclival	2
Clinoidal	2
Intraventricular	2

Table 1-Classification based on site

The other parameter that was diagnosed radiologically was with respect to the size of the lesion

Size greater than 4cm	-	19
Size less than 4cm	-	27

The preoperative functional status of the patient was analysed based on the ASA scale and the stratification was 59% of patients in ASA Stage II, 39% of patients in Stage III and 2% of patients in Stage I. All patients were subject to surgical treatment and the results of the surgery was measured by the parameters of the Glasgow Outcome Scoring at the end of the period of 6 weeks post operatively. The overall GOS distribution was as follows (Table 2)

Table 2-DISTRIBUTION OF CASES ACCORDING TO GOS

GOS 1	GOS 2	GOS 3	GOS 4	GOS 5
4(9%)	3(7%)	2(4%)	35 (76%)	2 (4%)

The scoring of the patients was done with GOS less than or equal to 3 taken as poor outcome and GOS more than 3 taken as representative of good outcome.

The outcome was also assessed on the basis of the postoperative neurological and medical complications that were also analyzed.(Table 3)

Table 3-Analysis of outcome

TOTAL SURGERIES	COMPLICATIONS	NO COMPLICATIONS
46	12(26%)	34(74%)

The distribution of the type of complications included wound related predominantly pseudomeningocele and neurological complications such as visual deterioration,hemiparesis,aphasia and behavioral disturbances.

The study also included medical complications the most important of which was deep vein thrombosis leading on to pulmonary embolism and the overall mortality was 3/46 (2 of which were due to associated medical complications).

DISCUSSION

The study encompasses the results of the analysis of 46 patients who

underwent surgical treatment for meningiomas in the Department of Neurosurgery at Government Rajaji Hospital Madurai.

The epidemiological analysis revealed that the incidence of meningiomas in terms of occurrence was more common in the age group of 40-49 with 39% of patients presenting in this age group closely followed by the age group of 30-39 with 22% with an incremental incidence with increasing age.

The overall ratio of sexual preponderance of meningiomas heavily tilts towards the female sex with three times more likely incidence and an odds ratio of 10.02 indicating ten times the odds of developing meningiomas.(Table 4)

Table 4-SEX DISTRIBUTION

Male : Female	24:76	1:3	OR -10.02
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With regard to the primary symptomatology of presentation the study indicates that the most common symptom is headache and vomiting both of which are nonspecific in the sense that no localization could be attributed to the headache as was evidenced in 40 of 46 patients about 86.9% of the total sampled.

The side of lesion as was exemplified in the study was of the distribution of a slightly predominant left sided occurrence of 46% compared to 39% which were right sided and 15% midline location.The location of the meningioma was of the order that convexity meningiomas were the most common accounting for about 30% of the lesions with parasagittal and falcine meningiomas making up about 22% of the lesions. (Table 5).

Table 5-CORRELATION OF LOCATION IN MENINGIOMAS

Location of the lesion	Observed
Convexity	30
Parasagittal/falcine	22
Tentorial	13.5
Sphenoidal	15.5
Olfactory groove/Basifrontal	7
Suprasellar	4
Posterior fossa	6
Intraventricular	2

With regard to the size of the lesions the findings of the study were of the order that 59% of lesions measuring less than 4cm and 41% of lesions were greater than 4cm with no significant odds ratio of occurrence.

The preoperative morbidity status of the patients analyzed in the study was of the finding of 59% of patients placed in the ASA II category and 39% of patients in the ASA III category.

CONCLUSION

The overall results and conclusions from the study corroborate the following findings were on the basis of the results of the observations on the forty six patients in the study.

The epidemiological conclusions were that the incidence of meningiomas is highest in the fourth decade with a marked preponderance of lesions in females. The primary symptomatology is headache of a non-localizing variety accompanied by vomiting. Most of these symptoms were mild to moderate in intensity and severity.

With regard to the imaging findings the location of the lesion was more in the convexities of the cerebral hemispheres followed by the parasagittal/falcine varieties and tentorial and sphenoid wing varieties with no specific predilection for side and midline located lesions formed a third of these varieties.

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