Original Research Article

CLASS ALGORITHM EVALUATION OF MENINGIOMA RISK VARIABLES AFFECTING SURGICAL OUTCOMES

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ABSTRACT

Background: Meningiomas are prevalent intracranial neoplasms that account for 13-25% of all intracranial neoplasms and are located outside the brain tissue. The incidence of asymptomatic meningiomas has risen due to recent advancements in neuroimaging.
Materials and Methods: A total of 60 patients were included in this investigation. This study was conducted at the Department of Neurosurgery & Department of Biochemistry, Andhra Medical College, Visakhapatnam, Andhra Pradesh, India. This study was conducted between October 2022 to September 2023. These patients were diagnosed with meningiomas based on clinical and radiological characteristics.
Results: The study includes the findings of an analysis that was performed on sixty patients who had meningiomas surgically treated prior to the study's completion. According to the epidemiological analysis, meningiomas were most commonly found in patients aged 40–49, with a close second place for patients aged 30-39, when compared to the incidence of these tumours in the 55.9–56.4% age group and the overall Western population, where the incidence increases with age. This was the case when comparing the two age groups.
Conclusion: The following findings were based on the findings of the observations made on the patients who participated in the study, and the overall results and conclusions from the study corroborate these findings.
Keywords: Algorithm, meningioma, risk variables, surgical outcomes.

INTRODUCTION

Meningiomas are prevalent intracranial neoplasms that account for 13-25% of all intracranial neoplasms and are located outside the brain tissue. The prevalence of asymptomatic meningiomas has risen due to recent advancements in neuroimaging. Meningiomas, which originate from arachnoid cap cells, can be seen in different sites and exhibit various histological characteristics.[1] They are usually classified into three classes based on the WHO classification, with the majority being classified as benign. The treatment options for meningiomas have historically ranged from simple monitoring to surgical intervention, radiation therapy, or a combination of therapeutic modalities. Due to the benign and slow-growing nature of most meningiomas, effective treatment planning can be carried out, increasing the likelihood of successfully removing these tumours completely.[2,3]

The extent of successful surgical excision primarily relies on the tumors placement and its proximity to critical neurovascular structures and functional brain tissue. The effectiveness of the surgical treatment depends on the extent of resection, as evaluated by Simpson grading.[4] This grading system primarily assesses the removal of the meningioma and the associated dura, and how it corresponds to the likelihood of the tumour coming back. The diverse and heterogeneous presentation of different forms of meningiomas, along with their frequent incidence, has prompted efforts to primarily forecast the surgical outcomes in meningioma surgery.[5,6]

Due to the benign histological nature of meningiomas, it is crucial to thoroughly evaluate the risk and benefit ratio of surgery for each patient. This assessment should adhere to the fundamental principle that the benefits should significantly outweigh the associated risks. This study evaluates the validity of several stratification methods, such as the "CLASS" algorithm, established with the specific goal in mind.[7,8]

The aim of this study was to examine the different epidemiological and risk factors that are linked to and have an impact on the surgical result in the treatment of meningiomas. The objective of this study is to evaluate the accuracy of the CLASS algorithm in patients with meningiomas who have surgical treatment. The study aims to compare the results and outcomes of this research with other significant studies in the literature that have also used the CLASS algorithm for meningiomas.

MATERIAL AND METHODS

A total of 60 patients were included in this investigation. This study was conducted at the Department of Neurosurgery & Department of Biochemistry, Andhra Medical College, Visakhapatnam, Andhra Pradesh, India. This study was conducted between October 2022 to September 2023. These patients were diagnosed with meningiomas based on clinical and radiological characteristics.

RESULTS

The study entails the examination of the assessment performed on around 60 patients who undergone surgical procedures for meningiomas. The patients were classified based on the class algorithm and the outcome factors were analysed. The demographic epidemiology of the 60 patients is as follows. The classification of patients according to their age is displayed in. [Table 1]

The age group of 40-49 years old has the highest patient count, whilst the age group of 60 years old or above demonstrates the lowest patient count. The data is provided in table 1, which also encompasses the age distribution of the patients.

Table 2 presents statistics on the distribution of sexes, with 36 females and 24 males detected. [Table 2]

In Table 3, the number of patients with lesions on the left side was reported to be the highest, with a total of 29 individuals. [Table 3]

Table 4 presents the distribution of patients according to their ASA stage. The majority of patients were classified as stage II, while a small number were classified as stage I. [Table 4]

Table 5 displays the patient's class scores. It is noted that class I has the highest number of patients, while class III has the lowest number of patients. [Table 5]

Table 1: Distribution by age

Sr. No.	Age Range	Number of patients	%
1.	< 29	8	13.33
2.	30-39	14	23.33
3.	40-49	26	43.33
4.	50-59	8	13.33
5.	> 60	4	06.66

Table 2: The incidence dependent on sex

Sr. No.	Sex	Number	%
1.	Male	24	40
2.	Female	36	60

Table 3: Side of lesions

Sr. No.	Side of lesion	Number	%
1.	Left Sided Lesions	29	48.33
2.	Right sided lesions	21	35.00
3.	Midline lesions	10	16.67

Table 4: ASA stage of the patients

Sr. No.	ASA stage	Number of patients	%
1.	I	2	3.33
2.	II	37	61.66
3.	III	19	35.00

Table 5: Class scoring of the patients

Sr. No.	Class scoring	Number of patients	%
1.	Class I	36	60
2.	Class II	22	36.66
3.	Class III	2	3.33

DISCUSSION

This paper presents the results of an analysis conducted on a cohort of sixty patients who underwent surgical intervention for meningiomas at the Department of Neurosurgery and Department of Biochemistry, Andhra Medical College, Visakhapatnam, Andhra Pradesh. The epidemiological analysis revealed that the largest occurrence of meningiomas was observed in individuals aged 40-49 years, with 39% of patients falling within this age range. The age group of 30-39 years had the second highest number of patients, accounting for 22% of the total. This is in contrast to the occurrence of these cancers in individuals aged 55.9-56.4 years, as described by Das et al., and in comparison to the incidence of tumours in the Western population aged 55-64 years, as indicated by the CBTRUS investigation. The CBTRUS study showed that the incidence of tumours increases with age.[9-11]

An odds ratio of 10.02 suggests that the chances of having eningiomas are ten times higher. This implies a significant bias towards females in terms of the overall ratio of meningiomas. Females have a threefold higher likelihood of developing meningiomas. The male-to-female ratio ranges from 1:1.4 to 2.6. There exists a notable disparity.[12] Regarding the main symptoms seen, the study shows that the most common symptom is a headache, followed by vomiting. Both of these symptoms are generic, meaning that the headache cannot be ascribed to a specific location. This was evidenced in 86.9% of the overall sample, specifically in forty out of sixty individuals.[13-15]

The study showed that the lesion was more commonly seen on the left side (46% of cases) compared to the right side (39% of cases) and the midline (15% of instances). Convexity meningiomas were the most common type of meningioma, comprising around thirty percent of the total lesions, based on their location. Parasagittal and falcine meningiomas constituted around twenty-two percent of the lesions.[16-18]

Regarding the size of the lesions, the study's findings revealed that 59% of the lesions were smaller than 4 centimetres, but 41% of the lesions were larger than 4 centimetres. In addition, none of the lesions showed a significant odds ratio of occurrence.[19] After using the CLASS algorithm to patient stratification, it was found that 59% of patients were categorised into Group I, 32% were categorised into Group II, and 9% were categorised into Group III.[20] Regarding the preoperative morbidity status of the patients studied in the study, it was found that 59% of patients were classified as ASA II, while 39% were classified as ASA III. In comparison, the percentage of patients put in the ASA II category ranged from 42.6% to 46%. When examining the relationship between the grade of resection and the CLASS algorithm grouping, it was found that 44% of patients in group I had grade 1 resection, while 40% of patients in group II and 25% of patients in group III had grade 1 resection.[21,22] Following that, the outcome parameters of the surgical methodology used in relation to the CLASS stratification were analysed in terms of the Glasgow Outcome Scoring, and the results were compared with the findings.[23,24] The study examined the relationship between surgical intervention and poor outcome, as measured by the GOS score of 1-3, using the 'CLASS' scoring system. The results showed that the percentage of poor outcomes was roughly 15% in Group I, 20% in Group II, and around 50% in Group III. Statistical analysis confirmed the correlation between these findings. The computed odds ratio comparison between Group III and Group I was 5.6, and the odds ratio comparison between Group III and Group II was.[25-27]

Analysed and compared the odds ratio of experiencing an unfavourable outcome based on the CLASS score. The study classified the post-operative complications based on the analysis of the CLASS algorithm. The odds ratio was determined to be 4.55 when comparing Group III to Group I, while it was determined to be 2.03 when comparing Group II to Group I. This suggests that there was a substantial and increased likelihood of difficulties having taken place.[28-31]

CONCLUSION

The study's overall findings and conclusions are derived from observations of the 60 patients in the study. Epidemiological data suggests that meningiomas are most commonly observed in individuals in their fourth decade of life, with a notable higher incidence of these tumours in females. The primary indication is a headache that is not specific to a particular area, accompanied by vomiting. Most of these symptoms displayed a mild to moderate level of intensity and severity. The study illustrates the simplicity and practicality of identifying the individuals with meningiomas who would derive the greatest advantage from their preoperative features and accompanying morbidities. This is corroborated by the comparative findings acquired in this investigation, emphasizing the ratio of risk to reward.

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Conflict of Interest

None.

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