Original Article

Surgical Outcome Following Meningioma Operation: Our Experience from a Tertiary Care Hospital

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Abstract

**Background:** Meningiomas are the commonest predominantly non-malignant brain tumour in adults. Various epidemiological and risk factors are associated with and influencing surgical outcome in the treatment of meningiomas.

**Objective:** The aim of the study is to assess surgical outcome by using the Glasgow Outcome Scale (GOS) for cranial meningiomas.

**Materials and Methods:** This prospective study conducted in Neurosurgery Department of Shaheed Shiek Abu Naser Specialized Hospital and other private Medical Colleges in Khulna from Jan 2018 – July 2019. Total 21 patients with meningioma underwent surgery are included in the study. The parameters analyzed included age, gender, location of tumor on imaging, histopathological type, and grade of tumor according to the 2007 WHO classification. The surgical outcome was assessed by the Glasgow Outcome Scale (GOS) at the end of the 1st week of convalescence and after 6 weeks following surgery. Favorable and unfavorable outcomes were defined as GOS 4–5 and GOS 1–3, respectively.

**Results:** Meningiomas are more common in the age group of 40–49 years with a female preponderance (61.90%). Headache was the most common symptom and convexity meningiomas were the most common accounting for about 42.85%. Simpson grade I achieved 10 (47.61%), Simpson II 5 (23.80%), Simpson III 2 (9.52%), Simpson IV 3 (14.28%) and Simpson V 1 (0.5%) respectively. Regarding histopathological examination most of the tumours were WHO grade 1 (85.71%). Surgical outcome assessed by the Glasgow Outcome Scale and majority of patients of this study GOS were between 4–5 which was good (90.47%).

**Conclusion:** The outcome for patients with meningioma is good and is improving. However, there remains a significant mortality related to disease process.

**Keyword:** Meningioma, Simpson grade, Histopathological type, Surgical outcome.

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Introduction:
Meningiomas are one of the most common extra-axial neoplasms of intracranial nature constituting 15-20% of all intracranial neoplasms¹,². They are twice as common in the female as in the male population, but a reverse male-to-female preponderance of 3:1 has been reported in the malignant form. The incidence increases with age with peak incidence between the ages of 40 and 60 years. A slight drop after the 8th decade has been noted³. Recent advance in

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neuroimaging have increased the incidence of asymptomatic meningiomas. Arising from arachnoid cap cells, meningiomas are present in varied locations. Histopathologically, meningiomas currently are separated into three grades, i.e., benign (ordinary) meningioma, atypical meningioma, and anaplastic (malignant) meningioma, that intend to reflect the clinical behavior of the tumor.

Treatment options for meningiomas have varied historically from mere observation to surgery to radiation therapy to combined modalities of treatment. The degree of complete surgical removal essentially depends on the location of the tumor and the presence of near by vital neurovascular structures and eloquent brain matter. 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.

Materials and Methods:
This prospective study conducted in Neurosurgery Department of Shaheed Shiek Abu Naser Specialized Hospital and others private Medical Colleges in Khulna from Jan 2018 – July 2019. Total 21 patients with meningioma underwent surgery are included in study. The parameters analyzed included age, gender, location of tumor in imaging, histopathological type, and grade of tumor according to the 2007 WHO classification. 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 post-operative course was monitored. The outcome was assessed by the Glasgow Outcome Scale (GOS) at the end of the 1st week of convalescence and after 6 weeks following surgery. Favorable and unfavorable outcomes were defined as GOS 4-5 and GOS 1-3, respectively. In addition, postoperative surgical (Neurologic and Nonneurologic) and medical complications within the first postoperative month were recorded. The information collected regarding all the selected cases in a master chart, and data analysis was done.

Results:
The study encompasses the analysis of the evaluation done of about 21 patients who underwent surgery for meningiomas during the period January 2018-July 2019. The outcome parameters were analyzed.

### Table I

| Distribution of cases according age (n=21) |
|---|---|---|
| Age | Number | Number (%) |
| <29 | 2 | 10% |
| 30-39 | 6 | 29% |
| 40-49 | 8 | 38% |
| 50-59 | 4 | 19% |
| >60 | 1 | 5% |

Table II Shows age distribution of the study patients. The grouping of patient with respect to the age-wise breakup is age range of <30-10%, 30-39-29%, 40-49-38%, the highest, 50-59-19%, >60-5%.

### Table II

| Distribution of cases according sex(n=21) |
|---|---|---|
| Sex | Number | Number (%) |
| Male | 8 | 38.09% |
| Female | 13 | 61.90% |

Table II Shows sex distribution of the study patients. The sex-based incidence showed a female preponderance of about 62% in females and 38% in males.

### Table III

| Distribution of cases according symptoms(n=21) |
|---|---|---|
| Symptoms | Number | Percentage |
| Headache & vomiting | 10 | 47.61% |
| Headache only | 1 | 4.76% |
| Seizure | 2 | 9.52% |
| Hemiparesis/deficit | 3 | 14.20% |
| Behavioral disturbances | 1 | 4.76% |
| Diminution of vision | 2 | 9.52% |
| Papilledema | 2 | 9.52% |

Table III With regard to the symptomatology of presentation, the findings were as follows: Headache and vomiting (47.61%), Headache alone (4.76%), Seizures (9.52%) Hemiparesis/Deficits (14.20%) Behavioral disturbances (4.76%), Diminution of vision (29.52%), Papilledema (9.52%).
Table IV
Distribution of cases according to anatomical locations (n=21)

| Location of the lesion | Number | Percentage |
|------------------------|--------|------------|
| Convexity              | 9      | 42.85%     |
| Parasagittal           | 4      | 19.04%     |
| Falcine                | 1      | 4.7%       |
| Suprasellar            | 2      | 9.52%      |
| Olfactory groove       | 2      | 9.52%      |
| Sphenoid wing          | 2      | 9.52%      |
| Interosseous           | 1      | 4.7%       |

Table IV shows anatomical location of the tumour and maximum tumours were convexity meningioma (42.85%).

1Table-V
Distribution of cases according to simpson grading (n=21)

| Simpson grading | Number | Number(%)  |
|-----------------|--------|------------|
| I               | 10     | 47.61%     |
| II              | 5      | 23.80%     |
| III             | 2      | 9.52%      |
| IV              | 3      | 14.28%     |
| V               | 1      | 4.76%      |

Table V shows Simpson grading I (47.61%) and grade II (23.80%) respectively.

Table VI
Distribution of cases according to GOS (n=21)

| GOS              | Number | Number(%)  |
|------------------|--------|------------|
| Good outcome (4-5)| 19     | 90.47%     |
| Poor outcome (1-3)| 2      | 9.52%      |

Table VI shows Glasgow outcome scoring <3(9.52%) and >3(90.47%).

Table VII
Analysis of outcome according to post up complications (n=21)

| Total surgeries | Complications | No complications |
|-----------------|---------------|------------------|
| 21              | 3(14.28%)     | 18(85.72%)       |

Table VII shows the post-operative neurological and medical complications that were also analyzed (Table VII).

Table VIII
Distribution of cases according to WHO grading (n=21)

| WHO Grade | Number | Number (%) |
|-----------|--------|------------|
| i         | 18     | 85.71%     |
| ii        | 2      | 9.52%      |
| iii       | 1      | 4.76%      |

Table VIII shows Histopathological examination report of study group which were WHO Grade1 (85.71%), WHO Grade2(9.52%), WHO Grade3(4.76%).

Discussion:
The study encompasses the results of the analysis of 21 patients who underwent surgical treatment for meningiomas in Neurosurgery Department of Shaheed Shiek Abu Naser Specialized Hospital and others private Medical Colleges in Khulna from Jan 2018 –July 2019.

The epidemiological analysis revealed that the incidence of meningiomas in terms of occurrence was more common in the age group of 40-49 with 38% of patients presenting in this age group closely followed by the age group of 30-39 with 29% with an incremental incidence with increasing age.

The overall ratio of sexual preponderance of meningiomas heavily tilts toward the female sex and near about two times more than the male. Age and female-to-male ratio in our study were comparable to meningioma patients characteristics in the literature.

With regard to the primary symptomatology of presentation, the study indicates that the most common symptom is headache and vomiting both of which are non-specific in the sense that no localization could be attributed to the headache as was evidenced in 10 of 21 patients about 47.61% of the total sampled.

The site of lesion as exemplified in this study was found to be convexity 42.85%, parasagittal 19.04%, falcine 4.7% suprasellar 9.52%, olfactory 9.52% and interosseous 4.7%. Most of our meningiomas were located over cerebral convexities followed by parasagittal meningiomas. We observed one case of primary intraosseous meningiomas which are consistent with world literature.
Meningiomas with skull-base location and bone invasion were less often completely resected. This is unsurprising as these locations can be technically more challenging due to their restricted surgical access and vicinity to vascular and/or neurological structures. This difference was particularly stark between convexity and cavernous or petroclival meningiomas, where a Simpson grade I or even grade II resection was rarely possible.

The complete surgical resection while preserving the patient’s neurological status is the goal, a Simpson I resection is neither always attainable nor does it guarantee increased Progression free survival. This holds especially true in view of other available adjuvant therapeutic options such as radiotherapy, second surgery, or a watchful wait-and-scan follow-up.

Recently, there has been a trend towards more conservative treatment for meningiomas, mainly because it has been shown that the Simpson grade is not universally applicable to all meningiomas. Hence, a staged treatment with debulking followed by adjuvant treatment might be preferable in order to minimize postoperative morbidity and mortality, especially in skull-base meningiomas.

The analysis of grade of resection reveals that Simpson grade I resection was achieved in 39.4%, Simpson II (23.80%), Simpson III (9.52%), Simpson IV (14.28%) and Simpson V (0.5%) Similar to other series, a Simpson grade I resection was achieved in 9.52%, Simpson II (34.3%), Simpson III (5.4%), Simpson IV (20.6%) and Simpson V (0.5%) of the cases.

The surgical outcome parameters assessed by the Glasgow outcome scoring was 90.47% of GOS 4-5 and 9.52% of GOS 1-3 in our study. Similar study was found where the Glasgow outcome scoring with 80% of GOS 4-5 and 20% of GOS 1-3. The scoring of the patients was done with GOS d”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 post-operative neurological and medical complications that were also analyzed. Total post-up complications were 3 (14.28%) in our study.

In this study, 85.71% of cases were WHO Grade I lesions, 9.52% Grade II, and 4.76% Grade III lesions which are consistent with world literature.

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