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*Original Research Article.*

# A Retrospective Study of Incidence, Pathological Nature & Surgical Outcome of Intracranial Meningiomas

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## ABSTRACT

**Background:** Although meningiomas represent only ~20% of intracranial tumors, they have been referred to as "the soul of neurosurgery." Meningiomas are the most common nonglial primary tumors of the central nervous system, representing 15 to 20% of primary brain tumors. Peak incidence occurs between the fourth and sixth decades. The female/male ratio is reported variously as 2:1 to 4:1. Management of meningioma can be done either by surgery, by radiotherapy or by medical treatment or combination of any of three approaches.

**Aims & objectives:** The aims & objectives of this study were to identify the incidence and pathological nature of intracranial meningiomas. Also to study surgical outcomes of patients undergoing intracranial meningioma surgery.

**Methods & Materials:** This study was done at neurosurgery department at a tertiary care centre. Retrospective analysis of data collected through hospital information system of patients operated for intracranial meningiomas between September 2014 & March 2017.

**Results:** In present study of 100 cases of intracranial meningioma, majority were occurring at convexity 34 (34%) followed by falcine 14 (14%), sphenoid wing 10 (10%) etc. Out of 100 cases around 70% cases occurred in 4th, 5th and 6th decade. There was a female preponderance in our series with a male:female ratio of 1:1.63. The most common histopathological type of tumor was meningothelial meningioma (38%) followed by others. The commonest complication noted in present series was post-operative limb weakness either hemiparesis or monoparesis. Overall outcome after surgery was seen as 66% neurologically intact patients and mortality was only 6%.

**Conclusion:** Present study reported that maximum incidence of meningiomas is in 3rd, 4th & 5th decade and Females were more affected than male with ratio of 1.63:1. In our study the most common histopathological type of tumor was meningothelial meningioma. The most common complications were limb weakness, followed by decreased vision and lower cranial nerve palsy which improved with time.

**Keywords:** Meningiomas, Incidence, Histopathology, Supratentorial, Simpson's Grade.

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## INTRODUCTION

The meningioma is the neurosurgeon's "friend" and often his most enduring challenge. The term meningioma was first coined by Harvey Cushing to describe a benign tumor arising from the central nervous system meninges. Occurrence of meningioma in the general population varies from 2.3 cases per 100,000 people during their lifespan to 5.5 cases per 100,000 if autopsy data are included. Hospital based brain tumor series indicate that the incidence is approximately 20% of all intracranial tumors, a figure derived from the combined results of several large series.[1] Meningiomas in children are rare (1-2% of all primary brain tumors). The availability of better diagnostic modalities, such as CT and MRI, has been suggested as a possible reason for the observed increase in the incidence of brain tumors.[2] The vast majority of meningiomas (92%) have a benign histology, whereas 8% show atypical or malignant features.[3] The most common histopathological subtype is the meningotheliomatous type followed by transitional, fibrous and psammomatous meningiomas.[4] Genetic alteration in the long arm of chromosome 22 plays an essential role in the development of meningioma. Meningiomas are slow-growing tumors derived from specialized

meningothelial cells called arachnoid cap cells. Meningiomas may become symptomatic during pregnancy, with the symptoms abating after parturition, only to reappear in next pregnancy. Symptoms may also be exacerbated during the proliferative phase of menstrual cycle.[5] The imaging of meningiomas has evolved in concert with the advancement of radiographic techniques. Currently available modalities for characterization of meningiomas include (1) plain roentgenograms, (2) computed tomography (CT), (3) magnetic resonance imaging (MRI), (4) magnetic resonance spectroscopy (MRS), (5) cerebral angiography, and (6) radionuclide assays.[6-9] Management of meningioma can be done either by surgery, by radiotherapy or by medical treatment or combination of any of three approaches.[10-15] Surgery is not necessary for every patient with a meningioma

## AIMS & OBJECTIVES

1. To identify the incidence and prevalence of meningiomas
2. To identify pathological nature of these tumors
3. To study morbidity and mortality in the surgical management of these tumors
4. To study the various complications occurring in patients operated for intracranial meningioma

## METHODS & MATERIALS

This study consists of 100 cases of intracranial meningioma treated in Neurosurgery department, Civil Hospital, Ahmedabad from September 2014 to March 2017. These patients were direct admissions from the OPD of department as well as those referred from the departments of paediatrics, medicine & neurology

**Inclusion Criteria**

- All intracranial meningioma treated by surgery.

**Exclusion Criteria**

- Conservatively treated meningioma
- Extracranial (spinal) meningioma.

**Table 1: Tumor location in present series of 100 patients.**

| Sr.no | Classification | Incidence (%) |
|---|---|---|
| 1 | Convexity | 34 |
| 2 | Parasagital | 07 |
| 3 | Falcine | 14 |
| 4 | Sphenoid wing | 10 |
| 5 | Tentorial | 08 |
| 6 | Olfactory groove | 04 |
| 7 | Tuberculam sellae | 04 |
| 8 | Planum sphenoidale | 05 |
| 9 | Petroclival | 03 |
| 10 | C p angle | 07 |
| 11 | Intraventricular | 04 |

**Table 2: Age incidence in present series of 100 patients**

| Age (in years) | Percentage of patient in present series (%) |
|---|---|
| 1-10 | 0 |
| 11-20 | 4 |
| 21-30 | 7 |
| 31-40 | 27 |
| 41-50 | 29 |
| 51-60 | 25 |
| >60 | 8 |

**Table 3: Genderwise incidence of meningiomas in present series:**

| Sr. No | Classification | Male | Female |
|---|---|---|---|
| 1 | Convexity | 16 | 18 |
| 2 | Parasagital | 4 | 3 |
| 3 | Falcine | 6 | 8 |
| 4 | Sphenoid wing | 2 | 8 |
| 5 | Tentorial | 4 | 4 |
| 6 | Olfactory groove | 1 | 3 |
| 7 | Cp angle | 1 | 6 |
| 8 | Tuberculam sellae | 1 | 3 |
| 9 | Planum sphenoidale | - | 5 |
| 10 | Petroclival | 2 | 1 |
| 11 | Intraventricular | 1 | 3 |
| | Total | 38 | 62 |

**Table 4: Pathological nature**

| Histological subtype | No. of patient |
|---|---|
| Meningothelial | 38 |
| Fibroblastic | 17 |
| Transitional (mixed) | 19 |
| Psammomatous | 15 |
| Angiomatous | 4 |
| Microcystic | 3 |
| Secretory | 1 |
| Lymphoplasmacyte-rich | 0 |
| Clear cell | 0 |
| Chordoid | 0 |
| Papillary | 0 |
| Rhabdoid | 0 |
| Atypical | 1 |
| Anaplastic (malignant) | 2 |

## RESULTS AND DISCUSSION

In present study of 100 cases of intracranial meningioma – meningioma occurring at convexity were 34 (34%), falcine 14 (14%), sphenoid wing 10 (10%), c p angle 7(7%), parasagital 7(7%), tentorial 8(8%), planum sphenoidale 5(5%), tuberculam sellae 4(4%), olfactory groove 4(4%), petroclival 3(3%) & intraventricular 4(4%). In comparison, in the Ojemann series the incidence of convexity meningioma is highest 30% followed by cp angle meningioma at 11%, the incidence of falcine and sphenoid wing was equal at 10% and the least common was the incidence of intraventricular meningioma at 2% which are comparable to our study.[13] Patients with optic sheath meningioma were also included in Ojemann series.

Out of 100 cases, 3% tumors occurred in the first decade of life, 5% in the second decade, 17% in the third decade, 20 % in the forth decade, 30 % in the fifth decade, another 20 % in the sixth decade and 5% in the seventh decade and no patient had presented with meningioma in eight decade of life. The present study shows increase incidence in 3rd, 4rth and 5th decade which is comparative with study of Ojemann.[13] The incidence in older age group is decreased in our study is probably because of decrease life expectancy in our country and negligence in older age group Out of 100 patients, 38 were male while 62 were female. There is a female preponderance in our series with a male:female ratio of 1:1.63 which is comparable to that of Ojemann et al series(1:2.66).[13] The difference in sex incidence may be due to small number of patients in our study.

**Table 5: Extent of surgical removal of meningioma**

| Extent of surgical removal (Simpson grade) | No. of patients |
|---|---|
| Grade 0 | 10 |
| Grade i | 27 |
| Grade ii | 54 |
| Grade iii | 8 |
| Grade iv | 1 |
| Grade v | 00 |

**Table 6: Incidence of complications in meningioma surgery**

| Complications | | No. of patient (present series) |
|---|---|---|
| Decrease vision | | 5 |
| CSF Rhinorrhoea | | 2 |
| | 5th n | - |
| | 6th n | - |
| Cranial | 7th n | 5 |
| Nerve | 8th n | 5 |
| Palsies | 9th,10th n | 5 |
| | 11th,12th n | - |
| Meningitis | | 2 |
| Csf leak | | 1 |
| Hematoma | | 2 |
| Wound infection | | 1 |
| Limb weakness | | 11 |
| Gait disturbances | | 1 |
| Pseudomeningocele | | 1 |
| Unconsciousness | | 5 |

In our study of 100 patients of intracranial meningioma the most common histopathological type of tumor was meningothelial meningioma (38%) followed by transitional type (19%), fibroblastic (17%), psammomatous (15%), angiomatous (4%) and microcystic (3%).

Simpson grade 2 excisions was achieved in 54 patients and grade 1 excision was done in 27 patients while grade 3 excision was done in 8 patients & grade 4 in 1 patients. Grade 2 or grade 3 excision was done because of intra operative occurrence of adhesions to major vessels or sinus. Simpson grade 1 excision was done in most cases of convexity meningioma.

The commonest complication noted in present series was post-operative limb weakness either hemiparesis or monoparesis was seen in 11 patients which recovered gradually over a period of 6 weeks to one year, persistent limb weakness was present in 9 patients. Decrease vision was noted in 8 patients, which was improved with time and residual decrease vision remained only in 5 patients. Temporary (Up to 1 month from surgery) lower cranial nerve and facial nerve paresis, which tends to improve with time and residual facial paresis remained only in 3 patients in follow-up. Gait disturbances, like post op cerebellar ataxia was present in 1 patient which recovered gradually on follow up over a period of 4 to 6 weeks. Other common complication was meningitis, which was present in 2 patients and was treated with higher antibiotics, according to culture sensitivity. CSF rhinorhea was present in 2 patients and CSF leak was present in 1 patient who was managed by lumbar drainage. Wound infection was present in 1 patient. Pseudo meningocele was seen in 1 patient who was treated by the coperitoneal shunt. Hematoma was seen in 2 patients and 5 patients developed unconsciousness in post-operative period.

## CONCLUSION

Present study reported that maximum incidence of meningiomas is in 3rd, 4th & 5th decade and Females were more affected than male with ratio of 1.63:1. Most of the patient present with normal neurology. Meningiomas were most common in Supratentorial location. Among Supratentorial meningiomas, cerebral convexity are most common (34%), followed by falcine meningiomas (14%). In our study the most common histopathological type of tumor was meningothelial meningioma. Most of the patients were having Simpson's grade I & II removal. The most common complications were limb weakness, followed by decreased vision and lower cranial nerve palsy which tends to improve with time. Of all the patient studied majority (70%) recovered well without any major neurological deficit. Mortality rate in the present study was 6%.

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