

Original Research Article

A 2 year study of meningiomas in correlation with squash cytology and histopathological examination

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Abstract

Background: Meningiomas are common CNS tumors arising from the meningotheial cells and usual sites are intracranial, followed by intra spinal. WHO 2007 has categorised meningiomas into 3 grades. This grading helps in predicting their behaviour and treatment.

Aim and objectives: To study the frequency, clinical details, histological typing of meningiomas in comparison with squash cytology (intra operative diagnosis) and Histopathological examination post operatively.

Materials and methods: The present study was a prospective study conducted from May 2015 to April 2017 in the Department of Pathology, Gandhi Hospital. We received 50 clinically as well as radiologically diagnosed cases of meningiomas, which were compared with squash cytology and Histopathological examination.

Results: In our study, meningiomas constituted 15% of all CNS tumors received from the Neurosurgery Department in a period of 2 years. In the present study, the number of Meningiomas was 50. Females outnumbered males (36 out of 50). Common site was intracranial (45), followed by intra spinal-thoracic (5). The commonest sub type was meningotheial variant of meningioma (12), followed by transitional variant (11). Squash cytology matched with the Histopathological examination in 91.15% cases.

Conclusion: Meningiomas are predominantly occur intra cranially with female preponderance, majority were of benign grade I neoplasms. Squash cytology plays a major role in their intra operative diagnosis.

Key words

Meningioma, Intra cranial, Squash cytology.

Introduction

The designation of Meningiomas has been extended through the years to diverse neoplasms sharing only a tendency to arise within the histogenetically complex tissue of the leptomeninges or dura matter [1].

Meningiomas may make their appearance in childhood or in adolescence, but mostly occurs in middle or later adult life. Females are mostly affected than males. Common sites are Superior sagittal sinus over the cerebral convexities or in contact with the falx cerebri followed by Sphenoidal ridge, olfactory grooves, parasellar region, cerebello pontine angle. Thoracic spine is more commonly affected when compare with the cervical and lumbar spine. Ectopic Meningiomas are very rare, and noticed at mediastinum, lung, or brachial plexus [away from the central neuraxis [1-3].

Gross Morphology; they are solid, lobulated, globose masses attached to the Dura matter. Cystic variants are rare. Very rarely a poorly delimited blanket like growth noticed—Meningioma en plaque [1-3]. Cut section reveals greyish tan and soft with sometimes whorled appearance. Gelatinous, due to the presence of mucopolysaccharides, gritty due to calcifications and grey black pigmentation due to colonization of lepto meningeal melanocytes.

Histopathological variants of Meningiomas

- Conventional or syncytial variant is the commonest one. Shows clusters of meningothelial cells in syncytial pattern with whorled pattern and also presence of psammoma bodies. Individual cells show moderate amount of cytoplasm and oval nucleus and fine to coarse chromatin.
- Fibrous (fibroblastic) Meningioma: The individual cells are spindle shaped, with the formation of inter lacing bundles.

Whorled pattern and Psammoma bodies are less common in this type.

- Transitional cell Meningioma: This variant is characterised by the combination of syncytial and Fibroblastic variants. Psammoma bodies and whorled pattern is common in this variant.
- Angiocentric Meningioma: It has got 2 patterns 1. Hemangioblastic variant; resembling hemangioblastoma of the cerebellum. 2. Hemangiopericytic form. In which the tumor cells arranged perivascularly. Both forms have got high rates of recurrences.
- Anaplastic (malignant) variant of Meningioma: These are rare tumors. Shows atypia, Increased cellularity and mitotic rate and atypical mitotic figures. Anaplasia may invade the underlying brain or spinal cord.
- Clear cell Meningioma: A distinctive variant of Meningioma characterised by sheets of polygonal cells with clear cytoplasm which contains abundant glycogen, coarse stromal and perivascular arrangement of collagen is the characterised pattern. This type must be distinguished by the metastatic deposits of renal cell carcinoma. Common sites are caudaequina and CP angle.
- Chordoid Meningioma: Typically extra osseous lobular tumor. Microscopically the tumor cells form chains of eosinophilic, occasionally vacuolated cells resembling meningothelial cells. The histological pattern mimics chordoma.

Grading of meningiomas is based on WHO 2007 classification.

Grade I is benign, grade II-atypical and grade III-Malignant. Higher grade meningiomas tend to behave more aggressively and recurrent rate is

more. Immuno histo chemistry; all meningiomas show vimentin positivity; majority stain for epithelial membrane antigen less frequently. S – 100 protein positivity is also noted.

Materials and methods

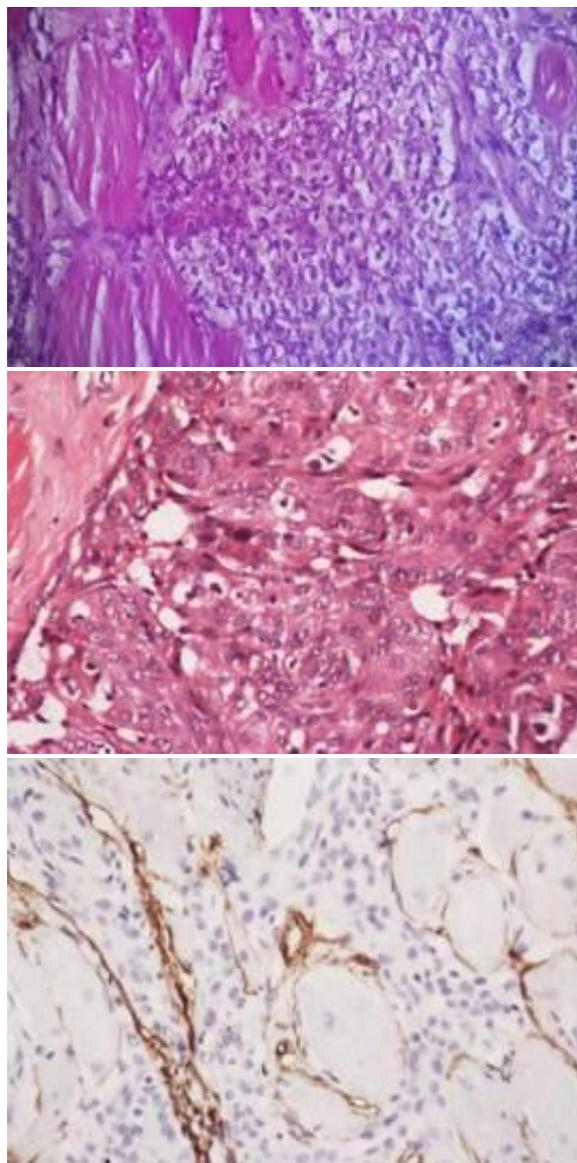
The above study was a prospective study of 2 years duration from May 2015 to April 2017. Fifty (50) specimens were received from the department of neurosurgery after clinical and radiological confirmation of meningioma. All these were subjected for intra operative squash cytology and post-operative histopathological examination and correlated and confirmed accordingly.

The details of each patient were taken from medical records that are age, gender, clinical presentation; radiological evaluation and location were noted. Squash cytology was done by the rapid Haematoxylin and eosin stain and Giemsa and Toluidine blue stain. Post-operative specimens are subjected to the processing and stained with hematoxylin and eosin stain. The sections were viewed and sub typed after histopathological examination (**Figure – 1 to 5**).

Figure – 1, 2: 60\f with Fronto temporal mass, Gross 6 x 4 x 2 cm in size; C\S grey white.



Figure - 3, 4, 5: Microscopical findings: Tumor cells were arranged in syncytial pattern, whorl pattern was also noted. Some places clearing of the cytoplasm was noted. IHC: Positive for vimentin.



Results

Total 335 CNS tumors received during a period of 2 years, out of which 50 (15%) were meningiomas. The most common affected age group was 41 to 60 years (22). Females' outnumbered males (**Table - 1**).

Cerebral convexity was the common site, constitutes 40%. Extra cranial meningiomas were 5 in number and majority occurred in the thorax (**Table - 2**).

Table - 1: Age and Sex incidence of meningiomas.

Age	Male	Female	Total
0-20	1	3	4 (8%)
21-40	2	14	16 (32%)
41-60	7	15	22 (44%)
61 and above	4	4	8 (16%)
Total	14 (14%)	36 (72%)	50

Table - 2: Regional distribution of meningiomas.

Region	Site	Number and percentage
Cranial		
a. Cerebral convexity	Frontal	10 (20%)
	Fronto parietal	4 (8%)
	Parietal	7 (14%)
	Parieto temporal	4 (8%)
	Temporal	3 (6%)
	Parieto occipital	3(6%)
	Occipital	3(6%)
	Tentorium cerebellum	3(6%)
	Sellar, supra sellar	1(2%)
	Posterior cranial fossa	2(4%)
	Cerebello pontine angle	3(6%)
	Intra ventricular	2(4%)
Extra cranial		5 (10%)

Table - 3: Histological subtypes of meningiomas.

Type of meningioma	Number	Percentage
Meningothelial	12	24
Transitional	11	22
Psummatous	8	16
Fibroblastic	8	16
Angiomatous	6	12
Atypical	1	2
Metaplastic	1	2
Mixed	2	4
Clearcell	1	2
microcystic	1	2

In the present study, meningothelial meningioma was the commonest type constitutes 24% followed by transitional type (22%) (**Table – 3**).

In our study radiological correlation was 75%, with the histopathologic study whereas intra operative squash smears and post-operative histopathological examination correlates 91%.

Discussion

Meningiomas are the most common non glial primary tumors of the CNS, accounting for nearly 15 to 30% of all CNS neoplasms [3]. Female preponderance is more when compared with males. In our study, females constituted 36 in number (72%). Middle ages (40-60 years) are prone for the occurrence of meningiomas. In our study this age group comprised 44% of all age groups. Meningiomas are usually slow growing benign neoplasms presenting with the signs and symptoms of intra cranial tension [3]. Radio

imaging plays a vital role in locating as well as diagnosing the meningiomas.

Intra operative squash cytology provides rapid, reliable, diagnosis as well as guidance to the surgeon during surgery [4]. The most common patterns of meningiomas observed in our study were meningothelial variant 24%, followed by the transitional variant 22%. Our study corresponding with the various studies done by Srilakshmi, et al., Haradhan, et al., but differs with the studies of Thomas Backer, et al., and Joseph Wanjeri, et al., in their study transitional meningiomas outnumbered meningothelial meningiomas (**Table - 4**) [4-8].

Table - 4: Comparison of incidence of histological subtypes of meningiomas.

Study	Meningothelial meningioma	Transitional meningioma
Present Study	24	22
Hardhan, et al. [6]	32	20
Srilakshmi, et al. [4]	23.4	15.6
Thomas Backer, et al. [7]	17	40
Joseph Wanjeri, et al. [8]	22.5	26

Histopathological study is an important predictor of tumor behaviour and is frequently a factor in taking the decision regarding the therapy. Interestingly we got very rare cases of clear cell variant, microcytic variant and metaplastic variant of meningiomas. Metaplastic variant shows focal cartilaginous differentiation. We observed two mixed tumors I. Fibroblastic variant of meningiomas with associated schwannoma, II. Meningothelial variant of meningioma with grade II glioma. One case of atypical variant of meningioma and six cases of angioblastic meningiomas, almost covering majority of the subtypes. The above study corresponds with the study done by Patil PR and Sondankar D, et al. [1].

There was 90% squash cytology results corresponding to the studies of histo pathological examination. This was in parallel with the study of Gabriella D, et al. and Plesec TP, et al. [9, 10], who found 94% concordance. In our study, it was difficult for us to differentiate two cases of fibroblastic meningiomas from schwannoma in squash cytology and also in two mixed cases the meningioma component was identified by the squash cytology but the other components i.e., grade II gliomas and schwannoma were missed by us. Later on histopathological examination confirmed the diagnosis of mixed tumors. But squash cytology reports did not cause any adverse impact on immediate surgical treatment of the patient.

Conclusions

Squash cytology is an intra-operative, rapid, reliable and simple technique for the diagnosis of meningiomas.

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