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SUPRASELLAR TUMORS;
PRE-OPERATIVE AND POST-OPERATIVE VISUAL STATUS IN PATIENTS. A TERTIARY CARE EXPERIENCE FROM KARACHI, PAKISTAN

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ABSTRACT… Objectives: Our aim was to analyze the postoperative visual status in patients with suprasellar tumors with preexisting preoperative visual deficit after surgical resection. **Study Design:** Comparative cross section study. **Setting:** Civil Hospital Karachi. **Period:** March 2013 to August 2016. **Methods:** A total of 107 patients with suprasellar tumors with preoperative visual deficit who were operated. Either via transsphenoidal (43) or transcranial (64) approaches, were included in this case series. Sixty six patients had pituitary adenomas, 24 had craniopharyngiomas, 13 had meningiomas, 3 had chordomas and 1 had epidermoid cyst. Twenty five patients had uniocular visual deficit and 82 had binocular. Visual acuity was recorded preoperatively, postoperatively at discharge and at four weeks follow-up. **Results:** Postoperatively 46% of eyes improved, while 34.4% and 19.6% remained same and deteriorated respectively. Patients underwent transsphenoidal technique got significant 65% improvement, and those who underwent transcranial had 37.5% improvement (p-valve=0.005). Pituitary adenomas showed the greatest visual improvement of 65% (p-value=0.000), followed by craniopharyngiomas (33.5%) and meningiomas (7.6%). In total 52 patients (48.6%) showed improvement in vision and the visual acuity of remaining 55 (51.4%) did not improve. **Conclusion:** Patients experience significant benefit in vision after decompressive surgery for suprasellar tumors, especially those who have pituitary adenoma and who undergo transsphenoidal technique.

Key words: Supraseller Tumors. Surgical Decompression. Visual Outcome. Transsphenoidal.

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INTRODUCTION

Suprasellar tumors have a close relationship with anterior visual apparatus, arteries of anterior circulation and neuroendocrine structures.[1,2] This anatomical proximity makes the safe surgical resection difficult. The tumors located in this region are meningioma, pituitary adenomas, craniopharyngiomas, epidermoid cysts, chordomas, germinomas. Pituitary adenomas are the most common type of suprasellar tumors followed by meningiomas and craniopharyngiomas.[2,3] They can present in the form of hormonal or visual disturbances or with signs of raised intracranial pressure, when they extend into the third ventricle and lead to hydrocephalus.[4]

Blurring of vision is the most common ophthalmic presentation in suprasellar tumors.[5] This visual deterioration, due to optic nerve compression is a common indication for decompressive surgery. There is a growing body of literature describing visual outcomes following optic nerve decompression.[1,2,6] Bulters et al reported 46% improvement in visual acquity following optic nerve decompression.[7]

Trans-sphenoidal approach is ideal for sellar and midline sellar-suprasellar tumors. It provides direct access and is safe and less time consuming than a transcranial operation. However transcranial approach is more suitable for tumors having significant extension into middle or anterior cranial fossa, as it allows better access to these

lesions. Both the transphenoidal and transcranial approaches show improvement in visual acuity in 41.2% and 44.6% of cases respectively, when compared to preoperative assessment.[8,9]

Although abundant data exist in western literature regarding deterioration in visual function with suprasellar lesions and its improvement following surgery, little information is available regarding the same in Pakistani population. The rationale of this study is two folds: Firstly to provide local data regarding postoperative visual outcome in patients with suprasellar tumors with preexisting preoperative visual deficit and secondly, to provide data in order to help counsel patients and their caretakers preoperatively to aid decision-making and set expectations.

MATERIAL AND METHODS

Our study was a comparative cross sectional study conducted at Civil Hospital Karachi. A total of 107 patients with suprasellar tumors fulfilling the inclusion criteria admitted through outpatient department or emergency at neurosurgery department, they were included after taking informed consent. The inclusion criteria included the patients of age >5 years and <60 years, of either sex with either uniocular or binocular visual deficit for < 6 months, having preoperative visual acquity less than 6/6 (i.e. from 6/9 to No light perception), and who underwent surgical removal. Patients who needed conservative management (eg Prolactinomas) or who had only partial debulking were excluded. The sampling technique was non-probability. Data regarding age, sex, ocular involvement, operative procedure opted and visual acuity, on admission, at the time of discharge and in clinic after 04 weeks of surgery.

Mandatory preoperative endocrinologic assessment and imaging investigations were done including both CT and MRI. Patients with diagnosis of prolactinomas, on the basis of raised prolactin, but without any visual deficit, were treated with bromocriptine and excluded from the study.

The patients had either Trancranial or transsphenoidal surgery after the decision which was made on the basis of location of tumor, type of tumor and radiological appearance, by a senior neurosurgeon with minimal 5 years post-fellowship experience.

Snellen's chart was used to record the visual acuity. Vision worse than 6/60 was recorded as finger counting, hand movement, light perception and no light perception. For the purpose of analysis, each of these was considered as a Snellen line.

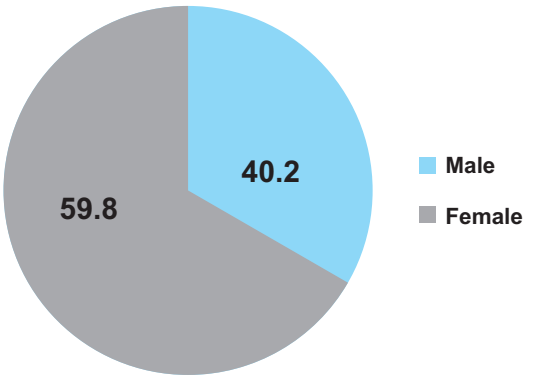
A change in vision for each effected eye was documented as Improved (I)/ Unchanged (U)/ Deteriorated (D), after comparing preoperative VA with VA at 4 weeks followup. The final visual outcome i.e. Improved or Not-improved was assigned to each patient, if VA of either eye improved or if it remained unchanged/ deteriorated respectively.

The data were entered in SPSS (Statistical programme for social sciences) version 17. Data was checked again to avoid any error. Frequencies and percentages were computed for categorical variables like sex, ocular involvement, operative procedure, tumor type and final visual outcome (Improved or Not-improved), whereas mean ± S.D was utilized for numerical variables like age and visual acuity. Stratification was done with regards to age, sex, ocular involvement, operative procedure and tumor type to control the effect on these outcome variables. Through Chi-square test, p-value ≤ 0.05 was taken as significant.

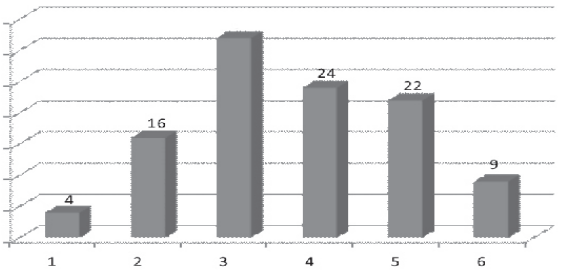
RESULTS

All the patients underwent Transsphenoidal or Transcranial surgery, depending on the location of tumor, type of tumor and radiological appearence, by a senior neurosurgeon and were followed post operatively for two weeks in outpatient department. Visual acuity of all 189 eyes with preoperative visual deficit (defined as decreased VA i.e. VA from 6/9 to No light perception) was recorded on admission, at the time of discharge and in clinics after 4 weeks of surgery.

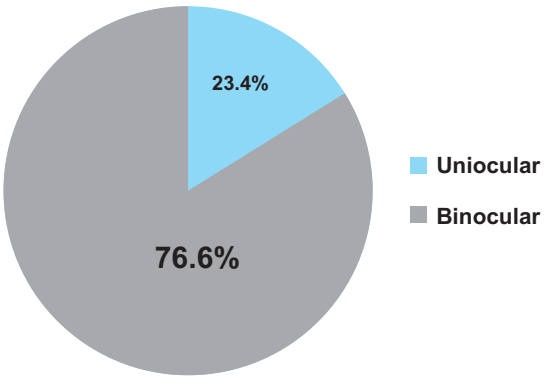
Gender distribution showed female predominance. Out of 107 patients 64 (59.8%) were female and 43 (40.2%) were male.



Patient age ranged from 7 to 56 years (mean age 31.8 years). The maximum number of patients age was 20 to 30 years. (32 patients, 30%) where as 24 (22.4%) patients were in fourth and 22 (20.5%) patients were in fifth decades. Three patients age was less than 10 years and nine patients were older than 50 years.



All of these patients had visual deficit, of whom 82 patients (76.6%) had binocular visual deficit and the remaining 25 (23.4%) had uniocular deficit, leading to 189 eyes with preoperative visual deficit.



All the patients underwent resection of tumor partially or completely depending upon the adherence to neurovascular structures. Transspheoidal approach was performed in 43 patients (40.2%) while transcranial approach was performed in 64 patients (59.8%).

Histopathology came back as pituitary adenomas in 66 patients (61.6%), craniopharyngiomas in 24 patients (22.4%) and meningioma in 13 patients (12%). The remaining patients (3.7%) had chordoma (3 patients) and epidermoid cyst (1 patient).

Out of 107 patients, vision improved in 52 patients (48.6%) and did not improve in the remainder 55 (51.4%).

Outcome	Frequency	Percentage
Improved	52	48.6
Not Improved	55	51.4

Of 25 patients suffering uniocular visual deficit, 10 (40%) experienced improved vision whereas vision of 15 patients (60%) was not improved. Visual improvement was noted in 42 patients (51.2%) with binocular visual deficit and in the remainder 40 patients (48.7%), no improvement was observed.

Out of 189 eyes with visual deficit, 87 eyes (46%) showed improvement after decompressive surgery, while 65 eyes (34.4%) and 37 eyes (19.6%) remained unchanged and deteriorated respectively after surgery.

Outcome	Frequency	Percentage
Improved	87	46
Unchanged	65	34.4
Deteriorated	37	19.6

Visual improvement was observed in 28 patients (65%), who were operated via transsphenoidal technique. No improvement was observed in the remainder 15 (34.8%). In the patients, who underwent transcranial approach, 24 patients (37.5%) had improvement in vision and in the rest 40 (62.5%) no improvement was observed (p-value = .005).

Operative Procedure	Improved	Not Improved	Total
Transsphenoidal approach	28	15	43
Transcranial approach	24	40	64
Total	52	55	107

The patients with pituitary adenoma showed significant (p value = 0.000) visual improvement (65%) as compared to patients with craniopharyngiomas (33.3%) and meningiomas (7.6%).

Tumor type	Improved	Not Improved	Total
Pituitary adenoma	43	23	66
Cranio-pharyngioma	8	16	24
Meningioma	1	12	13
Others	0	4	4
Total	52	55	107

DISCUSSION

The most common presentation of suprasellar tumors is blurred vision.[3,5,10,13] Huge number of patients with visual symptoms and signs are treated by ophthalmologist and then referred to Neurosurgery which results in delayed treatment.[14]

Several papers show the result of surgery for suprasellar lesion on the visual outcome but majority of these usually include a single kind of tumor.[15-22] In our study, patients with different histopathologic types tumors were included and the visual outcome was observed after decompressive surgery. Freda et al[23], Kitthaweesin et al[3], Suri A et al[2] and Aui-aree et al[5] in their studies on suprasellar tumors encountered pituitary adenoma as the most common type of suprasellar tumor. Similarly, in our study pituitary adenoma was the most common (61.6%) followed by craniopharyngioma (22.4%) and meningioma (12%).

In our study, the male to female ratio was 1:1.5 (43:64) showing female predominance. This is in contrary to ratio of 1.8:1 mentioned by Suri A in his series, and similar to ratio of 1:1.1 provided by Aui-aree.[5] Both of these studies included multiple variety of suprasellar tumors, like ours, eliminating the association of a particular variety with a particular sex (e.g. meningiomas with female sex).

In our study, patient age ranged from 7 to 56 years (mean age 31.8 years). The maximum number of patients age was 20 to 30 years (32 patients, 30%) where as 24 (22.4%) patients were in fourth and 22 (20.5%) patients were in fifth decades. This is comparable to the age of patients included in the study of Suri A for visual outcome in patients with suprasellar tumors and preoperative blindness. In his study, the mean age was 33.5 years and the frequency of patients age was 29%, 19% and 15.2% in the fourth, fifth and third decades respectively. Kitthaweesin and Ploypraisith[3] worked on ocular manifestations of suprasellar tumors in 2008 and determined the mean age of 37.7 years and the majority of patients were between 31 and 45 years of age.

In the present study, the patients with suprasellar tumors, presented mostly with impaired vision in both eyes (76.6%) than uniocular (23.4%), which is in contrary to the study of Aui-aree N et.al[5] on suprasellar tumors in neuro-ophthalmology clinic in Thailand.

There are few reports in the literature from developed countries regarding blindness due to suprasellar lesion. The reason might be lack of healthcare facilities and lack of neurosurgeons in the peripheral centres. In contrast to the believe that vision once lost due to compressive lesions is irreversible , Suri A and colleagues[1] reported the recovery of vision in 27.8% of eyes in their study. There are some case reports of recovery of vision from complete blindness after surgical resection of such lesions.[24-26] In our study a total of 17 eyes were blind (defined as no perception to light) preoperatively, out of which 8 (47%) showed improvement in vision. Our result points towards the ability of optic nerves/chiasm to withstand ischemia or compression for prolonged periods.

Bergland and Ray[27] studied the arterial supply of the chiasm in 480 autopsies, observed that

the blood supply of the central part of the optic chiasm is from below while that of the lateral part is from the lateral and superior aspects. Our results cannot be explained by Bergland and Ray's findings, as the visual improvement in our series was favorable in pituitary adenomas (65%, p-valve = 0.000) that compress the chiasm from the undersurface.

Aui-aree N and colleagues[5] showed visual improvement in 30 out of 42 eyes (71%) after surgical decompression in his series of suprasellar tumors in Thailand. Bulters DO et al.[7] reported, in his study in 2009 on optic nerve decompression for chronic compressive neuropathy, an improvement in visual acuity in 46% of eyes. In his study 31% of eyes were unchanged and 23% showed deterioration. Menke E. and coworkers[9] in their research got an improvement in 53 out of 124 eyes (42.8%) after surgical decompression, while 51.6% of eyes remained unchanged and 5.6% deteriorated. The results of our study with improvement, unchanged and deterioration frequencies of 46%, 34.4% and 19.6% of eyes respectively are comparable to the series of Bulters DO et al and to a major extent to Menke E et al.

Suri A[2] and associates in their work on detecting visual outcome after surgery in patients with suprasellar tumors and preoperative blindness, got visual improvement in 29% of patients. We got a higher percentage of improved patients (48.6%) as we included all patients with decreased visual acuity rather than patients with blind eyes only, as was the case in Suri research. While talking only for patients with, one or both, blind eyes; we had 12 patients, of which 7 patients showed recovery in vision in one or both blind eyes.

Both the transsphenoidal and transcranial approaches showed improvement in visual acuity when compared to preoperative assessment.[8,9] The work on functional assessment before and after interventions on the optic chiasm system by Menke E[9] published an improvement of 41.2% and 44.6% after transsphenoidal and transcranial operations respectively. This result is not supported by our observation; in which visual improvement was present in 65% of patients who underwent transsphenoidal operation, while improvement was 37.5% in patients who were operated with transcranial approach (p-value = 0.005). This can be explained by the fact that in our study all the transsphenoidal operations were done for the pituitary adenomas, the pathology, that itself had the highest percentage of improvement (65%, p-value = 0 .000), comparable to other series in past. In series of Suri A et al[2] the eyes had statistically significant favorable results (52.3%) in those patients who had transsphenoidal resection compared with the eyes in patients who underwent transcranial approach (10.9%).

The main limitation of the present study was the relatively short follow-up period (4 weeks), which may have led to an underestimation of the number of patients with visual improvement than a longer follow-up (up to 6 months) might have shown, as after decompression of the optic nerves/ chiasm, improvements in recovery of visual function can be found for up to 4 months.[28]

CONCLUSION

Patients with suprasellar tumors with preexisting preoperative visual deficit experienced significant benefit in vision from decompressive surgery irrespective of preoperative visual status. This benefit is more true for the decompressions via transsphenoidal route than the transcranial approach, and for the pituitary adenomas than other types of suprasellar tumors. Detailed data on visual outcome can help counsel patients and their caretakers preoperatively to aid decision-making and set expectations.

It is also recommended that although patients present in ophthalmology clinics with complaint of unilateral or bilateral blurred vision for which the common diagnosis is refractive error or cataract, a complete eye examination should be performed to avoid delayed or misdiagnosis of more serious conditions i.e. suprasellar brain tumors.

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3	Muhammad Imran	Principal idea, Proof reading	
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7	Shiraz Ahmed Ghori	Data collection	
8	M.Tayyab Shera	Data collection	