Original Research Article

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Evaluation of Epidemiology, Symptoms, Diagnosis, Treatment and Complications in Patients of Sellar Region Tumors

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Abstract

Introduction: The sellar and parasellar region is an anatomically complex area and the complexity of structures that define this region can produce a variety of neoplastic processes. A multimodal approach for the diagnosis and treatment of the same is frequently necessary.

Materials and methods: A total of 60 patients with radiologically confirmed diagnosis of sellar region tumor were included in the study and were assessed in terms of age and sex distribution, location, type, clinical features, treatment approach and complications.

Results: Characteristics of a total of 60 patients with sellar tumors were assessed in the study out of which 30 were in the age group of 21 to 40 yrs, followed by 24 patients in age group of 41 and above. Among 60 patients in the study group, 36 patients presented with visual symptoms, 56 with neurological symptoms and 20 patients had hormonal symptoms. Pituitary adenoma was the commonest lesion seen in 44 out of 60 patients. Surgical treatment was offered to all patients and 52 patients out of 60 underwent a transnasal transsphenoidal resection of tumor whereas 6 patients had to undergo microscopic resection and 2 patients had their tumor resected through an open approach.

Discussion: Age distribution among 60 patients showed that majority of the cases with sellar tumors were in age group of 21 to 40 yrs. 24 patients were in the age group of 41 yrs and above. Only 6 cases were in the age group less than 20 yrs. Distribution of type of tumor in the study group showed that 44 (73%) patients had pituitary adenoma, 4 had craniopharyngioma and fungal granuloma respectively and 2 patients had lymphocytic hypophysitis, chordoma, suprasellar epidermoid and sellar meningioma respectively. Out of a total of 44 patients with pituitary adenoma operated, 4 patients developed complications whereas 6 patients developed complications among 16 patients with diagnosis other than pituitary adenoma. The difference was statistically non significant. All patients with hormonally active tumors had raised urine output postoperatively but only 3 of them developed true DI.

Conclusion: The most commonly presenting clinical features of tumors of sellar region are neurological followed by visual symptoms. Pituitary adenomas are the most common tumors of the sellar region and among them, prolactinomas are most commonly encountered. Thin slice dedicated MRI of the sellar region is the gold standard investigation for diagnosis of sellar lesions and endoscopic transnasal transsphenoidal resection remains to be the surgical treatment of choice wherever possible.

Keywords: Epidemiology; Tumors; Pituitary adenomas; Hormonal symptoms; Craniopharyngioma.

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Introduction

The sellar and parasellar region is an anatomically complex area and the complexity of structures that define this region can produce a variety of neoplastic processes. The diagnosis of such lesions requires a multidisciplinary approach with detailed symptomatology, neurological, ophthalmological and endocrine examination and the correct diagnosis is essential prior to any intervention. Recent advances in endoscopic transnasal transsphenoidal surgery have significantly replaced open transcranial approaches due to its reliability and low rate of complications. A multimodal therapeutic approach including surgery, radiotherapy, primary or adjuvant medical treatment and replacement of endocrine deficits is frequently necessary.

Materials and methods

A total of 60 patients with radiologically confirmed diagnosis of sellar region tumor were studied and assessed over a period of 2 years in terms of age and sex distribution, location, type, clinical features and treatment approach offered. Uniform imaging modalities, i.e. contrast enhanced CT scan (Philips 128 slice) and MRI (Siemens 1.5T) were used for diagnosis and all patients were subjected to hormonal and ophthalmological (fundus and visual perimetry) examination. Symptoms were assessed in terms of visual, neurological and hormonal. All patients of recurrent tumors and parasellar tumors extending into sella were excluded from the study. Data was compiled and results were tabulated. All sellar lesions were operated by transnasal transsphenoidal route and sellar lesions operated by transcranial route were excluded from the study. Extent of resection was measured in terms of gross total resection, near total resection, sub total resection and biopsy. Post-HPE, patients were segregated into pituitary and non pituitary group-based on diagnosis and chi-square test was used to evaluate the statistical significance of the parameters against the same.

Results

Characteristics of a total of 60 patients with sellar tumors were assessed in the study out of which 30 were in the age group of 21 to 40 yrs, followed by 24 patients in age group of 41 and above. Only 6 patients were in the age group of ≤20 yrs. There was slight female preponderance with 36 female and 24 male patients.

Among 60 patients in the study group, 36 patients presented with visual symptoms, 56 with headache and 20 patients had hormonal symptoms. Out of 36 patients with visual disturbances, 26 patients had visual field defect and 10 patients had optic atrophy with visual field defects.

MRI imaging according to T1, T2 and post-contrast sequences were done and on T1 sequence, out of a total of 60 patients, 20 were found to have isointense lesion, 38 had a lesion that was hypointense and 2 patients had a hyperintense lesion. On T2 sequence, 2 patients had isointense and 6 had hypointense lesions. A total of 46 patients were found to have a hyperintense lesion and 6 patients had a mixed intensity lesion on T2 weighed images. Post-contrast enhancement revealed 30 homogenously and 28 heterogenously enhancing lesions where as 2 lesions showed no post-contrast enhancement

On final histopathological examination, 46 cases were diagnosed to be pituitary adenoma, 4 cases as craniopharyngioma and fungal granuloma respectively, 1 patient each had lymphocytic hypophysitis, chordoma, suprasellar epidermoid and 3 patients were diagnosed as sellar meningioma.

Of the 60 patients with sellar tumors, 38 had suprasellar extension, 14 had parasellar extension and 2 patients each had pre- and retrosellar extension.

Hormonal analysis was carried out for all patients and 32 of them had a normal hormonal profile. As many as 20 patients had increased prolactin levels only 9 of which were eventually diagnosed to be true prolactinomas, 6 had raised growth hormone and 2 patients had raised ACTH and cortisol.

Surgical treatment was offered to all patients who underwent a transnasal transsphenoidal resection of tumor.

In the pituitary group, out of 28 patients with deranged hormonal profile, only 17 patients were truly hormonally active and out of these 17 patients, 7 developed postoperative polyuria and 2 patients eventually landed in DI. Out of the remaining 29 patients within the same group (18 with normal hormonal profile +11 with deranged hormonal profile but not hormonally active), 3 patients had polyuria and only 1 patient eventually landed in DI.

Among the patient group with diagnosis other than pituitary adenoma, out of a total of

14 patients, 4 patients were diagnosed to be craniopharyngioma and 3 out of them developed polyuria postoperatively and 2 of these 3 patients landed in DI over a period of time. One patient each with diagnosis of a sellar meningioma, epidermoid and chordoma developed polyuria and eventually landed in DI. Thus, incidence of polyuria without DI was highest in hormonally active patients in the pituitary group and incidence of DI was highest in sellar tumors not of pituitary origin ($p < 0.018$).

Complications other than DI were also reported and these included a total of 6 patients with CSF leak, 2 patients with postoperative meningitis and 1 patient with postoperative hydrocephalus. A total of 3 patients in the pituitary group developed CSF leak and 1 of these patients eventually land up in DI whereas other 2 patients had an isolated CSF leak as complication which resolved spontaneously. In the non pituitary group too 3 patients reported a postoperative CSF leak and all three eventually landed up in DI. Highest incidence of complications (CSF leak, DI, meningitis and postoperative hydrocephalus) was seen in patients with sellar tumors other than pituitary origin as compared to lesions of pituitary origin ($p < 0.0005$).

Discussion

The present study was a hospital-based prospective observational study planned out to determine sellar region tumors with respect to age and sex incidence, location, type of tumor, symptoms, treatment approach, complications and prognosis.

Age distribution among 60 patients showed that majority of the cases with sellar tumors were in age group of 21 to 40 yrs. 24 patients were in the age group of 41 yrs and above. Only 6 cases were in the age group less than 20 yrs. Similar finding were seen in a study conducted by J.S. Aswini Jyothi[1] wherein majority of patients were between 20 and 40 years. In our study we also noticed 4 patients in pediatric age group 3 of whom had a craniopharyngioma. Similar findings were seen in the study conducted by Deopujari C.E *et al*.[2] where they noticed that the sellar tumors in pediatric age group are very rare only 3%.

Majority of the patients suffering from sellar tumors were females (60%) as compared to males (40%). McDowell *et al*.[3] confirmed similar findings in his study that females were commonly affected. Also, in the study carried out by Batra V *et al*.[4] it was noted that females were more commonly affected than males which correlates with our study.

Clinical symptoms were classified as visual, neurological and hormonal symptoms. 36 (60%) patients had visual symptoms and 56 (93%) patients had headache as the presenting symptom. Further, 20 (33%) patients had hormonal symptoms. Our study correlates with Valassi E *et al*.[5] where it was seen that the commonest symptoms were neurological followed by visual symptoms.

Visual signs associated were visual field defect and visual field defect with optic atrophy. 43% of the patients had visual field defect and 17% had optic atrophy with visual field defect. Simon *et al*.[6] studied neuro-ophthalmic manifestations and outcomes of pituitary apoplexy and reported that visual field defects were seen in 47.6% of the cases which correlates with the findings in our study.

Hormonal study among the cases with sellar tumors showed raised prolactin level among 20 (33%) patients and 6 (10%) patients had growth hormone levels raised. Two patients had ACTH and Cortisol levels raised in the study group. Out of 20 patients with raised prolactin level, only 9 were diagnosed to be prolactinoma and in rest of the 11 patients, prolactin levels were raised due to stalk effect. Pouyan Famini *et al*.[7] in their retrospective study of 2598 patients with sellar lesions recorded prolactinomas to be the most common pituitary adenomas (40%) which is in concurrence with the present study. Further the incidence of growth hormone adenomas was found to be 13% which correlates with our study.

On MRI, T2 weighted images of 46 patients showed hyperintense lesions whereas 6 patients each had hypointense and mixed intensity lesions. Two remaining patients had isointense lesions on T2 weighed images. ON PCT1 weighted image, 30 patients had homogenously enhancing lesions, 28 patients had heterogeneously enhancing lesions and 2 patients had nonenhancing lesions. Peck *et al*.[8] in their study in imaging modalities for pituitary gland lesions concluded that in comparison with the capabilities of CT detection of microadenomas, it appears that high-field thin-section MRI of the sella is the most sensitive imaging method.

Of all sellar lesions, a total of 38 patients underwent gross total resection (GTR) of tumor out of which 37 were adenomas and 1 epidermoid cyst. Eleven patients underwent near total resection (NTR) of tumor out of which 5 had pituitary adenoma with parasellar extension whereas 2 patients each had craniopharyngioma and sellar meningioma respectively and 1 patient each had a chordoma and fungal granuloma respectively. Sub total resection (STR) was possible in a total of

8 patients of which 4 had pituitary adenomas with retro and pre sellar extensions along with 2 patients of craniopharyngioma and 1 patient each of sellar meningioma and lymphocytic hypophysitis. Three remaining patients underwent biopsy (B) for fungal granuloma.

Distribution of type of tumor in the study group showed that 46 (73%) patients had pituitary adenoma, 4 had craniopharyngioma and fungal granuloma respectively and 1 patient each had lymphocytic hypophysitis, chordoma and suprasellar epidermoid respectively. Three patients had sellar meningioma. Similar findings were seen in a study conducted by J.S. Aswini *et al*.[1] whose results showed that commonest tumor encountered was pituitary adenoma (65%). Suri A *et al*.[9] in their study reported 37 cases of pituitary adenomas, 19 craniopharyngiomas, 18 meningiomas, and 5 other tumors. As a result showed occurrence of pituitary adenoma was more as compared to other tumors as seen in the present study.

Out of a total of 46 patients with pituitary adenoma operated, 28 patients had a deranged hormonal profile and 18 patients had a hormonal profile within normal range. Out of 28 patients with deranged hormonal profile, only 17 patients were truly hormonally active and out of these 17 patients, 7 developed postoperative polyuria and 2 patients eventually landed in DI. Out of the remaining 29 patients within the same group (18 with normal hormonal profile +11 with deranged hormonal profile but not hormonally active), 3 patients had polyuria and only 1 patient eventually landed in DI. Thus, in the pituitary adenoma group, only 3 patients landed in persistent DI

Among the patient group with diagnosis other than pituitary adenoma, out of a total of 14 patients, 4 patients were diagnosed to be craniopharyngioma and 3 out of them developed polyuria postoperatively and 2 of these 3 patients landed in DI over a period of time. One patient each with diagnosis of a sellar meningioma, epidermoid and chordoma developed polyuria and eventually landed in DI. Thus, a total of 5 patients developed DI in this group. Singer *et al*.[10] in their study on management of diabetes insipidus in adults concluded that DI is the most common complication after a pituitary surgery. Also, Pivonello R *et al*.[11] in their study of treatment of Cushing's disease stated that DI occurs in 10–30% of patients after pituitary surgery but it persists long term only in 2–7% of patients. These findings corroborate with our study wherein out of 16 patients with polyuria, only 8 (13%) of patients landed up in persistent DI. Onset of polyuria was abrupt, within the 1st day of surgery which relates to the findings of a study by Loh JA *et al*.[12] on disorders of water and salt metabolism where it was stated that acute disorders of water metabolism can manifest in a triphasic fashion: an initial polyuric phase, subsequent antidiuretic phase and a final polyuric phase that is usually chronic.

Complications other than DI were also reported and these included a total of 6 patients with CSF leak, 2 patients with postoperative meningitis and 1 patient with postoperative hydrocephalus. A total of 3 patients in the pituitary group developed CSF leak and 1 of these patients eventually land up in DI whereas other 2 patients had an isolated CSF leak as complication which resolved spontaneously. In the non pituitary group too 3 patients reported a postoperative CSF leak and all three eventually landed up in DI. Two of these 3 patients had craniopharyngioma as final diagnosis. Thus, among 8 patients who eventually developed DI, 4 had CSF leak postoperatively. These findings are in line with previous studies proving higher incidence of DI in patients with postoperative CSF leak[13] and following surgery for craniopharyngiomas.[14] Two patients developed postoperative meningitis which responded well to medical management and 1 patient of craniopharyngioma developed postoperative hydrocephalus which needed shunting. All 3 of the above mentioned patients belonged to non pituitary group diagnosis

Conclusion

Tumors of the sellar region aren't an uncommon entity and are mostly seen in the young age group. The most commonly presenting clinical features of tumors of sellar region are neurological followed by visual symptoms. Pituitary adenomas are the most common tumors of the sellar region and among them, prolactinomas are most commonly encountered. Thin slice dedicated MRI of the sellar region is the gold standard investigation for diagnosis of sellar lesions and endoscopic transnasal transsphenoidal resection remains to be the surgical treatment of choice wherever possible. Diabetes Insipiduis is the most common complication seen after surgery of sellar tumors and is most commonly seen in sellar tumors other than pituitary origin. Polyuria without DI is a common occurrence and most commonly associated with hormonally active pituitary tumors and seen in the immediate postoperative phase. It does not necessarily indicate the presence of DI as the disorders of water metabolism may present in a

triphasic phase post-surgery with only a fraction of such patients eventually landing in DI.

References

1. Jyothi JSA, Ramya P, Chandra AS, *et al*. Multiplanar MRI and CT imaging of sellar and parasellar tumors with clinical and pathological correlation. J. Evolution Med. Dent. Sci. 2016;5(19):969–77.
2. Deopujari CE, Kumar A, Karmarkar VS, *et al*. Pediatric suprasellar lesions. J Pediatr Neurosci. 2011 Oct;6(Suppl1):S46–S55.
3. McDowell BD, Wallace RB, Carnahan RM, *et al*. Demographic differences in incidence for pituitary adenoma. Pituitary. 2011 Mar;14(1):23–30.
4. Batra V, Gupta PK, Gehlot R, *et al*. Radiopathological correlation of sellar and suprasellar masses: our experience. Int J Res Med Sci. 2016;4:3924–8.
5. Valassi E, Beverly MK Biller, *et al*. Clinical features of non-pituitary sellar lesions in a large surgical series. Clin Endocrinol (Oxf). 2010 Dec;73(6):798–807.
6. Simon S, Torpy D, Brophy B, *et al*. Neuro-ophthalmic manifestations and outcomes of pituitary apoplexy—a life and sight-threatening emergency. N Z Med J. 2011 May 27;124(1335):52-9.
7. Famini P, Marcel M. Maya, and Melmed S. Pituitary Magnetic Resonance Imaging for Sellar and Parasellar Masses: Ten-Year Experience in 2598 Patients. J Clin Endocrinol Metab. 2011 Jun; 96(6):1633–41.
8. Peck WW, Dillon WP, Norman D, *et al*. High-resolution MR imaging of pituitary microadenomas at 1.5 T: experience with Cushing, disease. AJR. 1989;152:145–51.
9. Suri A, Narang KS, Sharma BS, *et al*. Visual outcome after surgery in patients with suprasellar tumors and preoperative blindness. J Neurosurg. 2008 Jan;108(1):19–25.
10. Singer I, Oster JR, Fishman LM. The management of diabetes insipidus in adults. Arch Intern Med. 1997;157:1293–1301.
11. Pivonello R, De Leo M, Cozzolino A, *et al*. The treatment of Cushing's disease. Endocr Rev. 2015;36:385–486.
12. Loh JA, Verbalis JG. Diabetes insipidus as a complication after pituitary surgery. Nat Clin Pract Endocrinol Metab. 2007;3:489–94.
13. Hensen J, Henig A, Fahlbusch R, *et al*. Prevalence, predictors and patterns of post-operative polyuria and hyponatraemia in the immediate course after transsphenoidal surgery for pituitary adenomas. Clin Endocrinol (Oxf). 1999;50:431–39.
14. Halac I, Zimmerman D. Endocrine manifestations of craniopharyngioma. Childs Nerv Syst. 2005;21:640–648.