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Original Research Article

STUDY OF SURGICAL MANAGEMENT OF PITUITARY ADENOMA : AN INSTITUTIONAL EXPERIENCE OF 98 CASES

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ABSTRACT

Background: Standard care for a pituitary adenoma involves primary surgical intervention followed by radio surgical management of the residual/recurrent tumor with or without chemotherapy. The transition from microscopic to endoscopic and to neuronavigation has significantly improved the outcomes of pituitary surgery. Present study was aimed to highlight the operative techniques, choice of approach, complications of pituitary adenoma pt operated at our institute. **Materials and Methods:** Present study was retrospective study, conducted in patients diagnosed with pituitary adenoma, operated by endonasal Endoscopic approach and open transcranial approaches. **Result:** 98 patients diagnosed with pituitary adenoma operated by endonasal Endoscopic approach and open transcranial approaches were studied. Majority were from 31-50 years age group (52.04 %) & were female (67.35 %). Common presenting complaints were vision loss (76.53 %) followed by headache (61.22 %), hormonal disturbances (51.02 %) & multiple cranial nerve palsies (3.06 %). Among 98 patients, common tumor type was functioning adenoma (68.36 %) subdivided as PRL adenoma (51.20 %) followed by GH adenoma (12.24 %) & ACTH adenoma (7.14 %). Nonfunctioning Adenoma was noted in 31 (31.63) patients. According to Tumor Grade, majority were enclosed (76.53 %) as compared to invasive (23.46 %). In present study, common surgical approach was endoscopic (81.63 %) followed by transcranial open (12.24 %), combined (4.08 %) & microscopic (2.04 %). Near Total Excision was achieved in 90 (91.83 %) cases. Post operative remission rate was best in non-functioning adenomas (93 %). Complications observed were diabetes insipidus (10 %) followed by CSF Leak (5.10 %) & anterior pituitary insufficiency (3.30 %). **Conclusion:** The endoscopy provides distinct advantages over microscopy in indicated skull base lesions like pituitary adenoma and clival chordoma, allows better end-on visualization of the vascular and neural structures, thus preserves neuronal function and decrease morbidity.

INTRODUCTION

Pituitary adenomas are benign adenomas which express and secrete various hormones. These hormone excess states may result in various systemic manifestations. On the other hand, compression of normal pituitary cells by tumorous tissue can lead to hormone deficiency state. Apart from it, they can lead to various compressive symptoms due to involvement of adjacent structures.

The clinical characteristics of pituitary tumour are complicated and varied, and they exhibit a wide spectrum of proliferating and invasive behaviours.[1] While some aggressive pituitary tumours (PAs) grow quickly and are resistant to standard therapies, other aggressive PAs are asymptomatic and maintain their size for a long time.[2] Pituitary neoplasms are classified as functional (causing hormone-related symptoms) or nonfunctional (presenting with mass effects like headaches or visual defects, or found incidentally).[3,4]

At present, the standard of care for a pituitary adenoma involves primary surgical intervention followed by radio surgical management of the residual/recurrent tumor with or without chemotherapy. Surgery remains the primary and the best treatment option as it provides immediate reduction of the tumor burden, decompression of the

visual apparatus and the hypothalamic pituitary axis, histopathological characterization of the tumor, and the best normalization of the endocrine status.[5] The transition from microscopic to endoscopic and to neuronavigation has significantly improved the outcomes of pituitary surgery. Present study was aimed to highlight the operative techniques, choice of approach, complications of pituitary adenoma pt operated at our institute.

MATERIALS AND METHODS

Present study was retrospective study, conducted in department of neurosurgery, at Grant Medical College and Sir JJ Hospital, Mumbai, India. Study period was from June 2011 to June 2015. Study was approved by institutional ethical committee.

We retrospectively analysed the clinical and surgical data of all the patients. Pituitary adenoma operated by endonasal Endoscopic approach and open transcranial approaches were included in the study.

Pre Operative Evaluation

- VA/ VF
- CT head with bone window images - for anatomy of sella, sphenoid sinus, septum
- CT Angio sos DSA
- MRI brain p+c with coronal cuts
- Hormonal profile: T3,T4, TSH, PRL, GH, cortisol.
- Nasal swab- c/s
- Antibiotic nasal drops
- Mustache shaving

Surgical Techniques

We use binostril access for better visualisation, less crowding of instruments and better control of hemorrhage. Endoscope was inserted at 12 O'clock position in right nostril. For expanded endonasal approach naso-septal flap is prepared. Sphenoid sinus cleared from mucosa, septation and sellar floor is reached. Confirm with navigation probe. Wide sphenoidotomy done to identify landmarks- PS, OP, OCR. Wide dural opening done. Resection done inferiorly, laterally and then superiorly. Intermittent Valsalva by anaesthetist and if required air can be injected through lumbar drain. Haemostasis was confirmed by saline irrigation and fibrillar surgical inserted. Inlay fascia, then fat graft, both obtained from thigh and fibrin glue to pack sella. Meroseal nasal pack for 24 hrs.

Post operatively, immediate CT brain p+c was done. After extubation patient shifted to ward. Lumbar drain kept for 3-5 days. Nasal pack kept for 24 hrs. Mobilization done after 5 days. MRI brain at follow up after 3 months. All the tumors were sent for immunohistochemical analysis. Follow-up CT scan was done on 2nd postop day and at one month interval.

For Secretory adenomas, hormonal assay was done regularly. For Non-secretory adenomas, MRI at 3 months, 6 months,1 year and then every 5 yearly or if symptomatic. Cabergoline 0.25 mg twice a week for residual prolactinomas.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

RESULTS

98 patients diagnosed with pituitary adenoma operated by endonasal Endoscopic approach and open transcranial approaches were studied. Majority were from 31-50 years age group (52.04 %) & were female (67.35 %).

Table 1: General characteristics

Characteristics	No. of subjects	Percentage
Age group (in years)		
20-30	22	22.44 %
31-50	51	52.04 %
51-75	15	15.30 %
Gender		
Male	32	32.65
Female	66	67.35

Common presenting complaints were vision loss (76.53 %) followed by headache (61.22 %), hormonal disturbances (51.02 %) & multiple cranial nerve palsies (3.06 %).

Table 2: Presenting complaints

Complaints	No	%
Vision Loss	75	76.53
Headache	60	61.22
Hormonal Disturbances	50	51.02
Multiple CN palsies	3	3.06

Among 98 patients, common tumor type was functioning adenoma (68.36 %) subdivided as PRL adenoma (51.20 %) followed by GH adenoma (12.24 %) & ACTH adenoma (7.14 %). Nonfunctioning Adenoma was noted in 31 (31.63) patients. According to Tumor Grade, majority were enclosed (76.53 %) as compared to invasive (23.46 %). Tumor grading was as follows

I: Sella normal or focally expanded tumor < 10mm (25.51 %)

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II: Sella enlarged or tumor > 10mm (51.20 %)
III: Localized perforation of sellar floor (15.30 %)
IV: Diffuse destruction of sellar floor (8.16 %)

Compression of optic chiasm was seen in 75 (76.53 %) patients. Cavernous Sinus invasion was noted in 30 (30.61 %) patients. Massive Supra and parasellar extensions was not observed in present study.

Table 3: Tumor Characteristics of Pituitary adenoma

	Tumor Type and Grade	Number of Patients (%)
Tumor type	Nonfunctioning Adenoma	31(31.63)
	Functioning Adenoma	67 (68.36)
	• PRL Adenoma	50 (51.20)
	• GH Adenoma	12 (12.24)
	• ACTH Adenoma	7 (7.14)
Tumor Grade	• Enclosed	75 (76.53)
	I: Sella normal or focally expanded tumor < 10mm	25 (25.51)
	II: Sella enlarged or tumor > 10mm	50 (51.20)
	• Invasive	23 (23.46)
	III: Localized perforation of sellar floor	15 (15.30)
	IV: Diffuse destruction of sellar floor	8 (8.16)
Massive Supra and parasellar extensions		0
Compression of optic chiasm		75 (76.53)
Cavernous Sinus invasion		30 (30.61)

In present study, common surgical approach was endoscopic (81.63 %) followed by transcranial open (12.24 %), combined (4.08 %) & microscopic (2.04 %).

Table 4: Surgical approach

Surgical approach	No of patients	Percentage
Endoscopic	80	81.63
Transcranial open	12	12.24
combined	4	4.08
Microscopic	2	2.04

Near Total Excision was achieved in 90 (91.83 %) cases.

Table 5: Surgical outcome

Outcome	No	%
Near Total Excision	90	91.83%
Partial Excision	8	8.16%

Post operative remission rate was best in non-functioning adenomas (93 %). While in hormonally active adenomas post operative remission rate was best in GH adenoma (88 %) followed by ACTH adenoma (84 %) & PRL adenoma (78 %)

Table 6: Post-operative remission rate

Post-operative remission rate	Percentage
Hormonally Active Adenomas	
GH	88%
ACTH	84%
PRL	78%
Non-functioning Adenomas	93%

In presents study complications observed were diabetes insipidus (10 %) followed by CSF Leak (5.10 %), anterior pituitary insufficiency (3.30 %), haematoma (1.02 %), post-operative infarct (1.02 %), meningitis (1.02 %), CNS Injury (1.02 %).

Table 7: Complication

Complication	No	%
Diabetes Insipidus (DI)	10	10%
CSF Leak	5	5.10%
Ant Pituitary Insufficiency	3	3.30%
Haematoma	1	1.02%
Post OP Infarct	1	1.02%
Meningitis	1	1.02%
CNS Injury	1	1.02%
Deterioration of Vision	0	0

DISCUSSION

MRI is crucial in pituitary adenoma surgery, assessing tumor size, extent, and consistency, which impact resection ease and complication risks. It provides detailed visualization of the mass, optic chiasm, vessels, and cavernous sinuses. Variations in signal characteristics can indicate hemorrhage, cysts, or necrosis.[6]

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The mainstay of treatment of pituitary adenoma is the surgery. Goals of surgery need to be firmly established in each individual patient. The aim of surgery was to remove as much as tumor as possible without damaging the normal pituitary gland or arachnoid. Criteria for disease control were total tumor removal in non-functioning and hormonal control in functioning pituitary tumors. The success of surgery was based on surgeon's intraoperative vision and MRI with contrast done 1 month after surgery.

The two main surgical approaches are transcranial surgery and the less invasive transsphenoidal surgery (TSS), which is now preferred by most neurosurgeons. The choice of each of these modalities depends on the type of tumor, aggressiveness or invasion, the extent of tumor removal and surgeons' expertise.

The transsphenoidal microsurgical approach to the pituitary has been established as the most widely employed surgical approach and represents a major development in the safe surgical treatment. This approach is often successful in accessing all tumors and achieving the main surgical goals. However, complete removal is not always possible in the presence of suprasellar and parasellar extensions.[7]

Currently the direct endoscopic endonasal transsphenoidal approach has gained popularity. The main advantages of the endoscope over the operating microscope are that it gives a clearer angled close up panoramic view and allows more complete tumor removal as illumination is close to the target. However, it involves endoscopic equipment as well as expertise in handling tissues in such closed corridors.[8]

In study by S. Hemachandran et al,[9] involving 28 patients with pituitary macroadenomas, 17(60.7%) were nonsecretory, and 11(39.3%) were secretory. Common symptoms included headaches (71.4%) and visual defects (42.8%). MRI revealed 46.4% of tumors were solid, 35.7% semisolid, and 17.9% cystic, with 50% extending to the suprasellar region. Surgical findings indicated that most solid tumors (92.3%) were firm, 60% of semisolid tumors were soft and 40% were firm, while cystic consistency matched MRI predictions. The most common postoperative complication was diabetes insipidus in 3 cases (10.7%).

The reported incidence of Diabetes Insipidus (DI) in the endoscopic pituitary surgery ranges from 2.5-20%.[10,11] It may be transient or permanent. The DI we encountered in our series were comparable to other series and all were temporary. This might be due to the simple manipulation of the pituitary gland during surgery. Temporary DI is assumed to be caused by temporary dysfunction of the vasopressin producing neurons due to surgical trauma.[12]

A relatively recent advancement is supraorbital eyebrow craniotomy for sellar-parasellar tumors. The supraorbital craniotomy with endoscopic assistance is an effective tool for removal of anterior and middle cranial fossa extra axial and intra axial pathologies. It is an approach for the sellar tumors particularly with far lateral and suprasellar extensions. It provides a minimally invasive access to the lesions with greater extension.[13]

CONCLUSION

In experienced hand endoscopy TNTS is gold standard. Lumbar drain is helpful for better intra & post operative management. Best approach should be chosen according to tumour extension, patients age, goal of surgery and surgeons comfort. The endoscopy provides distinct advantages over microscopy in indicated skull base lesions like pituitary adenoma and clival chordoma, allows better end-on visualization of the vascular and neural structures, thus preserves neuronal function and decrease morbidity.

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