ORIGINAL ARTICLE

ENDOSCOPIC ENDONASAL TRANS-SPHENOIDAL SURGERY IN PATIENTS WITH MACRO-ADENOMA EXTENT OF SURGICAL RESECTION AND RECURRENCE RATE

Zia Ur Rahman[1], Muhammad Idris Khan[2], Muhammad Aamir[1]

[1]Department of Neurosurgery Lady Reading Hospital Peshawar-Pakistan

[2]Department of Neurosurgery Khyber Teaching Hospital Peshawar-Pakistan

Background: Endoscopic Endonasal Trans-Sphenoidal Approach has been employed for skull base tumours especially macro—adenomas, for the last decade in our setup. Here we are sharing our experience with the EETA for patients with micro-adenomas in terms of extent of tumour resection and its recurrence. The objective was to assess endoscopic endonasal trans-sphenoidal surgery in patients with macro-adenoma for extent of surgical resection and recurrence rate. **Methods:** This descriptive case series study was carried out from May 2021 till April 2023. Male and female patients with macroadenoma were enrolled which was diagnosed with contrast enhanced volumetric MRI brain. EETA and resection was performed. Extent of resection recurrence was confirmed on post-op MRI and follow up at 6 months respectively. **Results:** A total of 58 patients were enrolled. Mean age of the patients was 47.51±7.93 years and male to female ratio was 1.3: 1. 42 (72.4%) tumours were non-functional. Somatotropin releasing tumour was the most common functional tumour (n=09, 15.5%). Total resection was performed in 49 (84.4%) patients. Recurrence was observed in 9 (15.6%) cases. **Conclusion:** EETA has been shown to be a safe and effective technique for the resection of macroadenoma of the skull base.

Keywords: Macro-adenomas; Endoscopic Endonasal Trans-Sphenoidal Approach; Extent of Resection; Recurrence

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INTRODUCTION

Macro-adenomas are benign tumour of pituitary gland located in the Sella turcica. The tumour comprises of cells secreting hormones and cells mostly relate to that of anterior pituitary.[1] The term micro is applied based on its size. Pituitary tumour smaller than 10mm are called micro-adenoma, size 10-40mm are called macro adenoma while the term giant is used when it is larger than 40mm. Another classification is based on secretory potential of the tumour. Tumour having the potential to secrete hormones are called functional tumour.[2]

The clinical spectrum of functional pituitary adenoma varies widely from mass effect to several clinical syndromes resulting from the chemical nature of the secretions such as Cushing's disease, hyperthyroidism and syndrome resulting from increased production of prolactin.[3] Non – functional adenomas on the other hand present mostly as pressure symptoms such as headache, visual field defects and neural palsies. At times, the tumour may Identified on imaging performed for other reasons, in which they are often referred as incidentalomas. Diagnosis is largely imaging; however, clinical and biochemical features differentiate the specific type of tumour. Biopsy is usually precluded due to invasive nature of the procedure; however, trans-sphenoidal approach has been increasing employed very recently.[4]

The treatment of pituitary adenomas has emerged over the years from open surgeries to minimally invasive trans-sphenoidal approach and medical treatment modalities.[5] Minimally invasive endoscopic endonasal trans-sphenoidal approach (EETA) has become the procedure of choice for skull base tumour. The approach allows for better visualization, close-up views and better manoeuvrability and landmarks identification.[6,7]

In our tertiary care center, we have been performing EETA for skull base tumour especially macro—adenomas, for the last decade using microscopic approach. Here we are sharing our experience with the EETA for patients with macro-adenomas in terms of extent of tumour resection and its recurrence.

This study aimed to determine the extent of tumour resection and recurrence using endoscopic endonasal trans-sphenoidal approach for patients

with pituitary macro-adenoma presenting to tertiary care hospital.

MATERIAL AND METHODS

It was a descriptive case series carried out at the Department of Neurosurgery, Lady Reading Hospital Peshawar from May 2021 till April 2023.

The comprised of male and female patients in the age range 18–60 years diagnosed with pituitary macro adenoma, planned for endoscopic endonasal trans-sphenoidal approach. Pituitary macroadenoma was diagnosed based on clinical findings and confirmed with MRI brain. Biochemical workup was performed to classify the tumour as functional or non-functional. Functional tumour was further grouped as corticoptropinomas, somatotropinomas, thyrotropinomas and prolactinomas. Resection was defined in terms of partial, subtotal and total resection. Extent of resection was assessed using volumetric MRI. Partial resection was defined as less than 50% reduction in the tumour size on post-op MRI. Subtotal was defined by 50–80% reduction and more than 80% reduction was called near-total or total resection. Recurrence was defined as regrowth of the tumour requiring surgical re-intervention. Patients with prior history of intervention, previous history of radiotherapy and patients with contrast allergy were excluded.

Permission was taken from the institutional research review board prior to the conduct of the study.

Basic clinical information: Baseline and demographic data was collected. Detailed history was taken about the complaints of the patient followed by comprehensive clinical examination.

Ophthalmological assessment: All cases were evaluated by consultant ophthalmologist for visual field defects and nerve palsies.

Endocrine evaluation: All patients were evaluated by consultant endocrinologist. To identify the tumour based on the potential to secrete and type of secretions, comprehensive endocrine evaluation was carried out. Work up for thytropin Oma included free thyroxin and TSH. Prolactin was assessed for prolactinoma while evaluation of IGF 1 and growth hormone was carried out for somatostatin Oma. The work up for gonadotropin Oma included measurement of testosterone, estradiol, LH and FSH. Non-functional tumour was labelled when the above parameters were in normal range.

Pre-op MRI: Pre-operative contrast enhanced volumetric MRI was performed to know the extent and volume of the tumour.

Surgical Technique: All procedures were carried out under GA by team comprising of neurosurgeon and ENT surgeon. Pre-operative antibiotics coverage was given and three phase nasals, sphenoidal and Sellar was employed. The nasal phase included approach to the sphenoidal sinuses followed by removal of the inferior portion of superior turbinate. Bilateral sphenoidotomy was performed to allow access to Sella. Sellar bone was removed by microdrill using diamond burr through endoscopic guidance. Tumour gland planes were identified and resection was performed. Sellar defect was closed and CSF leak was secured. Post-operative antibiotics and adequate analgesia was given. Volumetric contrast enhanced MRI was performed two days after procedure for extent of resection. Follow up MRI was performed 06 months after the procedure for recurrence.

Data was collected in excel spread sheet and analyzed using SPSS. Categorical data was presented as frequencies and percentages. Continuous data was presented as means±S.D. Statistical tests of significance included student t test for comparing mean difference and contingency table analysis with chi square test for categorical data. *p*-value ≤ 0.05 was set cut off for statistical significance.

RESULTS

A total of 58 patients were enrolled during the study period. 36 patients (%) were male. Age of the patients ranged from 28 to 59 years. The mean age of the participants was 47.51±7.93 years. 39 (67.3%) participants had age between 41–60 years. The mean BMI was 22.37±1.93 Kg/m^2. Comorbidities included hypertension (n =13, 22.4%), diabetes (n = 8, 13.8 %) and CAD (n=2, 3.4%). The mean duration of complaints was 2.13±0.79 months. Headache was the chief complaint in 25 patients (43.1%) followed by visual field defect in 17 patients (29.3%). Other common complaints included para-neoplastic syndromes due to hormonal secretions such as those related to growth hormone excess (n=9, 15.5%), TRH related (n=05, 8.6%) and ACTH hypersecretion (n = 2, 3.4%). (Table 1)

Complete resection was achieved in 49 patients (84.4%). Seven patients (12.1%) subtotal resection while 02 patients (3.4%) had partial resection. Recurrence of the tumour was observed in 09 cases (15.5%). (Table 2)

Table-1. Baseline information and demographics (n = 58)

Variables	Subgroups	Frequencies	Percentages
Age (years)	47.51 ± 7.93 years (means ± SD)		
	18-40 years	19	32.7
	41-60 years	39	67.3
Gender	Male	33	56.9
	Female	25	43.1
BMI (kg/m^2)	22.37 ± 1.93 (means ± SD)		
	≤22.0	23	39.7
	>22.0	35	60.3
Complaints duration (months)	2.13±0.79 (means ± SD)		
	≤3 months	30	51.7
	>3months	28	48.3
Co-morbidities	Hypertension	13	22.4
	Diabetes	08	13.8
	CAD	02	3.4
Complaints	Headache	25	43.1
	Visual Field defects	17	29.3
Hormone Defect	Somatotropin excess	9	15.5
	TRH excess	5	8.6
	ACTH excess	2	3.4
Tumour Type	Functional	16	27.6
	Non functional	42	72.4

Table-2: Patients' statistics according to extent of resection and recurrence (n = 58)

Parameters	Subgroups	Frequency	%age
Extent of resection	Total	49	84.4
	Subtotal	07	12.1
	Partial	02	3.4
Recurrence	No	49	84.4
	Yes	09	15.6

DISCUSSION

This was the first of its kind study performed at local level, sharing our experiences with macro-adenomas of the skull base. Pituitary adenoma was the most common type of macroadenoma observed. This observation correlates with previous literature reported internationally.[8] Moreover, most of our study participants were male which is in contrast to the findings of previous studies where majority of the patients were female.[9]

Preoperative headache is a very typical symptom of the patient, and our findings are consistent with the literature.[10] Inevitably, headache is also a highly typical and vague concern in people of all ages. According to study, when there is disease near the base of the skull, visual symptoms are significantly more distinct and frequent.[11] It's intriguing to note that our cohort's prevalence of visual signals is at the lower end of the literature's stated occurrence. Given that our cohort's incidence of macroadenomas is about equal to that reported in the literature, it seems doubtful that this is the result of reduced tumour size. We only reported symptoms that were verified by an ophthalmologic exam, which makes this explanation more believable.

Overall, as documented by other studies, the Sella is less traumatized in minimally invasive endoscopic surgery for a skull base microadenoma. Complication rate in our group was somewhat lower than that stated in other investigations, and we did not experience any iatrogenic perforation.[12]

The incidence of recurrence in pituitary adenoma was seen in around 15% of cases, comparatively lower than previously documented. However, the likelihood of recurrence is significantly influenced by certain tumour characteristics. In a recent meta-analysis, remission rate for acromegaly was shown than our findings. For corticotrope adenoma, Braun et al. reported recurrence in 14% patients which is in line with our observation.[13]

Due to changes in hormone levels, both of these forms of adenomas have the potential to recur, sometimes without being detected on imaging. In the first instance, surgery may be repeated; however, in the second, medical treatment or radiation therapy should be taken into account.[14]

CONCLUSION

EETA has been shown to be a secure and effective technique in this descriptive case series study for the resection of macroadenoma of the skull base. Surgical teams should allow for the first somewhat longer operation time when switching from a microscopic to an endoscopic technique. This series contributes to the growing body of information demonstrating that

EETA is an emerging mode of care for those with (para) Sellar tumour.

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Address for Correspondence:

Zia Ur Rahman, Department of Neurosurgery Lady Reading Hospital Peshawar-Pakistan
Email: drziaktk@gmail.com