MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.59218/makrjms.2024.3.283.287

Study to Evaluate the Efficacy of Endoscopic Versus Microscopic Excision of Pituitary Adenoma, in a Tertiary Care Hospital South India

[1]B.D. Bharath Singh Naik, [2]Ravi Theja Akumalla and [3]G.N. Bhaskar Babu

[1-3]*Department of Neurosurgery, Government Medical College Ananthapuramu, Andhra Pradesh, India*

OPEN ACCESS

Key Words
Endoscopic, microscopic, pituitary adenoma, tran's sphenoidal surgery

Corresponding Author
B.D. Bharath Singh Naik,
Department of Neurosurgery, Government Medical College Ananthapuramu, Andhra Pradesh, India

Author Designation
[1]Associate Professor
[2,3]Assistant Professor

Received: 31 January 2024
Accepted: 25 February 2024
Published: 11 March 2024

Citation: B.D. Bharath Singh Naik, Ravi Theja Akumalla and G.N. Bhaskar Babu, 2024. Study to Evaluate the Efficacy of Endoscopic Versus Microscopic Excision of Pituitary Adenoma, in a Tertiary Care Hospital South India. Res. J. Med. Sci., 18: 283-287, doi: 10.59218/makrjms.2024.3.283.287

ABSTRACT
The aim of the present study is to compare the efficacy of endoscopic versus microscopic excision of pituitary adenoma. The present study included 100 cases of pituitary adenoma. 60 cases underwent endonasal endoscopic Tran's sphenoidal surgery whereas remaining 40 cases were operated using the microscopic Trans sphenoidal surgery. In endoscopic group, the mean symptom duration was 28.22±19.31 months (15 days to 8 years), whereas in microscopic group, it was 22.6±18.02 months (1 month to 5 years). Endoscopically, 40 (66.66%) and microscopically 22 (55%) patients had complete tumour resection. In the endoscopic group, the average operation time was 1.88±0.32 hours (range 80-135 min). The microscopic group had a mean operational time of 2.28±0.12 hours (range: 120-145 min Mean blood loss in endoscopic group was 125.45±38.62 ml (range: 60-190 ml), whereas in microscopic group, it was 178.22±40.024 ml (range: 100-220 ml). Postoperative complications were seen in endoscopic and microscopic groups. Microscopic group had somewhat greater rates of diabetes insipidus, CSF leak, reoperation and sinusitis than endoscopic group. Both groups had postoperative hematoma and CSF leak reoperations. All post-surgery patients improved their headaches and eyesight. In both groups, endocrinal function did not decline. In endoscopic group, mean hospital stay was 9.12 = 8±2.621 (5-12 days), whereas in microscopic group, it was 10.05±2.154 (6-14 days). Endoscopic surgery in pituitary adenoma has introduced new possibilities by both direct endonasal access and offering a comprehensive view of the sphenoid cavity and sella turcica. Endonasal endoscopic transsphenoidal surgery for pituitary adenomas is a safe and successful method.

INTRODUCTION

A pituitary adenoma that secretes adrenocorticotropic hormone (ACTH) causes Cushing's disease by creating an excess of endogenous glucocorticoids. Annual incidence estimates range from 1.2-1.7 per million[1]. Neuropsychiatric diseases, central obesity, osteoporosis, dyslipidemia, hypertension and hypercoagulability are all symptoms of an overabundance of glucocorticoids[2,3]. The transsphenoidal pituitary surgery that removes the corticotroph adenoma selectively is still the first-choice therapy[4,5]. Patients with Cushing's disease continue to have an elevated risk of death even after receiving a biochemical cure[6]. The initial report of the transsphenoidal approach in a sella tumour was made in 1907 by Schloffer *et al*.[7]. The sublabial transseptal transsphenoidal procedure was popularised by Cushing *et al*.[8], who did away with external incisions. By introducing the operational microscope in the 1960s, Hardy[9] refined Cushing's method. Due to its low risk of complications and death, the conventional transseptal/translabial technique has been the gold standard for quite some time. In 1992, Jankowski[10] suggested doing pituitary surgery entirely using endoscopes, taking advantage of the growing number of endoscopic equipment and procedures. Due to its minimum invasiveness and enhanced visibility, endoscopic transsphenoidal pituitary surgery is currently the method of choice for accessing lesions in the central skull base. When contrasting the two methods for treating pituitary adenomas, the endoscope's lack of stereoscopic vision renders the advantages of the two approaches inconclusive.

Although researchers have looked at both microscopic and endoscopic methods, they haven't been able to determine which one is superior. Researchers have looked at how surgeons learned to use the endoscopic approach as a novel method for transsphenoidal pituitary surgery and how it was integrated into clinical practice. With the exception of two studies that failed to find any difference between endoscopic and microscopic pituitary surgery, all of these studies found that the endoscopic technique had promising results for gross tumour resection[11,12], postoperative pituitary function[11,13], visual field changes[13] and surgery duration[14-17]. The current research set out to evaluate endoscopic vs microscopic excision of pituitary adenomas for their respective efficacies.

MATERIALS AND METHODS

Hospital based interventional study. Conducted in the Neuro Surgery department of King George Hospital andhra Medical College, Visakhapatnam. Which included 100 cases of pituitary adenoma. Among which 60 cases under went endonasal endoscopic transsphenoidal surgery whereas remaining 40 cases were operated using the microscopic transsphenoidal surgery.

Inclusion Criteria Are:

- Sellar and suprasellar pituitary adenoma
- Functioning and non-functioning pituitary adenoma
- Solid and cystic pituitary adenoma

Exclusion Criteria Are:

- Sellar tumor with large parasellar or retrosellar extension

A comprehensive evaluation of the nervous system was carried out, which included testing the patient's motor, sensory and cranial nerves. They ran the standard blood tests and checked the patient's hormone levels. Each patient had comprehensive imaging, including brain magnetic resonance imaging (MRI) and sella and paranasal sinus computed tomography (CT). After their surgeries, all patients received the same standard of care.

Orotracheal intubation was used throughout both procedures, which were conducted under general anaesthesia. Our sinonasal rigid endoscopes were 4 mm in diameter and 30° and 0° angled. The nasal passages were cleared. The sphenoid rostrum was located when we approached through the middle meatus. Using Kerrison Rongeurs, the sphenoidectomy was performed. We found and opened the sella's anterior wall. In order to access the dura, a cruciate incision was made. Curettes were used under direct vision to remove the tumour, starting from the back and working their way forward. Using a 30° endoscope, the Sella was examined for any remaining tumour. The arachnoid membrane falls into the sellar cavity following tumour excision. Completed hemostasis. The sphenoid sinus is filled with adipose tissue and then sealed with fibrin adhesive. Merocel was used to fill the nasal passages at the level of the middle meatus. Debris was discarded after 48 hours. Patients with arachnoid rupture had intraoperative placement of a lumber drain, which was then removed 48-72 hours following surgery. Although it shared many similarities with endoscopic surgery, microscopic surgery was performed under the illumination of a microscope rather than an endoscope and required the use of Hardy's speculum. We compared the results from preoperative and postoperative assessments of hormone profiles, ocular function, magnetic resonance imaging (MRI) and computed tomography (CT) scans.

Statistical Analysis: The statistical software tool SPSS version 20 for Windows (SPSS Inc., Chicago, IL, USA) was used for the statistical analysis. A statistically significant result is defined as $p<0.05$.

RESULTS AND DISCUSSIONS

Symptoms lasted an average of 28.22±19.31 months in the endoscopic group (ranging from 15 days to 8 years) and 22.6±18.02 months in the microscopic group (ranging from 1 month to 5 years). Forty patients (66.66%) in the endoscopic group and twenty-two patients (55%) in the microscopic group obtained complete tumour removal. The average operating duration in the endoscopic group was 1.88±0.32 hours, with a range of 80-135 min. The average operating duration in the tiny group was 2.28±0.12 hours, with a range of 120-145 min. Blood loss averaged 125.45±38.62 ml (ranging from 60 to 190 ml) in the endoscopic group and 178.22±40.024 ml (ranging from 100-220 ml) in the microscopic group. Both the endoscopic and microscopic groups had complications after the operation. Compared to the endoscopic group, the microscopic group had a slightly greater rate of complications, including diabetes insipidus, cerebrospinal fluid (CSF) leak, reoperation and sinusitis. In all groups, reoperation was necessary due to one case of postoperative hematoma and one case of CSF leak. Following surgery, all patients in both groups saw a marked improvement in their headache and eyesight. Endocrine function remained unaffected in both groups. With a range of 5-12 days, the endoscopic group had an average hospital stay of 9.12 = 8±2.621 days, while the microscopic group had an average of 10.05±2.154 days, with a range of 6-14 days.

With a prevalence ranging from 10-25%, pituitary adenomas rank among intracranial tumours surgically removed[18]. According to recent epidemiological statistics, the general population has an incidence of 1/1000 for pituitary adenomas that are clinically obvious[19]. Although malignant pituitary tumours are very uncommon, they may nonetheless cause substantial morbidity to those who suffer from them. The first pituitary tumour operation was performed by Sir Victor Horsley in 1920 [20]. Afterwards, the transnasal transsphenoidal route was developed by Schloffer in 1920 and the sublabial transseptal route was developed by Cushing in 1922[21,22]. It was the operational microscope that Hirsch[23] first presented. Jankowski *et al*.[8] then ushered in a new age by performing the first endoscopic pituitary surgery.

Symptoms lasted an average of 28.22±19.31 months in the endoscopic group (ranging from 15 days to 8 years) and 22.6±18.02 months in the microscopic group (ranging from 1 month to 5 years). Forty patients (66.66%) in the endoscopic group and twenty-two patients (55%) in the microscopic group had complete tumour removal. The average operating duration in the endoscopic group was 1.88±0.32 hours, with a range of 80-135 min. The average operating duration in the tiny group was 2.28±0.12 hours, with a range of 120-145 min. Blood loss averaged 125.45±38.62 ml (ranging from 60-190 ml) in the endoscopic group and 178.22±40.024 ml (ranging from 100-220 ml) in the microscopic group. The prospective series of 170 patients with endoscopic approach published by De Divitiis *et al*.[24] did not include a microsurgical group. Kim *et al*.[25] compared endoscopic transsphenoidal surgery with the endoscope-assisted microsurgical method in a prospective trial including 12 patients. In a retrospective study, Koren *et al*.[26] contrasted endoscopic transseptal technique with sublabial transseptal microscopy.

Each of the two groups, endoscopic and microscopic, had complications after the operation. In the endoscopic group, complications such sinusitis, diabetes insipidus, cerebrospinal fluid (CSF) leak and reoperation were less common than in the microscopic group. In each group, a reoperation was carried out due to a postoperative hematoma or a cerebrospinal fluid leak. Both groups of patients reported an improvement in pain and vision after surgery. No decline in endocrine function was seen in either group. Mean hospital stay in the endoscopic group was 9.12 = 8±2.621 days (ranging from 5-12 days), whereas in the microscopic group it was 10.05±2.154 days (ranging from 6-14 days). There were fewer postoperative complications and less operative time with endoscopic surgery compared to endonasal transsphenoidal microscopic surgery, according to a prospective study by Jain *et al*.[27] However, the percentage of patients whose tumours were completely removed was the same in both groups. Minimal damage to the nasal cavity and decreased postoperative morbidity were seen during endoscopic surgery. The use of an angled endoscope allowed for

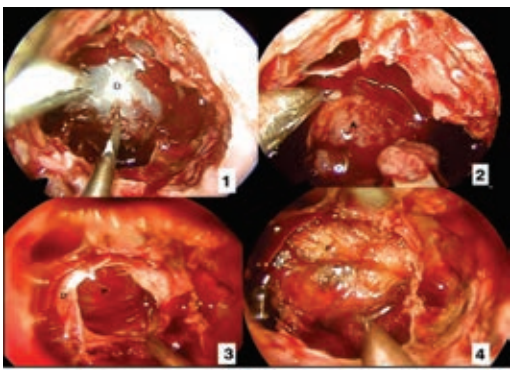

Fig 1: 1. Dura after removal sphenoid floor (D: dura) 2. Adenoma resection (A: adenoma tissue) 3. The pituitary gland after tumor resection (P: Pituitary gland D: dura) 4. Reconstruction (F: facia)

Table 1: Pre-operative and intra operative Characteristics of the study Population

Preoperative	Endoscoipic (N = 60)	Microscopic (N = 40)	p-value
Age (mean±SD)	42.09±11.69 (24-60yrs)	41.88±12.48 (16-60)	0.80
Duration in months (mean±SD)	28.22±19.31 (15 days-8yrs)	22.6±18.02 (1m-5 yrs)	0.52
Intra operative Complete Excision (no %)	40 (66.66)	22 (55)	0.855
Operative time in Hrs.(mean±SD)	1.88±0.32 (1.3-2.25hrs)	2.28±0.12 (2-2.4hrs)	0.007
Blood loss ml (mean±SD)	125.45±38.62 (60-190ml)	178.22±40.024 (60-220ml)	0.007

Table 2: Postoperative complication among the groups

	Endoscopic (N = 60)	Microscopic (N = 40)	p-value
CSF leak (no %)	8 (13.34)	8 (20)	0.913
Diabetes insipidious (no %)	8 (13.34)	12 (30)	0.64
Reoperation (no %)	8 (13.34)	8 (20)	0.955
Sinusitis (no %)	4 (6.66)	8 (20)	0.78
Vision deterioration (no %)	0	0	
Endocrinal deterioration (no %)	0	0	
Hospital stay (days) mean ± SD	9.12 = 8±2.621 (5-12 days)	10.05±2.154 (6-14 Days)	0.36

comprehensive visualisation of the whole nose and paranasal sinus. When compared to an operational microscope, the endoscope's optical characteristics are much better. Minimising the possibilities of catastrophic damage to the internal carotid artery is made possible by the endoscope's excellent view of the optic bulge, carotid bulge and opticocarotid recess [28]. Due to its high learning curve and need for a bloodless surgical area, the endoscopic technique has a number of drawbacks. There is no need to elevate a mucoperichondrial flap from the septum or make an incision under the nose or in the sublabial area for endonasal endoscopic surgery. So, the regions of the septum and the para nasal sinuses are no longer considered possible sources of complications.

CONCLUSION

Endoscopic surgery has opened up new dimensions in pituitary surgery, allowing a panoramic view within the sphenoid cavity and sella turcica in addition to a direct endonasal access. Surgery to remove an endonasal endoscopic trans sphenoidal pituitary adenoma is a reliable and risk-free option. The procedure was minimally invasive and offered a safer, more efficient and more extensive opportunity for tumour excision in relation to the sphenoid, sellar and parasellar structures due to its direct and larger anatomical control of the operating areas. The endonasal endoscopic approach to the pituitary gland is the most recent development in endoscopic surgery for this gland. This method has several advantages over previous generations, including the elimination of intraoral and trans-septal dissection, shorter operating times, less intraoperative blood loss and fewer postoperative complications.

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