E-ISSN: 2616-3470
P-ISSN: 2616-3462

www.surgeryscience.com
2021; 5(2): 198-200
Received: 12-04-2021
Accepted: 10-05-2021

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A prospective comparative study assessing the efficacy of endoscopic and microscopic excision of noninvasive pituitary adenoma

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DOI: https://doi.org/10.33545/surgery.2021.v5.i2d.685

Abstract
Aim: To compare the effectiveness of endoscopic v/s microscopic excision of a benign pituitary adenoma.
Materials and methods: The present prospective comparative was conducted in the Department of General Surgery, Pt. J.N.M. Medical College Raipur, C.G., India among 50 patients diagnosed of noninvasive pituitary Adenoma. Group I (n=28); underwent endoscopic transsphenoidal surgery. Group II (n=22): underwent microscopic transsphenoidal surgery.
Results: A total of 50 patients with pituitary noninvasive adenoma were operated transsphenoidally. Endonasal endoscopic transsphenoidal surgery (group I) was carried out among 28 patients and 22 patients were operated by microscopic transsphenoidal surgery (group II). In group I, complete tumor excision was achieved in 16 (57.1%) patients, and in group II, it was achieved in 12 (54.5%) patients.
Conclusion: Pituitary noninvasive adenomas can be treated with any approach. In compared to microscopic method, endoscopy is superior for resection and has less post-operative complications.

Keywords: endoscopy, microscopy, pituitary adenoma

Introduction
Pituitary adenoma is the third most frequent brain tumour in surgical treatment, accounting for 10%–25% of all intracranial tumors [1]. Although pituitary tumours are seldom malignant, they can cause substantial morbidity in patients.
Most functional and nonfunctioning pituitary tumours are treated with transsphenoidal surgery. Hardy pioneered the use of the operating microscope in selective adenomectomy transsphenoidal surgery in the late 1960s. The microscopic transsphenoidal surgery through a sublabial or endonasal route remained the "gold standard" for surgically treating pituitary adenomas for the next 30 years, until the emergence of endoscopic tumour removal techniques [2].
The first endoscopic pituitary surgery was performed by Jankowski *et al*. [3], ushering in a new era. Since then, endoscopic pituitary surgery has increased in popularity, and many microscopic pituitary surgeons have shifted to a transsphenoidal endoscope-assisted or wholly endoscopic method for pituitary adenomas and other parasellar malignancies [4].
In pituitary adenoma removals, the endoscope offers several benefits over the microscope, such as greater visibility and light. In compared to tunnel vision and the microscope's relatively limited access, the increased panoramic high-resolution image might conceivably lead to better tumour removal [5].
Endoscopic v/s. microscopic transsphenoidal surgery studies have had mixed results, with some indicating no difference [6-8] and others preferring the new procedure [9, 10]. As a result, the purpose of this study was to compare the effectiveness of endoscopic v/s microscopic excision of a pituitary noninvasive adenoma.

Materials and methods
Study Design
The present prospective comparative was conducted in the Department of General Surgery, Pt. J.N.M. Medical College Raipur, C.G., India among 50 patients diagnosed of noninvasive pituitary Adenoma.

Ethical approval and Informed consent
The study protocol was reviewed by the Ethical Committee and granted ethical clearance. After explaining the purpose and details of the study, a written informed consent was obtained.

Inclusion Criteria
- Sellar and suprasellar pituitary adenoma
- Functioning and non-functioning pituitary adenomas
- Noninvasive pituitary adenomas
- Patients who has signed the informed consent

Exclusion criteria
- Sellar tumor with large parasellar or retrosellar extension.
- Patients who has not signed the informed consent
- Patients who are not fit for surgery

Groups
Group I (28 subjects): underwent endoscopic transsphenoidal surgery
Group II (22 subjects): underwent microscopic transsphenoidal surgery

Methodology
Full neurological examination including motor, sensory, and cranial nerve examination was performed. Routine blood examination and basic hormonal profile were performed. Magnetic resonance imaging (MRI) brain and computed tomography (CT) of sella and paranasal sinus were performed for all cases. All patients were provided a uniform postoperative care.
Both surgeries were performed under general anesthesia with orotracheal intubation. We used 4 mm diameter sinonasal rigid endoscope, 0° and 30°. The nostrils were decongested. We approach through middle meatus and identified the sphenoid rostrum. Sphenoidectomy was done by using Kerrison Rongeurs. The anterior wall of the sella was identified and opened. The dura was opened with a cruciate incision. Under direct visualization, the tumor was removed first from posterior part and then from anterior part using curette. Sella was inspected for residual tumor with a 30° endoscope. After complete removal of tumor, there is fall of arachnoid in the sellar cavity. Hemostasis done. Sphenoid sinus is packed with fat and sealed with fibrin glue. The nasal packing was done with merocel at the level of middle meatus. The packing was removed after 48 h. Lumber drain was inserted in patients having arachnoid rupture intraoperatively and removed in 48-72 h after surgery.
Microscopic surgery was similar to endoscopic surgery, except that it requires Hardy's speculum and was done under visualization with a microscope instead of endoscope.

Statistical analysis
The data was entered in the form of a data matrix in Microsoft Excel® and analysed statistically using IBM® SPSS® version 20.0.0. Descriptive statistics were calculated as frequencies for categorical variables and means and standard deviation for continuous variables. The association between the categorical variables was explored using Pearson chi-square test or fisher's exact test where as applicable. The difference of continuous variables, among two groups was explored using independent samples t-test. P-value of <0.05 was considered statistically significant for the purpose of the study.

Results

Table 1: Demographic and clinical profile of the study groups

Variables	Group I (N=28)	Group II (N=22)	p-value
Age (years) Mean±SD	41.01±3.11	40.70±3.14	0.261 (NS)
Tumor duration (Months)	25.01±3.13	25.19±3.19	0.119 (NS)
Gender			
Male	11 (39.3%)	9 (40.9%)	0.042 (Sig.)
Female	17 (60.7%)	13 (59.1%)	
Tumor Type			
Micoradenoma	12 (42.8%)	8 (36.4%)	0.036 (Sig.)
Macroadenoma	16 (57.2%)	14 (63.6%)	

Table 2: Intra-operative characteristics of the study groups

Variables	Group I (N=22)	Group II (N=18)	p-value
Complete excision	16 (57.1%)	12 (54.5%)	0.178 (NS)
Duration of Surgery (Minutes)	187.01±14.16	211.12±19.11	0.001 (Sig.)
Blood loss (ML)	109.12±7.13	161.11±11.41	0.001 (Sig.)

Table 3: Post-operative characteristics of the study groups

Variables	Group I (N=28)	Group II (N=22)	p-value
Length of Hospital stay (Days)	184.01±14.16	209.12±19.22	0.041 (Sig.)
Complications			
CSF Leakage	1 (3.6%)	3 (13.6%)	0.109 (NS)
Epistaxis	1 (3.6%)	2 (9.1%)	0.216 (NS)
Sinusitis	3 (10.7%)	4 (18.2%)	0.161 (NS)
Hypopituitarism	3 (10.7%)	3 (13.6%)	0.361 (NS)
Diabetes Insipidus	2 (7.1%)	3 (13.6%)	0.226 (NS)

Discussion
Over the past decade, the evolution of pituitary tumors surgery had been characterized by progressive trends toward less invasive approach. Despite the extensive literature comparing the two techniques which were used in the present study, and agreeing that both are safe and efficient, no consensus has yet been reached on which is the best as regards postoperative results, hormonal control, visual field improvement, and complication rates.
According to the available data in the literature, research using the endoscopic approach [11-13] exhibit better outcomes than studies using the microscopic technique, which show larger percentages of resection [14, 15]. In terms of pathological anatomy, we feel that a high tumour proliferation= marker (Ki67) may be a factor related with the existence of persistent illness and greater tumour recurrence rates, independent of the approach used, even if further research is needed.

Rhinosinusitis was infrequent in both groups, and no variations in their occurrence were discovered. Patients who had undergone endoscopy had a decreased number of rhinosinusal problems, according to White *et al.* [16] In another study conducted by Eltabl MA *et al.* [1]. demonstrated that surgical results in endoscopic transsphenoidal technique are superior than microscopic approach in terms of postoperative nasal complication in a prospective trial.

In terms of hospital stay length, we have seen no significant differences in the average length of stay across the groups in our experience. This was discovered to be consistent with a series of studies reported in the literature [12, 15]

In several investigations, patients who were operated on with transnasal endoscopic technique had a greater incidence of CSF fistula [13, 17, 18]. There was no discernible difference between the two procedures in our experience. As a result, it is critical to preserve the suprasellar cistern and, if intraoperative CSF leakage occurs, to patch the defect by rebuilding the sellar floor using a pediculated graft and fibrin glue.

Conclusion

Both approaches were shown to be effective in the treatment of noninvasive adenomas in this investigation. In the endoscopic group, however, full tumour removal was achieved in a higher percentage of patients, and there were fewer postoperative complications, shorter operational times, and earlier hospital discharge than in the microscopic group.

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