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Efficacy of endoscopic versus microscopic removal of pituitary noninvasive adenoma

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Abstract

Purpose: The purpose of this study was to compare the effectiveness of endoscopic vs microscopic excision of pituitary noninvasive adenoma.

Materials and Methods: The current prospective comparison study was carried out at the Department of Neurology, Apex Hospital, Jaipur, Rajasthan, India among 40 patients who had been diagnosed with noninvasive pituitary adenoma.....Group I (n=22) had endoscopic trans-sphenoidal surgery performed on them. Group II (n=18) had trans-sphenoidal surgery using a microscopic approach.

Results: An overall total of 40 individuals with pituitary nodules had transsphenoidal surgery as a result of this study. Endonasal endoscopic trans-sphenoidal surgery (Group I) was performed on 22 patients, whereas microscopic trans-sphenoidal surgery (Group II) was performed on 18 patients (group II). Complete tumour excision was accomplished in 14 (63.6 percent) of the patients in group I, while it was achieved in 10 (55.6 percent) of the patients in group II.

Conclusion: Both techniques are valid for the treatment of pituitary noninvasive adenomas. However, endoscopy proves to be superior for resection followed by less post-operative complication in comparison to microscopic technique.

Keywords: Endoscopy, microscopy, pituitary adenoma

Introduction

Following a recent epidemiological study, it was shown that pituitary adenoma is the third most frequent brain tumour seen in surgical surgery, accounting for roughly 10% To 25% of all intracranial tumours [1]. Pituitary tumours, while they are only extremely rarely cancerous, may cause considerable morbidity in individuals who are afflicted by them.

Transsphenoidal surgery is the treatment of choice for the vast majority of pituitary tumours, both functional and nonfunctional. Hardy was a pioneer in the use of the operating microscope in transsphenoidal surgery for selective adenomectomy in the late 1960s and early 1970s. The microscopic transsphenoidal surgery using a sublabial or endonasal route has been the "gold standard" for surgically treating pituitary adenomas for the next 30 years, until the advent of endoscopic tumour removal techniques [2].

Following that, Jankowski et al. [3] conducted the first endoscopic pituitary surgery, marking the beginning of a new era. Since then, endoscopic pituitary surgery has grown in popularity, and many microscopic pituitary surgeons have switched to using an endoscope-assisted technique or a completely endoscopic transsphenoidal approach for pituitary adenomas and other parasellar tumours instead of the traditional way [4].

When it comes to pituitary adenoma excision, the endoscope offers a few benefits over the microscope, the most notable of which are improved visibility and lighting. When compared to the microscope's tunnel vision and somewhat limited access, the enhanced panoramic high-resolution image has the potential to provide superior tumour eradication, at least hypothetically speaking [5].

Studies comparing endoscopic and microscopic transsphenoidal surgery have generated conflicting findings, with some indicating no difference between the two techniques [6-8] and others indicating a preference for the new procedure [9, 10]. So the current research was designed to compare the effectiveness of endoscopic vs microscopic excision of a pituitary noninvasive adenoma in order to determine which is superior.

Materials and Methods

The current prospective comparison study was carried out at the Department of Neurology, Apex Hospital, Jaipur, and Rajasthan, India among 40 patients who had been diagnosed with noninvasive pituitary Adenoma.

Informed consent and ethical approval are two terms used to describe the process of obtaining informed consent.

The research protocol was evaluated and approved by the Ethical Committee, which also provided financial support. After describing the study's objective and specifics, a signed informed permission was acquired from the participants.

Criteria for Inclusion

- Pituitary adenoma in the sellar and supra sellar regions
- Pituitary adenomas both functional and nonfunctional
- Pituitary adenomas noninvasive
- The informed consent form has been signed by the patient.

Criteria for exclusion

- A sellar tumour with extensive para sellar or retrosellar extension is a rare occurrence.
- In the case of patients who have not signed the informed consent form,
- Patients who are not medically fit to undergo surgery

Selection of Samples

A total of 50 participants were recruited for the research in each arm in order to reach an 80 percent power of study and a level of significance of 0.05.

The following formula was used to determine the minimum sample size for each group:

$$n = (Z/2+Z)2 *2*2 / d2, n = (Z/2+Z)2 *2*2 / d2, n = (Z/2+Z)2 *2*2 / d2,$$

Where Z/2 is the critical value of the Normal distribution at /2, Z is the critical value of the Normal distribution at, 2 denotes the population variance, and d denotes the hypothesised difference between the two research groups. Assuming equal group sizes in order to obtain an 80 percent power and a 95 percent two-sided confidence level, the research needed a sample size ranging from 12 to 18 participants for each group. Because of an assumed 10-percent response rate, a sample size of 20 people was needed as a bare minimum. Consequently, a sample size of 20 participants for each group was used in the research.

Groups

Participants in Group I were subjected to transsphenoidal endoscopic surgery.

In Group II, transsphenoidal surgery was performed using a microscope.

Results

Table 1: demographic and clinical profile of the study groups

Variables	Group I (N=22)	Group II (N=18)	p-value
Age (years) Mean±SD	42.81±3.71	41.67±3.04	0.196 (NS)*
Tumor duration (Months)	24.81±4.93	25±4.99	0.217 (NS)*
Gender			
Male	8 (36.4%)	7 (38.9%)	0.001 (Sig.)**
Female	14 (63.4%)	11 (61.1%)	
Tumor Type			
Microadenoma	9 (40.9%)	6 (33.3%)	0.001 (Sig.)**
Macroadenoma	13 (59.1%)	12 (66.7%)	

Test applied: student t-test* and Pearson chi-square**

Methodology

There was a thorough neurological examination done that included motor, sensory, and cranial nerve testing as well. A routine blood check and a basic hormonal profile were conducted as part of the evaluation. Brain magnetic resonance imaging (MRI) and computed tomography (CT) of the sella and paranasal sinus were both done in all of the patients studied. Postoperative treatment was given in a consistent manner to all patients.

In both cases, general anaesthesia was used, and orotracheal intubation was used throughout the procedure. We utilised a sinonasal rigid endoscope with a diameter of 4 mm and an angle of 0° and 30°. The nasal passages had been cleared. We came in via the middle meatus and found the sphenoid rostrum, which we labelled. Kerrison Rongeurs were used in the sphenoidectomy procedure. The anterior wall of the sella was identified and the sella itself was opened. Using a cruciate incision, a hole was made in the dura mater. The tumour was excised using a curette from the rear portion first, and subsequently from the anterior part, all under direct sight of the surgeon. A 30° endoscope was used to check on Sella for any signs of tumour recurrence. It is common for arachnoid to fall into the sellar cavity after a tumour has been completely removed. Hemostasis has been achieved. The sphenoid sinus is densely packed with fat and sealed with fibrin glue, as seen here. At the level of the middle meatus, merocel was used to fill the nasal passageways. After 48 hours, the packaging was removed. Lumber drains were placed intraoperatively in individuals who had had an arachnoid rupture and removed 48-72 hours following the operation.

Microscopic surgery was very similar to endoscopic surgery, with the exception that it required the use of a Hardy's speculum and was performed under visual observation using a microscope rather than an endoscope instead of the latter.

Statistics are used in this study

The data was input into Microsoft Excel® in the form of a data matrix, and the results were statistically analysed using IBM® SPSS® version 20.0.0. For categorical variables, descriptive statistics were computed as frequencies, and for continuous variables, descriptive statistics were produced as means and standard deviation. The connection between the categorical variables was investigated using the Pearson chi-square test or the Fisher's exact test, as appropriate, to determine their relationship. In this study, the difference between two groups in continuous variables was investigated using the independent samples t-test. For the purposes of this research, a p-value of less than 0.05 was deemed statistically significant.

Table 2: Intra-operative characteristics of the study groups

Variables	Group I (N=22)	Group II (N=18)	p-value
Complete excision	14 (63.6%)	10 (55.6%)	0.178 (NS)**
Duration of Surgery (Minutes)	186.41±15.36	210.92±20.81	0.041 (Sig.)*
Blood loss (ML)	110.42±8.93	160.31±10.71	0.036 (Sig.)*

Test applied: student t-test* and Pearson chi-square**

Table 3: Post-operative characteristics of the study groups

Variables	Group I (N=22)	Group II (N=18)	p-value
Length of Hospital stay (Days)	186.41±15.36	210.92±20.81	0.041 (Sig.)*
Complications			
CSF Leakage	1 (4.5%)	2 (11.1%)	0.326 (NS)**
Epistaxis	1 (4.5%)	2 (11.1%)	0.326 (NS)**
Sinusitis	2 (9.1%)	3 (16.7%)	0.061 (NS)**
Hypopituitarism	2 (9.1%)	3 (16.7%)	0.061 (NS)**
Diabetes Insipid us	1 (4.5%)	2 (11.1%)	0.326 (NS)**

Test applied: student t-test* and Pearson chi-square**

Discussion

Transnasal transsphenoidal surgery, whether we use the microscope or the endoscope, has become, throughout the years, the treatment of choice for the pathology of the sellar region, since it is a minimally invasive procedure that uses the body's own pneumatic cavities to reach a small space with highly relevant anatomical elements. Over the last decade, the development of pituitary tumours surgery has been marked by increasing tendencies toward less intrusive technique. Despite the considerable literature comparing the methods, and recognizing that both are safe and efficient, no agreement has yet been established on which is the best as respects postoperative outcomes, hormonal management, vision field improvement, and complication rates.

Regarding the information available in the literature, the studies indicate superior outcomes with the endoscopic approach^[11-13], while the studies which demonstrate greater percentages of resection with the microscopic method^[14, 15]. Concerning pathological anatomy, even if more research are needed, we think that a high tumour proliferation= marker (Ki-67) may be a factor linked with presence of chronic illness and greater tumour recurrence rates, independent of the method used.

Rhinosinusal complications were rare in both groups, and no differences were observed regarding their frequency. In the research by White et al.^[16], a reduced number of rhinosinusal consequences was observed from individuals who had undergone endoscopy. 16 in a prospective research performed by Eltabl MA et al.^[1] showed surgical results in endoscopic transsphenoidal technique is superior than microscopic method regarding postoperative nasal complication.

In certain published research, a greater risk is reported of CSF fistula in those patients operated on using transnasal endoscopic technique^[13, 17, 18]. In our experience, there was no substantial difference seen between the two methods. Thus, it is of paramount significance to maintain the suprasellar cistern intact and, if intraoperative CSF leaking is detected, to repair the defect by rebuilding the sellar floor using a pediculated graft and fibrin glue.

Regarding the length of hospital stay, in our experience no significant difference detected between the average duration of hospital stay in between the groups. This was discovered in accordance with the series reported in the literature^[12-15].

Conclusion

According to the findings of the current research, both methods are effective for the treatment of noninvasive

adenomas. Although the endoscopic group accomplished full tumour removal in a higher proportion of patients, there were less postoperative complications, shorter operating times, and earlier hospital release in the endoscopic group when compared to that of the microscopic group.

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