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EFFICACY OF ENDOSCOPIC VERSUS MICROSCOPIC REMOVAL OF PITUITARY NONINVASIVE ADENOMA: A PROSPECTIVE COMPARATIVE STUDY.

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Abstract

Aim: to evaluate the efficacy of endoscopic versus microscopic removal of pituitary noninvasive adenoma.

Materials and methods: The present prospective comparative was conducted in the Department of Neurosurgery, SKMCH, Muzaffarpur, Bihar, India among 40 patients diagnosed of noninvasive pituitary Adenoma. Group I (n=22); underwent endoscopic transsphenoidal surgery. Group II (n=18): underwent microscopic transsphenoidal surgery.

Results: A total of 40 patients with pituitary noninvasive adenoma were operated transsphenoidally. Endonasal endoscopic transsphenoidal surgery (group I) was carried out among 22 patients and 18 patients were operated by microscopic transsphenoidal surgery (group II). In group I, complete tumor excision was achieved in 14 (63.6%) patients, and in group II, it was achieved in 10 (55.6%) patients.

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

Recent epidemiological data suggested that Pituitary adenoma is the third most common intracranial tumor in surgical practice, accounting for approximately 10%–25% of all intracranial tumors.[1] Although only very rarely malignant, pituitary tumors may cause significant morbidity in affected patients.

Transsphenoidal surgery is the treatment of choice for most functioning and nonfunctioning pituitary tumors. In the late 1960s Hardy popularized the use of the operating microscope in transsphenoidal surgery for selective adenomectomy. In the following 30 years till the introduction of endoscopic technique of tumor removal, the microscopic transsphenoidal procedure *via* a sublabial or endonasal approach remains the “gold standard” for surgically treating pituitary adenomas.[2]

Subsequently, Jankowski et al.[3] performed the first endoscopic pituitary surgery to start a new era. Since then, endoscopic pituitary surgery has gained great popularity, and many microscopic pituitary surgeons have transitioned to an endoscope-assisted method or fully endoscopic transsphenoidal approach for pituitary adenomas and other parasellar tumors.[4]

The endoscope has some advantages over the microscope in pituitary adenoma removals, which are the enhanced visualization and better illumination. The improved panoramic high-resolution view can lead theoretically to better tumor removal in comparison to the tunnel vision and relatively restricted access of the microscope.[5]

Studies comparing endoscopic with microscopic transsphenoidal surgery have produced inconsistent results, either showing no difference between them[6-8] or favoring the new technique.[9,10] Hence the present study was conducted with the aim to evaluate the efficacy of endoscopic versus microscopic removal of pituitary noninvasive adenoma.

Materials and Methods

Study Design

The present prospective comparative was conducted in the Department of Neurosurgery, SKMCH, Muzaffarpur, Bihar India among 40 patients diagnosed of noninvasive pituitary Adenoma.

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

Sample Selection

50 subjects in each arm to achieve 80% power of study and level of significance 0.05 were recruited for the study.

The minimum sample size for each group was calculated using the formula:

$n = (Z_{\alpha/2}+Z_{\beta})^2 *2*\sigma^2 / d^2$,

where $Z_{\alpha/2}$ is the critical value of the Normal distribution at $\alpha/2$, Z_{β} is the critical value of the Normal distribution at β, σ^2 is the population variance, and d is the hypothesized difference between the two study groups. Assuming equal group sizes to achieve a power of 80% and a two-sided confidence level of 95%, the study required a sample size ranging from 12 to 18 for each group. Assuming a non response rate of 10%, the minimum required sample size was 20. Therefore, a sample size of 20 for each group was included in the study.

Groups

Group I: underwent endoscopic transsphenoidal surgery

Group II: 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=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			
Micoradenoma	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**

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 Insipidus	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 past decade, the evolution of pituitary tumors surgery had been characterized by progressive trends toward less invasive approach. Despite the extensive literature comparing the techniques, 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.

Regarding the information available in the literature, the studies report better results with the endoscopic approach[11-13], whereas the studies which show higher percentages of resection with the microscopic technique.[14,15] Concerning pathological anatomy, even though further studies are warranted, we believe that a high tumor proliferation= marker (Ki‑67) might be a factor associated with presence of persistent disease and higher tumor recurrence rates, regardless of the technique applied.

Rhinosinusal complications were uncommon in both groups, and no differences were found regarding their incidence. In the study by White et al.[16], a lower number of rhinosinusal complications was reported from patients who had undergone endoscopy.[16] in a prospective study conducted by Eltabl MA et al.[1] reported surgical outcomes in endoscopic transsphenoidal approach is better than microscopic approach regarding postoperative nasal complication.

In some available studies, a higher risk is observed of CSF fistula in those patients operated on via transnasal endoscopic approach.[13,17,18] In our experience, there was no significant difference observed between the two techniques. Thus, it is of utmost importance to keep the suprasellar cistern intact and, if intraoperative CSF leakage is observed, to repair the defect by reconstructing the sellar floor using a pediculated graft and fibrin glue.

Regarding the length of hospital stay, in our experience no significant difference observed between the average duration of hospital stay in between the groups. This was found in agreement with the series published in the literature.[12-15]

Conclusion

The present study concluded that both techniques are valid for the treatment of noninvasive adenomas. However, complete tumor excision was achieved in greater percentage of patients, and there were less postoperative complication, less operative time early discharge from hospital in endoscopic group as compared to microscopic group.

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