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Endoscopic Versus Microscopic Pituitary Adenoma: Comparative Study of Two Different Approaches

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Abstract

Background: The comparisons in both techniques' outcomes, complications, and hospital stay were the study questions in this article.

Aim of Study: The study included two arms: Group A: Microscopic sublabial pituitary surgery was done for 18 patients. Group B: Endoscopic surgery was done for 20 patients.

Patients and Methods: A retrospective comparative observational trial held at two places. Microscopic sublabial pituitary surgery casesarmed as group A (n=18). While endoscopic endonasal transsphenoidal pituitary surgery cases were abbreviated as group B (n=20).

Statistical analysis: The variables of interest included age, sex, symptomatology, tumor sizes in (cm^3), resection, operative time, hospital stay, blood loss, and postoperative complications using Statistical Package of Social Sciences version 25 (Chicago, IL, USA). Categorical data were presented as percentages and compared using the Chi-square *t*-test. Numerical data were presented as mean and standard deviation and compared by using Student's *t*-test. A *p*-value below 0.05 was regarded as statistically significant.

Results: The total resection rate in group A was found in 14/18 (77.7%) which is not statistically different from group B 15/20 (75%) with *p*-value=0.852. As regard operative time, group A had a longer duration in comparison to group B with a slightly significant difference (2.15±0.24 vs. 1.75±0.8 hrs, *p*=0.049). As regard complications, It has been noticed that postoperative sinusitis/septal problems are higher in group A than group B.

Conclusion: Microscopic sublabial pituitary surgery is not superior to the endoscopic approach as regard resectability in the field of purely sellar lesions. However, higher rates of postoperative complications in the naso-septal apparatus may affect patients' quality of life.

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Key Words: *Pituitary adenoma – Transsphenoidal surgery – Microscopic sublabial.*

Introduction

SINCE the 1st endoscopic transsphenoidal surgery was done by Jankowski **[1]**, pituitary surgery enters a new era of management and prognosis transition from microscopic sublabial approach to endoscopic was difficult and certain centers in developing countries found difficulty in gaining the clues to add this new technique to her management plan **[2-5]**. The introduction of ENT surgeons isan important step in starting up the techniques in neurosurgery centers **[6-8]**. Minimally invasive surgery is a new term or concept that enters the field of neurosurgery in the last decades, however, after a long period since enrolling this term into practice, a new concept emerges into the surface; optimally invasive neurosurgery **[9,10]**. What matters: Finding the optimum level of invasiveness for each patient - and that doesn't always have to be the procedure with the smallest incisions. The comparisons in both techniques' outcomes, complications, and hospital stay were the study questions in this article.

Patients and Methods

The study was a retrospective comparative observational trial held at two separate places. Microscopic sublabial pituitary surgery cases were retrieved from 2014-2020. While endoscopic endonasal transsphenoidal pituitary surgery cases were collected from 2013 to 2020. After gaining approval from local health committees at our hospitals, the patients' medical records were collected. The inclusion criterion included sellar (with/without

suprasellar extension) pituitary adenoma (functioning or non-functioning). The presence of parasellar extension was regarded as an exclusion criterion.

The variables of interest included age, sex, symptomatology, tumor sizes in (cm^3), resection, operative time, hospital stay, blood loss, and postoperative complications.

Statistical analysis:

The statistical analysis was done by the Statistical Package of Social Sciences version 25 (Chicago, IL, USA). Categorical data were presented as percentages and compared using the Chi-square *t*-test. Numerical data were presented as mean and standard deviation and compared by using Student's *t*-test. A *p*-value below 0.05 was regarded as statistically significant.

Results

The mean and standard deviation of age in group A was 42.08±10.88 years while in group B was 41.99±11.1 years, the age was distributed homogenously between two groups (*p*=0.98). There were 10 males (55.5%) in group A while group B had 12 males (60%), with no sex bias (*p*=0.96). Thirty-three percent of group A patients had visual symptoms as the main complaint in comparison to 40% in group B as shown in Table (1). There wasthe homogenous distribution of symptomatology across both groups which refers to unbiased distribution.

Table (1): Patients' criteria.

	Group A (n=18)	Group B (n=20)	*p*-value
Age (mean±SD) (years)	42.08±10.88	41.99±11.1	0.98
Male (%)	10 (55.5%)	12 (60%)	0.96
Main symptomatology (%):			
• Visual symptoms	6 (33.3%)	8 (40%)	0.92
• Headache	4 (22.2%)	5 (25%)	0.857
• Endocrinopathy	4 (22.2%)	4 (20%)	0.816
• Apoplexy	2 (11.1%)	3 (15%)	0.9
Tumor vertical size (mean±SD) (cm)	2.9±1.6	2.7±2.2	0.75
Total resection (%)	14 (77.7%)	15 (75%)	0.852
Operative time (mean±SD) (Hrs.)	2.15±0.24	1.75±0.8	0.049
Blood loss (mean±SD) (mL)	161.22±37.5	122.3±14	0.0001
Hospital stay (mean±SD) (day)	4.7±2.1	3.8±1	0.095

In Fig. (1), the distribution of diagnoses is illustrated.

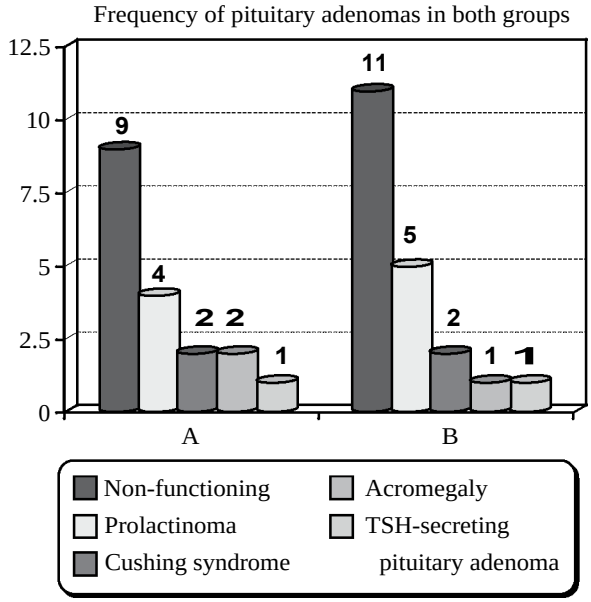

Fig. (1): Frequency of pituitary adenoma in both groups.

The tumor size was estimated in vertical size in cm. The mean and standard deviation of the tumor size in group A was 2.9(1.6) cm while in group B was found to be slightly small with a mean and standard deviation of 2.7(2.2) with no statistically significant difference between both groups in size (*p*=0.75). The total resection rate in group A was found in 14/18 (77.7%) which is not statistically different from group B 15/20 (75%) with p value=0.852. As regard operative time, group A had a longer duration in comparison to group B with a slightly significant difference (2.15±0.24 vs. 1.75±0.8 Hrs, *p*=0.049). Blood loss was markedly higher in group A than group B with a highly statistically significant difference (161.22±37.5 vs. 122.3±14mL, *p*=0.0001). Group A patients tend to take more days at hospital admission than group B but statistically insignificant (4.7±2.1 vs 3.8±1 days, *p*=0.095). As regard complications, Table (2) showed the frequency of complications in both groups. It is noticed that postoperative sinusitis and septal problems are higher in group A than group B with a statistically significant difference [(10(55.4%) vs 1(5%), *p*=0.0026)].

Table (2): Postoperative complication.

	Group A (n=18)	Group B (n=20)	*p*-value
Diabetes Insipidus	4 (22.2%)	2 (10%)	0.55
CSF leak	3 (16.6%)	2 (10%)	0.9
Sinusitis and septal complications	10 (55.4%)	1 (5%)	0.0026
Reoperation	1 (5.55%)	0 (0%)	–

Case presentation:

Case 1:

A 24 years old female patient complaining of amenorrhea galactorrhea syndrome unresponsive to medical treatment for 4 years and worsening of visual symptoms. She had bitemporal hemianopia with MRI evidence of sellar lesion (Fig. 2). She underwent sublabial microscopic pituitary adenomectomy (see video 1). Postoperatively she developed no worsening of vision or fluid imbalance. AT postoperative day 4, she developed a loss of consciousness, dehydration, and rhinorrhea. She was diagnosed with DI and CSF leakage. She underwent an immediate CT scan and showed extensive subarachnoid pneumocephalus (Fig. 3). She underwent endoscopic repair with middle turbinate flap and packing for 4 days and lumbar drain at ICU. Here consciousness improved markedly. Another CT scan was done before ICU and showed the resolution of pneumocephalus (Fig. 3).

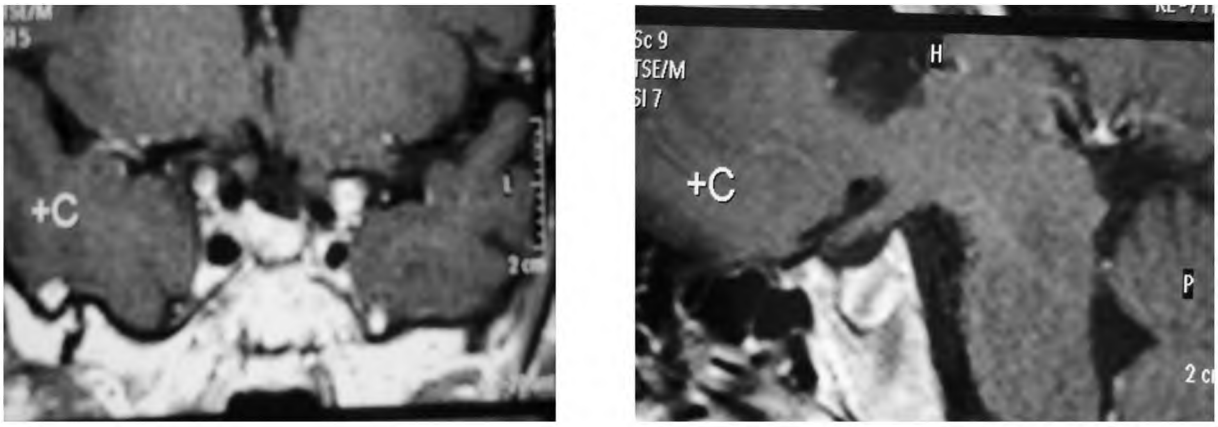

Fig. (2): Preoperative MRI sella with contrast. Left, coronal view. Right, sagittal view.

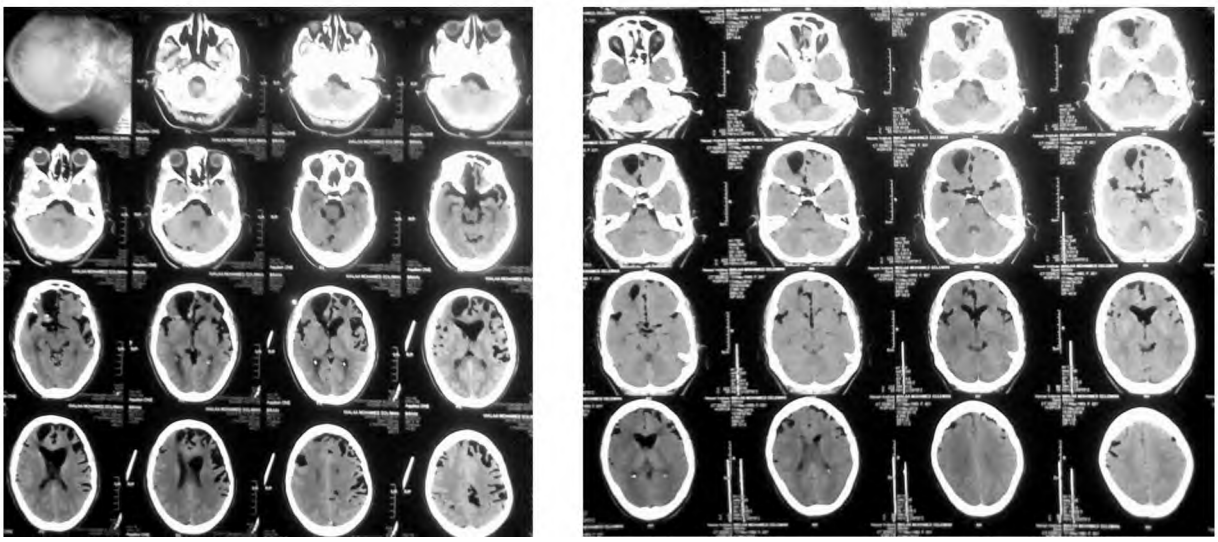

Fig. (3): Postoperative CT scan. Left, immediate after deterioration of conscious level at PO 4. Right, after endoscopic repair and closure of defect.

Case 2:

A 43 years old female patient complaining of long-standing headache and worsening of visual symptoms like a decrease of visual acuity especially on the right eye. She was diabetic on oral hypoglycemic drugs. She underwent an MRI investigation which showed hyperintense sellar lesion (Fig. 4). She underwent endoscopic endonasal transsphenoidal pituitary adenomectomy (see video 2). Her postoperative status passed well with no adverse events. A postoperative CT scan was done before discharge showed no hemorrhage or hydrocephalus (Fig. 5).

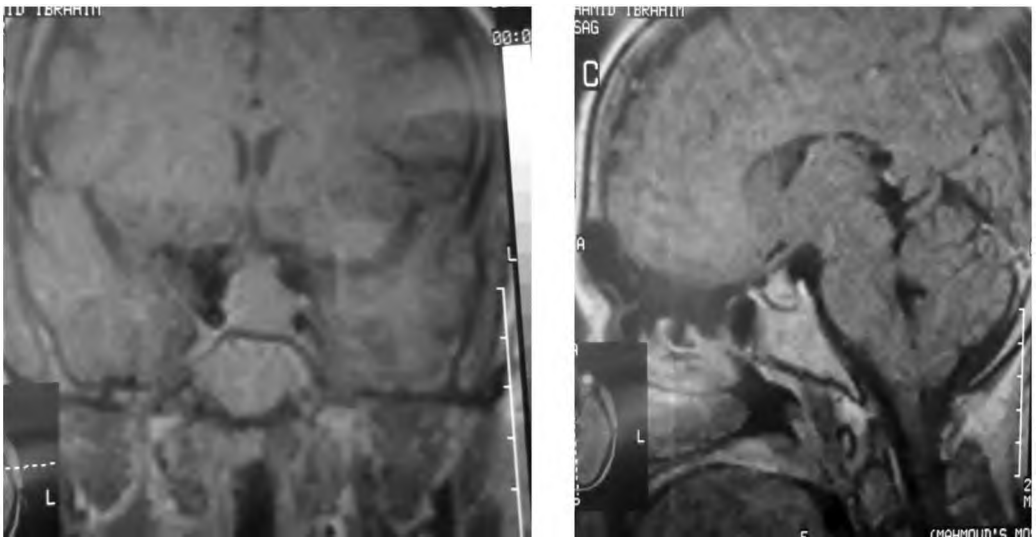

Fig. (4): Preoperative MRI sella with contrast. Left, coronal view. Right, sagittal view.

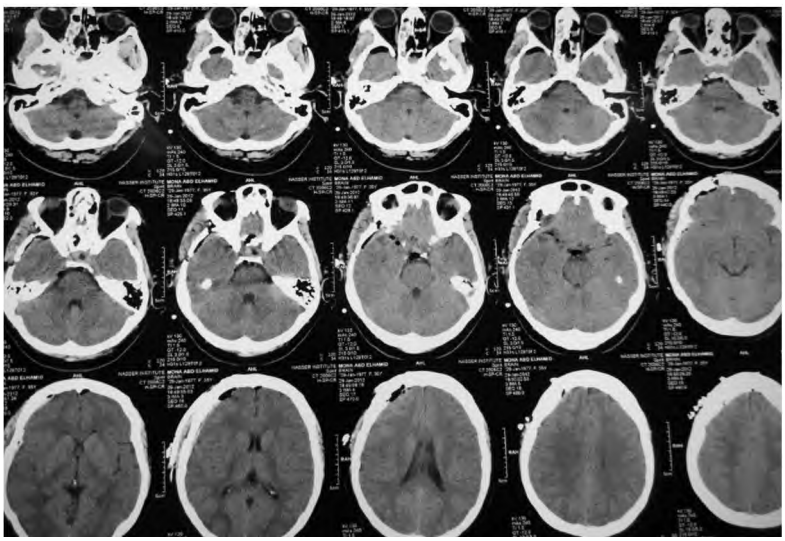

Fig. (5): Postoperative CT scan.

Discussion

The refined nature of microsurgery renders pituitary surgery approaches accessible **[4,5,11]**. However, challenges still exist. Endoscopic surgery gained significant popularity among neurosurgeons and ENT surgeons **[4,5,11-14]**. The new era of pituitary surgery is moving toward minimally invasive surgery but optimally invasive surgery is highly dependent on surgeons' experiences **[15-18]**.

Kawamata et al., published a large series of endoscopic transsphenoidal surgery (215 patients) **[19]**. The comparison of his series was against endoscopic assisted microsurgery but not a 'pure' microsurgical approach. So as in De Divitiis and coworkers methodology **[20]**. Both of the last trials found insignificant differences in resectability in general. Koren and colleagues compared both techniques in the same methodology as ours **[21]**.

Ahmed Aly and coworkers published a retrospective analysis and showed a superior result of endoscopic surgery over microsurgery in terms of postoperative complications especially nasal complications **[5]**.

Jain and colleagues did the same design of the study as ours **[22]**. The same Ahmed Alys's conclusion was achieved. Besides, less operative time was in the endoscopic arm rather than the microsurgery arm. However, in terms of tumor resection, both techniques showed homogenous results (p>0.05).

The comparison of both techniques should include merits and demerits. Intraoperatively, the microscope does not permit full 3D visualization of the sphenoidal sinus **[3]**, pituitary fossa and paraspinal area. In contrast, the endoscope has the advantages of full visualization of pituitary tumor interface, needs no fixed tunnel with a wide field **[23]**. Angular endoscopes provide good visualization of extreme lateral walls of the surgical field **[24,25]**. Hence, the advantage of the optical ability of endoscope over microscope is real and effective **[8,26-28]**.

Several limitations of the endoscope like the need fora blood less field and a steep learning curve **[11]**. Septal and paranasal sinus complications do not exist in endoscope surgery but microscopic surgery **[2,7,19,20]**.

Total tumor excision was achieved in both groups despite its size and method **[3,5,9]**. This reflects the surgical experience of both teams in managing pituitary adenoma in cold and emergent cases (apoplexy) **[29]**. Operative time and complications were homogeneously distributed in both groups which are mentioned previously in literatures **[8,30]**.

Several studies found gross total resection by traditional microsurgical methodology is superior to endoscopic surgery **[10,31,32]**, however, this is not applicable in parasellar extension of pituitary adenoma cases **[33]**.

Conclusion:

Microscopic sublabial pituitary surgery is not superior to the endoscopic approach as regard resectability in the field of purely sellar lesions. However, higher rates of postoperative complications in the naso-septal apparatus may affect patients' quality of life.

Conflict of interest:

There is no conflict of interest.

Informed consent:

This type of study does not require informed consent.

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دراسة مقارنة بين استئصال أورام الغدة النخامية بالمنظار عن طريق الأنف أو بالميكروسكوب الجراحى عن طريق أسفل الشفاه

فى هذه الدراسة المرجعية، تم دراسة استئصال أورام الغدة النخامية بالمنظار عن طريق الأنف أو بالميكروسكوب عن طريق أسفل الشفاه من حيث النتائج والمضاعفات وفترة الإقامة فى المستشفى.

ولقد تم تقسيم الحالات إلى قسمين القسم الأول الخاص بحالات الميكروسكوب (أ) والقسم الثانى خاص بحالات المنظار (ب).

فى الجزء الخاص بحالات الميكروسكوب تم عمل استئصال كامل فى ١٤ مريض من أصل ١٨ وهذا لا يختلف عن حالات المنظار حيث تم استئصال الورم كاملاً فى ١٥ حالة من أصل ٢٠. بالنظر إلى وقت الجراحة كان الوقت أطول فى المجموعة أ الخاصة بالميكروسكوب عن حالات المجموعة ب الخاصة بالمنظار. أ ما بالنسبة لإلتهاب الجيوب الأنفية و مشا كل الحاجز الأنفى بعد الجراحة فقد كانت أكثر فى المجموعة أ عنه فى المجموعة ب.

ولقد استنتجنا أن استئصال أورام الغدة النخامية بالميكروسكوب عن طريق أسفل الشفاه ليس بأفضل من استئصاله عن طريق المنظار فيما يخص اكتمال الاستئصال وخصوصاً فى الحالات التى تقع كاملاً فى السرج، أما فيما يخص المضاعفات التى تتضمن الأنف والحاجز الأنفى فأنها أكثر فى حالة استخدام طريق أسفل الشفاه بالميكروسكوب وهو ما يؤثر على نوعية وجودة حياة المريض فيما بعد.