

Endoscopic Endonasal Transsphenoidal Surgery in Regional Sellar Lesions (Surgical trial).

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Summary

Introduction. Endonasal endoscopic approach has entered recently like a strong option for pituitary tumors treatment. **Material and method.** A prospective, controlled, randomized and double blind surgical assay was carried out in 41 patients with regional sellar lesions between August 2002 and July 2004. Effectiveness of this method in relation to the microscopic transphenoidal one was evaluated. **Results.** Forty one patients were intervened (21 microscopic and 20 endoscopic), adenoma's Total resections were achieved in 71,4 and 70% and one empty sella was resolved by each technique. Associated complications were presented in 66,6 and 30% respectively. They were higher in endoscopic operations. **Conclusions.** Regional sellar lesions can be treated by Endoscopic surgery with similar effectiveness and less complications.

Introduction

Transsphenoidal approach is the most versatile method to treat sellar affections due to the high resolatory capacity. Schloffer was the first in makes one (Innsbruck en 1907). The standard technique was established by Guiot and Hardy with the introduction of fluoroscopic monitoring in 50s and surgical microscope in 60s.^{1,2}

In 70s, endoscópico para nasal sinus surgery was successful in Germany, and the foundations were established to repair fistulae through sellar floor.³ After isolated reports in adenomas⁴, Jho and Carrau described the current techniques in 50 patients.⁵

There are no still enough scientific evidences (class I) to sustain that the microscope can be replaced by the endoscope in transsphenoidal pituitary surgery. To obtain these evidences is the main objective of our work.

Materials and Methods

A surgical assay in 4 phases was assessed in patients with sellar affections to evaluate effectiveness of endoscópico transsphenoidal endonasal approach (EEA) in relation to transsphenoidal microsurgical approach (MTA). Phase I (experimental) was obviated. It was considered no necessary by the authors, because EEA had had very low morbidity in multiple series in the whole world. Ethical conditions were established to the next phase. Phase II results (preliminary short assay or cohort study were recently published.⁶ At the present article we report phase III (prospective, controlled, randomized and single blind surgical assay, previous informed patient consent about each method) and phase IV (clinical, by images and hormonal evaluation at 3 and 6 months).

Results

Forty one patients underwent surgery (MTA n=21 and EEA n=20). All lesions according to the approach are showed in table 1. Procedures effectiveness depending on images and hormonal tests are illustrated in graphics 1 and listed in table 2. Twenty five patients had had preoperative

Table 1
Preoperative diagnosis according to tests of images and type of approach.

Type of lesion	Applied approach				Total	
	Microscopic		Endoscopic			
Empty sella	1	4,8%	1	5,0%	2	4,9%
Microadenomas	4	19,0%	5	25,0%	9	22,0%
Intrasellar macroadenoma	1	4,8%	1	5,0%	2	4,9%
Macroadenoma degree A	3	14,3%	4	20,0%	7	17,1%
Macroadenoma degree B	10	47,6%	5	25,0%	15	36,6%
Macroadenoma degree C	2	9,5%	4	20,0%	6	14,6%
Total	21	100%	20	100%	41	100%

P=0.601

Table 2
Postoperative evolution of the Hormonal Dysfunctions in Secretors Adenomas according to Type of Approach.

Approach	Disease	Normalization		improvement		Total	
		No.	%	No.	%	No.	%
Microscopic	Acromegaly	7	63,6	1	9,1	8	72,7
	Cushing disease	2	18,2	-	-	2	18,2
	Forbes-Albright	1	9,1	-	-	1	9,1
	Total	10	90,9	1	9,1	11	100
Endoscopic	Acromegaly	5	71,4	-	-	5	71,4
	Cushing disease	1	14,3	-	-	1	14,3
	Forbes-Albright	-	-	1	14,3	1	14,3
	Total	6	85,7	1	14,3	7	100

Source: clinical files

neurophthalmological symptoms. They were disappeared in 54,5% of MTA patients and 64,3% of the EEA patients. These symptoms were improved at 36,4% and 28,6% respectively.

One MTA operated patient worsened (9,1%).

Table 3
Complications

Complications	Approach			
	Microscopic No.	%	Endoscopic No.	%
visual worsening	1	4,76	0	-
Meningitis	1	4,76	0	-
Inspid diabetes	6	28,6	5	25
Broken mucous	4	19,0	1	5
Sinequia of Mucous	2	9,52	0	-
Total	14	66,7	6	30

Note: Percentage based on the total of patient operated by each approach

Source: clinical files

In all acromegalic patients according to the symptoms, acral growing was stopped and partial regression was observed. Galactorrhea and amenorrhea disappeared in patients with macroprolactinomas. Hypertension, obesity and hirsutism were disappeared in ACTH adenomas, but menstrual disorders not changed. Patients with empty sellae (ES) becoming asymptomatics.

Postoperative complications are listed in table 3.

Range surgical time was 2 hours for MTA and 3 hours for EEA. Post-operative hospitalization stage was 9 and 3,5 days respectively.

Discussion

Pre-sellar sinus sphenoidal is a lucky anatomic event to provide an extracranial rectilinear trajectory to sellae turci. Theoretically endoscopic procedure should minimize all injuries and cost related to this strategy.

Approach

Nostril wideness and nasal diversion give us an orientation about the correct side to the approaches. Contralateral approach is advisable in lesions with lateral growing.⁵ Endonasal operation avoid injuries and surgical time during septum dissection.^{3,7} Middle turbinectomy that was initially indicated to obtain more wideness⁴ were considered not necessary by means of consequent actions related to nostril size, nasal septum diversion, turbinates development and concha bullosae presence. The best endoscópico gradual penetration is made it near to nasal floor to identify the lower turbinate and then middle turbinate. After that, it's necessary to ascend between the middle turbinate and nasal septum. Rostrum and ostium sphenoidal will be expose with a good visualization.^{5,8}

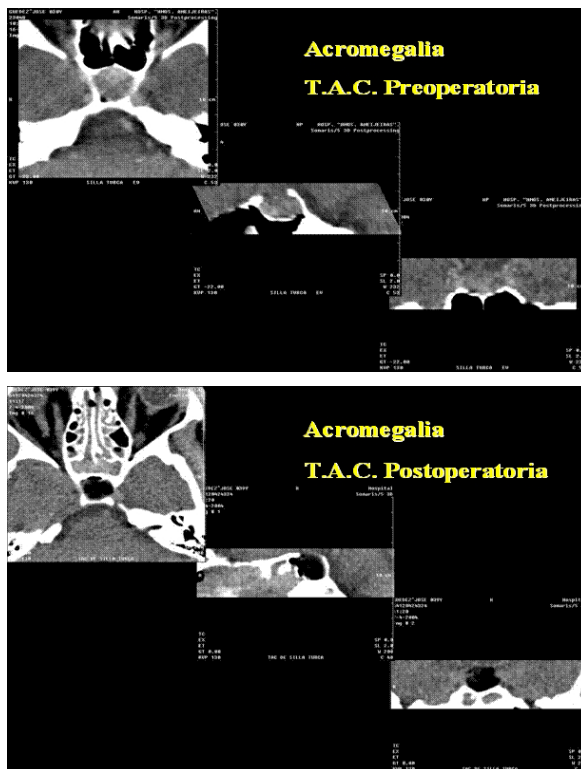
Papay has said the superiority of transnasal-transeptal endoscopic approach, but the endonasal endoscópico approach is the only one to ignore the traumatic dissection and septal resection.^{3,9}

To Yaniv,¹⁰ more benefits are obtained with both approaches combination.

Bidimensional endoscópico vision was compensated by direct approach to the anatomy, and better definition was obtained in order to tumors-gland-diaphragm/arachnoid interphases.

Surgeon's eyes movement provided a panoramic vision of surgical field, and the possibility to identify the carotid and optic protuberances, carotid-optic recess clivus and suprasellar cisterns as equal to described by previous reports.^{8,11} A rigid tunnel and limited visual angle were determined by speculum in MTA.

We observed a lower complications rate and a higher effectiveness in relation to resection grade by EEA. Tumoral residues were extracted by Helal trough endoscópico method in 40,5% of patients that were previously operated (MTA) by himself.¹² A good identification about diaphragm descent



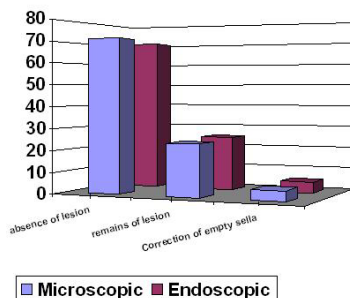
was reported by Heilman after tumor resection.⁷

An additional surgical time is related to the continuous worsening of endoscópico vision, because the lent is covered by blood elements frequently.

Cure treatment

Similar effectiveness was confirmed during postoperative evaluation in but methods. Jho and Carrau have referred to obtain the same initial resolution of symptoms in 13 of 14 adenomas that were operated by endoscopy.⁵ Heilman obtained total resection in 2 of 5 adenomas with a similar approach, clinical and hormone references improved in 2, meanwhile in one Cushing disease the cortisol levels stay high.⁷ Stamm showed total cure in 92,5% of 53 adenomas by EEA.¹³ Our results by EEA are very similar to the previously mentioned and our results with MTA,¹⁴ (photos 1 and 2 showing pre and postoperative tomography in a patient with GH adenoma. See fat into the sella in postoperative tomography).

Graphic 1. Postoperative evaluation by means of tests of images.



Operative morbidity

Relevant complications (visual damage and meningitis) were observed only with MTA. Cappaviana observed intact nasal mucosa in all patients one month after EEA.⁸ Jho and Carrau reported one fistulae and one sinequia among 27 patients operated by endoscópico method.¹¹

A low rate of complications in EEA will be determinant in their future.

Surgical time, hospitalization stay and costs

It's recognized a longer learning curve to the EEA because usually surgeons are not related with endoscopic techniques.^{8,11} University Federico II's group (Naples) has developed some instruments to make easier endoscópico approach.¹⁵ Some authors have considered that EEA training will provide a shorter surgical time.⁹

A lower postoperative hospitalization in EEA patients will permit to reduce costs. It will be better with a diminished surgical time.

Conclusions

Similar effectiveness has been demonstrated to MTA and EEA to treat sellar lesions, but endoscópico method show lower morbidities and less postoperative symptoms. Therefore, it will be obtain lower hospitalizations stay and then a consequent hospital costs reduction.

Bibliografía

1. DOTT N, BAILEY N. A consideration of the hypophyseal adenomata. Br J Surg 13:314-66, 1925.
2. GUIOT G. Transsphenoidal approach in surgical treatment of pituitary adenomas: general principles and indications in nonfunctioning adenomas. In:

- Kohler PO, Ross GT.,ed. Diagnosis and treatment of pituitary tumors. New York: American Elsevier, 1973.
3. PAPAY FA, BENNINGER MS, LEVINE HL, et al. Transnasal transeptal endoscopic repair of sphenoidal fluid fistula. *Otolaryngol Head Neck Surg* 101:595-7, 1989
 4. JANKOWSKI R, AUNQUE J, SIMON C, MARCHAL JC, HEPNER H, WAYOFF M. Endoscopic pituitary tumor surgery. *Laryngoscope* 102:198-202, 1992
 5. JHO HD, CARRAU RL, DALY MA. Endoscopic pituitary surgery: an early experience. *Surg Neurol* 47: 213-23, 1997.
 6. GONZÁLES GONZÁLES J, LÓPEZ ARBOLAY O, MORALES SABINA O, PIÑEIRO MARTI J, VIDAL VERDIAL R. Cirugía transnasal transesfenoidal endoscópica en afecciones de región selar. *Rev.Española Neurocirugía* 16:27-33, 2005.
 7. HEILMAN CB, SHUCART WA, REBEIZ EE. Endoscopic sphenoidotomy approach to the sella. *Neurosurgery* 41:602-7, 1997.
 8. CAPPABIANCA P, ALFIERI A, DE DIVITIS E. Endoscopic endonasal transsphenoidal approach to the sella: towards functional endoscopic pituitary surgery (FEPS). *Minim Invas Neurosurg* 41:66-73, 1998;.
 9. PAPAY FA, STEIN JM, RHOTEN RLP, LUCIANO M, ZINS J, HAHN J. Transnasal transeptal endoscopic approach to the sphenoid sinus. *J Craniofacial Surg* 8:159-63, 1997.
 10. YANIV E, RAPPAPORT H. Endoscopic transseptal transsphenoidal surgery for pituitary tumors. *Neurosurgery* 40: 944-6, 1997.
 11. CARRAU RL, JHO HD, KO Y. Transnasal-transsphenoidal endoscopic surgery of the pituitary gland. *Laryngoscope* 106: 914-8, 1996.
 12. HELAL MZ. Combined micro-endoscopic trans-sphenoid excisions of pituitary macroadenomas. *Eur Arch Otorhinolaryngol* 252: 186-9, 1995.
 13. STAMM A, BORDASCH A, VELLUTINI E, PAHL F. Transnasal micro-endoscopic surgery for pituitary surgery. E.R.S. and I.S.I.A.N. Meeting, Viena, Austria, 1998.
 14. LÓPEZ ARBOLAY O, GONZÁLEZ GONZÁLEZ J, MORALES SABINA O, VALDÉS LORENZO N. Abordajes transesfenoidales, primera opción para lesiones de región selar con criterio quirúrgico. *Rev. Cubana Endocrinología* Vol.16, No2, 2005.
 15. Cappabianca P, Alfieri A, Thermes S, Buonamassa S, Divitis E. Instruments for endoscopic endonasal transsphenoidal surgery. *Neurosurgery* 1999; 45: 392-7.