Endoscopic Transnasal-transsphenoidal Versus Microscopic Transseptal-transsphenoidal Pituitary Adenoma Resection

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Thesis

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BY

Mohamed Rashad Mohamed Khedr
M.B , B.Ch. , M.Sc

Under supervision of

Dr. Hossam Mohamed El Husseiny Khalil
Professor of Neurosurgery – Ain Shams University

Dr. Magdy Abd Elazim Mohamed Osman
Professor of Neurosurgery – Ain Shams University

Dr. Tarek Mohamed Lotfy Salem
Assistant Professor of Neurosurgery – Ain Shams University

Faculty of Medicine
Ain Shams University

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تحت إشراف

الأستاذ الدكتور/ حسام محمد الحسيني خليل

أستاذ جراحة المخ و الأعصاب- جامعة عين شمس

الأستاذ الدكتور/ مجدي عبد العظيم محمد عثمان

أستاذ جراحة المخ و الأعصاب- جامعة عين شمس

الأستاذ الدكتور/ طارق محمد لطفي سالم

أستاذ مساعد جراحة المخ و الأعصاب- جامعة عين شمس

كلية الطب- جامعة عين شمس

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List of abbreviations

<	: less than
>	: more than
1/3	: one third
1^{st}	: first
2/3	: two thirds
1ry	: primary
2ry	: secondary
2^{nd}	: second
3^{rd}	: third
4^{th}	: fourth
5^{th}	: fifth
6^{th}	: sixth
A1	: first part of the anterior cerebral artery
A2	: second part of the anterior cerebral artery
ACA	: anterior cerebral artery
A-COM	: anterior communicating artery
ACTH	: Adrenocorticotropic hormone
ADH	: anti diuretic hormone
AICA	: anterior inferior cerebellar artery
AP	: anteroposterior
B-LP	: beta lipoprotein
CA	: Carotid artery
Cc	: cubic centimeter
Cm	: centimeter
CRH	: corticotrophin releasing hormone
CS	: cavernous sinus

CSI	:	cavernous sinus invasion
CSF	:	cerebro-spinal fluid
CT	:	computerized tomography
CTA	:	CT-angiography
DDAVP	:	1,8-D-arginine vasopressin (synthetic vasopressin).
dl	:	deciliter
F	:	female
FSH	:	follicle-stimulating hormone
G	:	grade
g	:	grams
GFAP	:	glial fibrillary acid protein
GH	:	growth hormone
GHRH	:	growth hormone releasing hormone
GNRH	:	gonadotropin releasing hormone
IV	:	intravenous
IAA	:	internal auditory artery
ICA	:	internal carotid artery
ICSH	:	interstitial cell stimulating hormone
Kg	:	kilogram
L	:	liter
LH	:	lutinizing hormone
Lt	:	left
L-troxine	:	levothyroxine
M	:	male
M1	:	first part of the middle cerebral artery
M2	:	second part of the middle cerebral artery
M3	:	third part of the middle cerebral artery
MCA	:	middle cerebral artery
MEN-1	:	multiple endocrine neoplasia type 1 syndrome
Mg	:	milligram
ml	:	milliliter

mm	: millimeter
MRA	: magnetic resonance angiography
MRI	: magnetic resonance imaging
MSH	: melanocyte stimulating hormone
n.sec	: non secreting pituitary adenoma
ng	: nanogram
nm	: nanometer
no	: number
PA	: pituitary adenoma
P1	: first part of the posterior cerebellar artery
PAS	: periodic acid schiff
PC	: post-contrast
PCA	: posterior cerebellar artery
Pr	: prolactin
PRL	: prolactin
RER	: rough endoplasmic reticulum
RNA	: ribonucleic acid
Rt	: right
SCA	: superior cerebellar artery
Sec	: seconds
STH	: somatotropin
T1W1	: T1-weighted image
T2W1	: T2-weighted image
T3	: tri-iodo thyronin
T4	: thyroxine
TCD	: transcranial doppler
TSH	: thyroid stimulating hormone
ug	: microgram
y	: year

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INTRODUCTION

Approximately one century ago neurosurgical procedures required maximally invasive surgery because of poor diagnostic techniques, poor instrumentation and a large number of assisting hands in the operating field. Improvement in all these conditions enabled precise localization and more accurate determination of anatomic relations of pathological lesions. These advances in the era of modern micro-neurosurgery enabled a reduction of surgical invasiveness and brain retraction which has been defined as minimally invasive or keyhole surgery.

Although microsurgical transsphenoidal approaches have been established as the standard surgical treatment for pituitary adenomas for decades, continuous effort to improve surgical techniques and thier out-comes are still being made. As an alternative to sublabial or septal incision for transsphenoidal pituitary surgery, an endonasal endoscopic technique has been reported. *Endoscopic endonasal surgery* may have the same effectiveness as traditional microsurgery; however, endoscopic surgery may shorten hospital stay and operative time, and lead to fewer complications with no or minimal sinonasal complaints. Provision of close-up views and its viewing capability are some advantages of the endoscope compared to the operating microscope, which allows only limited peripheral viewing; the endoscope provides visibility into anatomical corners which enables a widening of the working angle in the three spatial directions.

AIM OF THE WORK

The aim of this study is to asses the significance of using the endoscope endonasally to resect pituitary adenomas, and to compare it with the traditional microscopic technique.

Review of literature

HISTORICAL REVIEW

Historically, the first successful removal of a pituitary tumor was performed by *Schlofferin* 1907, using an extracranial transphenoidal approach through a superolateral nasoethmoidal route .Although *Hirsch* from Vienna pioneered in 1909an inferolateral Endonasal approach, *Harvey Cushing* introduced a new method in 1910 that combined the advantages of previous technical modalities; he deserves the credit for having standardized an oronasal midline rhinoseptal transphenoidal approach. He routinely used this method during a 20 year period for over 247 cases of pituitary tumor. By 1929 *Cushing* began using the intracranial transfrontal operation , which was initially described by *Frazier* who first performed it in 1912 .The reason for changing from the transphenoidal to the intracranial operation was not the operative results but rather a consideration of the indications .The occasional discovery of other kinds of lesions about the sella turcica , such as a meningioma or a craniopharyngioma , was so much emphasized that, *Henderson* in 1930s noted that the intracranial approach was eventually used for nearly all pituitary tumors irrespective of whether the growth of the tumor was chiefly upwards or downwards. Another reason was the higher incidence of recurrence with the transphenoidal operation due to incomplete tumor removal. By the beginning of the 1940s, *Norman Dott* from Edinburgh remained faithful to Cushing's approach and used the transphenoidal operation throughout his career in over 120 cases. *Guiot* of Paris learned the procedure from *Dott* in 1956 and deserves the credit for reviving and popularizing the method in Europe by the early 1960s. Until then, the indications for surgical treatment remained the classic criteria that had been used over the previous 40 years. The procedure was a massive debulking of the tumor in order to relieve pressure on the optic nerves, which indeed was successful in most cases; the alternative was subtotal removal of the tumor followed by radiation therapy. The attempt to perform a complete radical excision of the tumor did not permit distinction between normal and pathologic tissue; both were excised, resulting in panhypopituitarism which required total pituitary hormonal substitution therapy ***(Hardy J, 1998).***

In 1962, *Hardy* of Montreal, returning from Paris where he had learned the transphenoidal approach from *Guiot*, reintroduced the procedure in North America. He improved the technique by introducing the combined use televised radio fluoroscopic control, optical magnification with the surgical microscope, and microsurgical techniques of dissection. He demonstrated the ability of achieving a complete removal of the tumor (including the suprasellar extension) by direct monitoring of the fluoroscopic control during surgery and by observing the refilling of the chiasmatic cistern with air after tumor removal. A direct magnified view with excellent illumination of the operative field overcame the major criticism in the past that the transphenoidal approach was a blind procedure. The main advantage was to assure a complete tumor removal in most of the cases thus avoiding the postoperative radiotherapy. Striking progress in microsurgery made it possible to distinguish between normal and a pathological tissue. Selective microsurgical adenomectomy with preservation of the normal gland became possible, so that pituitary