Comparative Study between Key Hole and Limited Approaches versus the Extended Skull base Approaches for Huge Sellar and Suprasellar Masses

Thesis submitted by

Mohammad Alaa-Eldin

(MB.B.H, MSC.)

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Neurosurgery

Supervised by

Dr. Mostafa Wagih Kotb

Professor of Neurosurgery,

Faculty of Medicine, Cairo University

Dr. Helmy Abd-Elhalim

Professor of Neurosurgery

Faculty of Medicine, Cairo University

Dr. Mohammad Shihab

Professor of Neurosurgery

Faculty of Medicine, Cairo University

Dr. Bassim M.Ayoub

Assistant Professor of Neurosurgery

Faculty of Medicine, Cairo University

Faculty of Medicine

Cairo University

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بسم الله الرحمن الرحيم

"و قُل رَبِ زِدنيِ عِلماً"

صدق الله العظيم

سورة طه أية ١١٤

To all of my family.

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ABSTRACT

Objective: The aim of this work is to study the *indications*, *versatility, clinical and radiological results* of the supraorbital approach,the orbitozygomatic approach in the treatment of different sellar and anterior cranial fossa lesions, and comparing these results with those obtained by the standard pterional approach. The results will hopefully be guidance to the advantages, disadvantages and limitations of both approaches.

Methods: Pathological lesions involving the anterior cranial skull base, the sellar region, and the interpeduncular fossa are included as long as they could be approached by both approaches. Lesions include different tumors, developmental pathology, congenital lesions, and inflammatory lesions. The patients will be evaluated and investigated preoperatively. The operative procedure will be evaluated and analyzed. The patients will be followed for evaluation of extent of resection, postoperative complication and outcome.

Results: In this study 40 cases were operated upon, 12by the supraorbital, 8 by the OZ and20 by the pterional approach. There were a total of 21 males and 19females, the ages of whom ranged from 10 months to 70 years. The *extent of removal* was found to be total removal in 7 (58.1%) cases in the supraorbital group and 12 (60%) cases in the pterional group, and 6(75%) cases in the orbitozygomatic group. Subtotal removal was 5 (41.5%) cases in the supraorbital group and 8 (40%) cases in the pterional group, and 2(25%) cases in the orbitozygomatic group. Regarding the *outcome* of the patients: in the lateral supraorbital group four (33.2%) cases had an excellent outcome, five (41.5%) cases had a good outcome, 2 (16.6%) had a poor outcome, and 2 (16.6%) died. In the pterional group 7 (35%) had excellent outcome, 9 (45%) had good outcome, 3 (15%) had poor outcome, and only one (5%) died. In the FOZ group 4 (50%) had excellent outcome, 3(37.5%) had good outcome and one case had poor outcome.

Conclusion: The supraorbital approach is a safe approach that can be applied with good preoperative planning to lesions of the sellar area. Lesions extending into the 3rd ventricle are better approached by the OZ approach with better outcome

Keywords: Supraorbital, Pterional, Minimal invasive surgery, Keyhole surgery, Sellar region, Craniotomy.

CONTENTS

LIST OF ABREVATIONS

A: Artery.
ACA: Anterior cerebral artery.
AchA: Anterior choroidal artery.
AComA: Anterior communicating artery.
Bi: Bilateral.
CS: Cavernous sinus.
CSF: Cerebro-spinal fluid
CT: Computerized tomography.
ID: Diabetes incipitus
EVD: External ventricular drainage.
Fig: Figure.
FOZ: fronto orbitoaygomatic.
Gli: Glioma.
HM: Hand movement.
ICA: Internal carotid artery.
Inf: Inferior / infarction.
Interped: Interpeduncular.
Lt: Left.
MCA: Middle cerebral artery.
MRI: Magnetic resonance imaging.
N: Nerve.
Och: Optic chiasm.
ON: Optic nerve.
OpA: Ophthalmic artery.
OZ: orbitozygomatic.
PcomA: Posterior communicating artery.
Pit: Pituitary
PL: Perception of light.
RT: Right.
Temp: Temporal.
Tub: Tuberculum selle.
V: Vein.
V-P: Ventriculo-peritoneal.

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INTRODUCTION

Lesions in suprasellar region especially if large and extending into parasellar region and interpeduncular fossa are challenging and often difficult to approach as a result of both the deep position and surrounding vital structures that obscure the view. **(Chanda& Nanda, 2002)**

The standard pterional approach has been the work horse for neurosurgical armamentarium in large part, Yasargil was responsible for introducing this approach in contemporary neurosurgery, and it consists of a frontotemporal flap with drilling of the remaining portion of the sphenoid wing. It is used widely to expose the anterior skull base, parasellar and sphenoid ridge areas. **(Yasargil, 1984)**

The most common approach to the suprasellar region, after the transsphenoidal route, is the subfrontal approach. When tumors extend far above the sella turcica, this approach allows improved visualization of the optic nerves and chiasm and surrounding brain structures to ensure an adequate removal. **(Karmarkar et al., 2000)**

The supraorbital 'keyhole' craniotomy with an eyebrow incision is a versatile minimally invasive keyhole procedure for anterior and midline skull-base lesions that have been proposed as an alternative to more extensive skull base approaches as well as 'classic' approaches for many indications. The supraorbital keyhole craniotomy for anterior and midline skull-base lesions utilizes high-performance microscopes, shaft instruments and endoscope assistance to reduce the size of bone removal required, while effectively retaining the same exposure and other advantages afforded by larger craniotomies.**(Al-Mefty,1987)**

Neuroendoscopy has facilitated the use of endonasal route in pituitary surgery. Decompression of the optic nerve at the optic canal can be approached easily using the endoscopic endonasal technique. The surgical approach to the cavernous sinus is similar to the former approach. This endoscopic approach to the cavernous sinus is best suited for pituitary adenomas invading the cavernous sinus. Tough fibrotic tumors (eg.meningiomas) are challenging to remove using the endoscopic technique. **(Jho et al, 1997)**

The orbitozygomatic approach consisting of an orbitozygomatic osteotomy, a fronto-tempro-orbital craniotomy and removal of the posterolateral wall of the orbital bone and major sphenoid wing lateral to the foramen spinosum. This permits access to parasellar region, interpeduncular fossa and permits safe manipulation of parasellar and interpeduncular lesions. **(Hakuba et al., 1986)**

The orbitozygomatic approach achieves better exposure of basal structures with less brain retraction than the frontotemporal approach for lesions of the cranial base. It allows excellent exposure for the lesions of the frontal, middle and upper segment of the posterior fossa, infra temporal fossa, ptyregopalatine fossa, petrous apex and tentorial hiatus. **(Sindou, 2002)**

Radical removal of parasellar lesions usually involves difficult surgical procedures, with the orbitozygomatic approach, the working distance to the lesions in the parasellar region and interpeduncular fossa is three centimeters shorter and the angle to the lesions about 1-3 centimeters lower than with either the pterional or the infratemporal approaches. **(Day, 2000)**

An important point in surgery using the orbitozygomatic approach there is no need to temporal lobe retraction saving the temporal lobe from being contused during surgery. Also using this approach removes the bulky temporalis muscle which limits exposure with the pterional approach which requires more brain retraction. **(Karmarkar et al., 2000)**

On the other hand a standard bifrontal transbasal approach is used as the approach of choice for the removal of most large olfactory groove meningiomas. The several advantages of this approach include the need for the least amount of frontal lobe retraction, Access to all sides of the tumor and enabling the surgeon to interrupt the blood supply to the tumor at the base of the skull. **(Symon& Rosenstein 1984)**

The cavernous sinus region may be approached via different corridors. The appropriate choice of surgical approach is dedicated mainly by the extent and the character of involvement of adjacent structures. Some lesions are confined to the boundaries of the cavernous sinus and require only straight forward dissection of the region. Other lesions require the combination of two or more standard approaches to gain adequate access of the lesions. **(Dolenc, 1985)**

Dolenc is credited with the initial development and use of the combined epidural and subdural frontotemporal approach (anteromedial transcavernous approach) this technique has become the standard by which lesions confined within the cavernous sinus and those with extension to the supratentorial compartement are approached. **(Dolenc, 1985)**