ENDONASAL ENDOSCOPIC SURGERY OF SKULL BASE LESIONS

Thesis

Submitted for Complete Fulfillment of
The M.D. Degree in
Neurosurgery

By

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FACULTY OF MEDICINE
CAIRO UNIVERSITY
2010

بسم الله الرحمن الرحيم

"ولولا فضل الله عليك ورحمته لهمت طائفة منهم أن يضلوك وما يضلون
الا أنفسهم وما يضرونك من شئ وأنزل الله عليك الكتاب والحكمة وعلمك
ما لم تكن تعلم وكان فضل الله عليك عظيما"

صدق الله العظيم
(الآية: ١١٣، سورة النساء)

ACKNOLEDGEMENT

*First of all, I am deeply thankful to **Allah** by the grace of whom this work was possible.*

*It is my pleasure to express my deepest gratitude and sincere thanks to Prof. Dr. **Mohamed Lotfy M. Ibrahim**, Professor of Neurosurgery, Faculty of Medicine, Cairo University, for his generous concern, sincere supervision, valuable suggestions and cooperation, continuous advice and support saving no effort or time in reading each word in this work. To him I will always be grateful.*

*I wish also to express my sincere gratitude and thanks to Prof. Dr. **El-Gohary Mohamed El-Gohary**, Professor of Neurosurgery, Faculty of Medicine, Cairo University, for his kind supervision, sincere encouragement, valuable advices and instructions throughout this work.*

*I am also highly indebted to Prof. Dr. **Reda Hussein Kamel**, Professor of Otorhinolaryngology, Faculty of Medicine, Cairo University, for his kind support, sincere supervision, advices, guidance and precious participation throughout this work.*

*I would like to express my appreciation and thanks to Dr. **Khaled Samir Anbar**, Assistant Professor of Neurosurgery, Faculty of Medicine, Cairo University, for his valuable cooperation in patients' referral and cardiological assessment.*

*Also I would like to thank Prof. Dr. **Hazem Abdel Badie**, Professor of Neurosurgery, Faculty of Medicine, Cairo University, for his help and support of this work.*

I would like to express my gratitude to all the members of Neurosurgery Department for their help and support.

I am especially grateful to my family especially my wife for her endless patience and support throughout this work.

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Abstract

The results of this study confirm the value, efficacy, and safety of endoscopic pituitary surgery. The technique can achieve favorable removal and remission rates with very low morbidity. Endoscopic cranial base surgery is a minimal invasive alternative to traditional transsphenoidal, transcranial, or transfacial approaches to the cranial base. The main indication is for centrally located lesions or as an adjunct to craniotomy for more extensive tumors. The technique's minimally invasive nature makes it very attractive for selected patients, as it has the potential to minimize the morbidity associated with other extensive approaches. Long-term control data and prospective analysis of surgical series are required to strengthen these conclusions and to extend the approach to totally remove skull base tumors. The endoscopic endonasal trans-sphenoidal approach for skull base tumors is a minimally invasive surgery preserving the nasal structures thus facilitating faster postoperative recovery. It offers a panoramic view of the sphenoid sinus with visualization of the corners of the sellar and suprasellar structures with increased illumination and magnifications. Such visualization provides a potential for more complete tumor removal with preservation of pituitary function and very low rate of complication. Finally we still need time to increase our skills and experience to master this approach and to improve our results regarding total excision of skull base tumors other than pituitary adenoma. We feel that the advantages of the endoscopic approach will make this technique the favored approach for future treatment of skull base tumors.

Keywords:

Endonasal
Endoscopic surgery
Skull base lesions

INTRODUCTION

INTRODUCTION

The cranial base constitutes an anatomic boundary between the fields of neurosurgery and otolaryngology. Surgery in this region has always been a challenge for both disciplines. As a result of productive collaborations between practitioners in the fields of otolaryngology and neurosurgery, a variety of transcranial and transfacial cranial base approaches have been developed to reach pathology in almost any location. However, these open approaches have a complication rate of 18 to 60%; they often involve significant amounts of brain retraction, neurovascular manipulation, and cosmetic compromise; and they frequently rely on complex plastic surgery closures. In response, another collaboration between neurosurgeons and otolaryngologists has recently resulted in the development of the new field of endoscopic endonasal cranial base surgery. These minimally invasive approaches access the midline cranial base using the natural apertures in the face, namely the nostrils. Visualization is provided with rigid straight and angled endoscopes that can illuminate areas of the cranial base that were previously unreachable with standard microscope-based trans-sphenoidal or transoral approaches. Because the lens sits at the tip of the endoscope and travels to the pathology, magnification is unnecessary and the panoramic 360-degree view facilitates visualization, even around corners. Rather than calling these approaches minimally invasive, it may be more accurate to say minimal access, because the ultimate goal is to perform a resection as aggressively as with an open approach **(Paolo Cappapianca** *et al.,* **2008)**.

In recent years, several pioneering groups have published cadaveric studies, small case series, case reports, and conceptual articles illustrating the potential for a purely endonasal endoscopic approach to remove an assortment of pathological lesions in a range locations throughout the midline cranial base **(Schwartz** *et al.*, **2008)**.

Transsphenoidal approaches to the ventral midline skull base were first proposed more than a century ago. Initially these approaches were restricted to the pituitary fossa, but with progressive evolution in biotechnology, coupled with increased anatomical understanding, the transsphenoidal approaches were extended to regions beyond the sella turcica to include other entities in addition to pituitary tumors. The introduction of the operating microscope by Hardy in the 1960s, coupled with Dott's contribution of fluoroscopy, provided the first critical navigation/visualization integration that formed the foundation of the work that followed **(Amin Kassam** *et al.,* **2005)**.

The addition of the endoscope, coupled with the current sophisticated neuronavigation systems, builds on this foundation. The expanded endonasal approach evolved when these principles were then further augmented with the concept of team surgery; that is, a neurosurgeon and otolaryngologist working simultaneously throughout all phases of the surgery (approach, resection, and reconstruction). Using the principles of the expanded endonasal approach, we are now able to access the entire ventral skull base, from the crista galli up to and through the odontoid, and we are able to address a diverse array of intra- and extradural entities **(Fig. 1) (Amin Kassam** *et al.*, **2005).**

The first principle in both understanding and successfully achieving the desired results using the endoscopic endonasal approaches is that the surgery is best performed as collaborative surgery between otolaryngology and neurosurgery, preferably by an otolaryngologist with experience performing functional endoscopic sinus surgery and a neurosurgeon with experience performing transsphenoidal pituitary and transcranial cranial base surgery. Both surgeons should be involved in all aspects of the case, including operative planning as well as the approach, resection, and closure. Our categorization of the endoscopic cranial base approaches derives precisely from this collaboration. Although the nasal corridors are most familiar to the otolaryngologist, the targets are most familiar to the neurosurgeon. The approaches derive from the union of these two perspectives. In addition, the surgical technique itself and the understanding of how straight and angled endoscopes can be applied to improve visualization arise from the meeting of these two unique perspectives, which evolves over time during the course of the collaboration. The second principle for successful endoscopic cranial base surgery-and critical in deriving adequate approaches and exposure-is the role of stereotactic navigation, which we use in all cases. One now has the option of using either rigid fixation or a cranial pin to fix the reference frame as well as electromagnetic or infrared tracking systems. Although fluoroscopy has been the primary method of navigation during transsphenoidal surgery, the ease and accuracy of modern frameless stereotactic systems has made implementation of more extensive endoscopic approaches safe and feasible. Although the corridor(s), approach(s), and target(s) are chosen before each procedure, as the operation progresses, we often use intraoperative stereotactic navigation to modify, improve, update, and streamline our approach **(Schwartz** *et al.*, **2008).**