Comparative study between Bifrontal Approach and Frontolateral Minicraniotomy in the Management of Olfactory Groove Meningiomas

Thesis

Submitted for Partial Fulfillment of the Requirement for the MD Degree in Neurosurgery

By

Ibrahim Abd-El Mohsen Abd-El-Naiem
M.B.,B.Ch, M.Sc.
Faculty of Medicine, Ain Shams University

Supervised by

Prof. Dr. Hosam Mohamed El-Huseiny
Professor of Neurosurgery Department
Faculty of Medicine – Ain Shams University

Prof. Dr. Mohamed Sayed Ismaiel
Professor of Neurosurgery
Faculty of Medicine – Ain Shams University

Prof. Dr. Khaled Mohamed El-Bahy
Professor of Neurosurgery
Faculty of Medicine – Ain Shams University

Dr. Khaled Mohamed Saoud
Assistant Professor of Neurosurgery
Faculty of Medicine – Ain Shams University

Faculty of Medicine
Ain Shams University
2014

بِسْمِ اللّهِ الرّحمَنِ الرّحيمِ

[...رَبِّ أَوزِعنِي أَن أَشكُرَ نِعمَتَكَ
الَّتِي أَنْعَمْتَ عَلَيَّ و عَلى والِدَيَّ
و أَنْ أَعْمَلَ صَالِحاً تَرْضَاهُ و أَدْخِلْنِي
بِرَحْمَتِكَ فِي عِبَادِكَ الصَّالِحِينَ]

صدق الله العظيم

النمل.. اية رقم ١٩

Acknowledgments

*First of all, thanks to **ALLAH** for giving me the strength to complete this work.*

*I would like to express my sincere appreciation and my deep gratitude to **Prof. Dr. Hosam Mohamed El-Huseiny,** for his mentorship, wonderful gustiness, keen interest, beneficial advice, constant personal and scientific support; I have the honor to complete this work under his supervision.*

*My extreme thanks and gratefulness to **Prof. Dr. Mohamed Sayed Ismaiel,** Professor of Neurosurgery, Faculty of Medicine – Ain Shams University, for his kind guidance and supervision on this work and throughout my career.*

*I am also grateful to **Prof. Dr. Khaled Mohamed El-Bahy,** Professor of Neurosurgery, Faculty of Medicine – Ain Shams University, for dedicating so much of his precious time and effort to complete this work throughout all stages.*

*My great thanks to**. Dr. Khaled Mohamed Saoud,** Assistant Professor of Neurosurgery, Faculty of Medicine – Ain Shams University, for his supervision, review of the work, and his kind advises also for his continuous encouragement and kindness.*

Last but not least, I can't forget to thank all members, Professor, colleagues and junior staff in Neurosurgery Department, Faculty of Medicine, Ain Shams University, for their cooperation and encouragement to accomplish this work.

Ibrahim Abd-El Mohsen Abd-El-Naiem

List of Contents

Subject *Page No.*

List of Abbreviations

ACA : Anterior cerebral artery

AComA : Anterior communicating artery

CBC : Complete blood picture

ADC : Apparent diffusion coefficient

CSF : Cerebrospinal fluid

CT : Computed tomography

DVT : Deep venous thrombosis

EMA : Epithelial membrane antigen

ER : Estrogen receptors

FLAIR : Fluid-attenuated inversion-recovery

HPFs : High power fields

ICA : Internal carotid artery

ICP : Intracranial pressure

ICU : Intensive care unit

MRI : Magnetic Resonance Imaging

MRS : Magnetic resonance spectrography

NAA : N-acetylaspartate

PR : Progesterone receptors

PXR : Plain roentgenograms

SD : Standard deviation

STA : Superficial temporal artery

WHO : World Health Organization

List of Tables

List of Figures

List of Figures *(Cont...)*

List of Figures *(Cont...)*

List of Figures *(Cont...)*

List of Figures *(Cont...)*

Introduction

Meningiomas are usually slow-growing, benign tumors, presumed to develop from the arachnoidal cap cells. They account for approximately 20% of all primary intracranial tumors ***(Tuna et al., 2005).***

The occurrence of meningiomas in the general population varies from 2.3 cases per 100,000 people during their life span to 5.5 per 100,000 if autopsy data are included ***(Al-Mefty et al., 2011).***

Of all intracranial meningiomas, 10% arise from the olfactory groove. Olfactory groove meningiomas develop at the dura of the anterior cranial fossa over the cribriform plate and the planum sphenoidale. These tumors usually receive their blood supply from the anterior and posterior ethmoidal arteries ***(Tuna et al., 2005).***

Several surgical series regarding olfactory groove meningiomas have been published. The bifrontal frontobasal approach and its variants have long been recommended as the standard for removal of these tumors ***(El-Bahy, 2009).***

The bifrontal approach was first described by Horsley (1906) and Cushing (1927) and was later proposed by Tönnes (1938) who preserved the frontal brain tissue by a subfrontal approach.

Many others have used the bifrontal approach for large tumors of the frontal base, such as Al-Mefty (2010), Nakamura (2007), Ransohoff and Nockels (1993). A bifrontal craniotomy might be considered for patients with large tumors because this approach gives direct access to all sides of the tumor. Due to the wide exposure, retraction on the frontal lobes is minimal. It simultaneously allows interruption of the blood supply, preparation of the frontobasal matrix of the tumor, and concomitant decompression. There is usually no problem from the ligation of the anterior sagittal sinus. However, venous drainage should be evaluated by preoperative imaging to avoid venous congestion, and coagulation of draining veins from the anterior frontal lobe should be avoided of possible ***(Kirsch et al., 2012).***

In recent decades, the discovery of fundamental anatomic and physiological principles and the improvement of intraoperative visualization provided by the operating microscope, together with refined instrumentation, allowed the evolution of microneurosurgical techniques. These techniques and the enormous development of diagnostic facilities enabled neurosurgeons to treat more complicated neurosurgical diseases through smaller and more specific approaches the keyhole approach in neurosurgery should not aim to limit the craniotomy to the size of a keyhole, which has been a frequent misunderstanding in the past. First of all, the term “keyhole” may imply a concept of geometric construction of the surgical

approach with a choice of the correct limited craniotomy as a key characteristic for entering a particular intracranial space and for working with a minimum of traumatization. In choosing the correct keyhole approach for a specific lesion, it becomes possible to dramatically reduce the size of the craniotomy with less need for dural opening, less brain exposure, and less retraction. The concept of keyhole surgery is based on the careful preoperative study of diagnostic images to determine the anatomic windows that provide access to the pathological processes, taking into consideration the individual pathoanatomic situation of the patient ***(Reisch and Perneczky, 2005).***

Aim of the Work

The aim of this study is to compare between the bifrontal and frontolateral approaches regarding the surgical techniques, advantages, disadvantages and outcome in treatment of olfactory groove meningioma.