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# Surgical Approaches to Lesions of the Clival Region

## *Thesis*

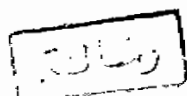
Submitted for Partial Fulfillment of  
M.D. Degree in

## **NEUROSURGERY**

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**1999**

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*Handwritten signature of Adel Hussien Al-Hakim*







﴿ ألم تر أن الله أنزل من السماء ماءً فأخرجنا به  
ثمراً مختلفاً ألوانها ومن الجبال جددٌ بيضٌ وحمرٌ مختلفٌ  
ألوانها وغرايبٌ سودٌ، ومن الناس والدواب والأنعام مختلفٌ  
ألوانها كذلك إنما يخشى الله من عباده العلماء إن الله عزيزٌ

﴿ غفور

بِاللهِ  
الصَّادِقِ  
الْحَقِّ

الآيات ٢٧، ٢٨ سورة فاطر



*To My Wife and My Sun Khaled  
and to  
Our Parents*

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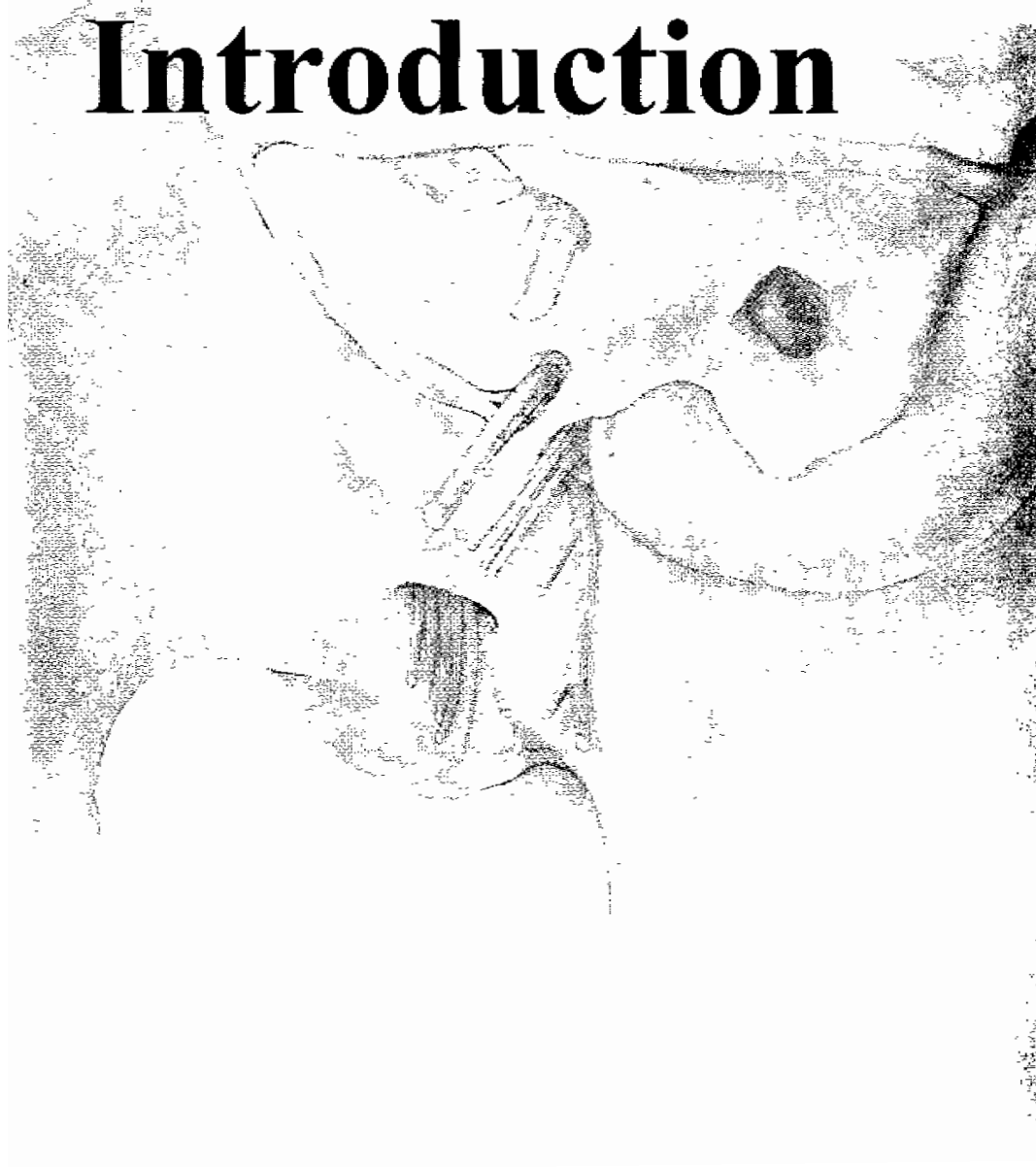
*I would like to express my utmost gratitude to Prof. Dr. Harry van Loveren, Professor and vice chairman of Neurosurgery, in the University of Cincinnati, to whom I*

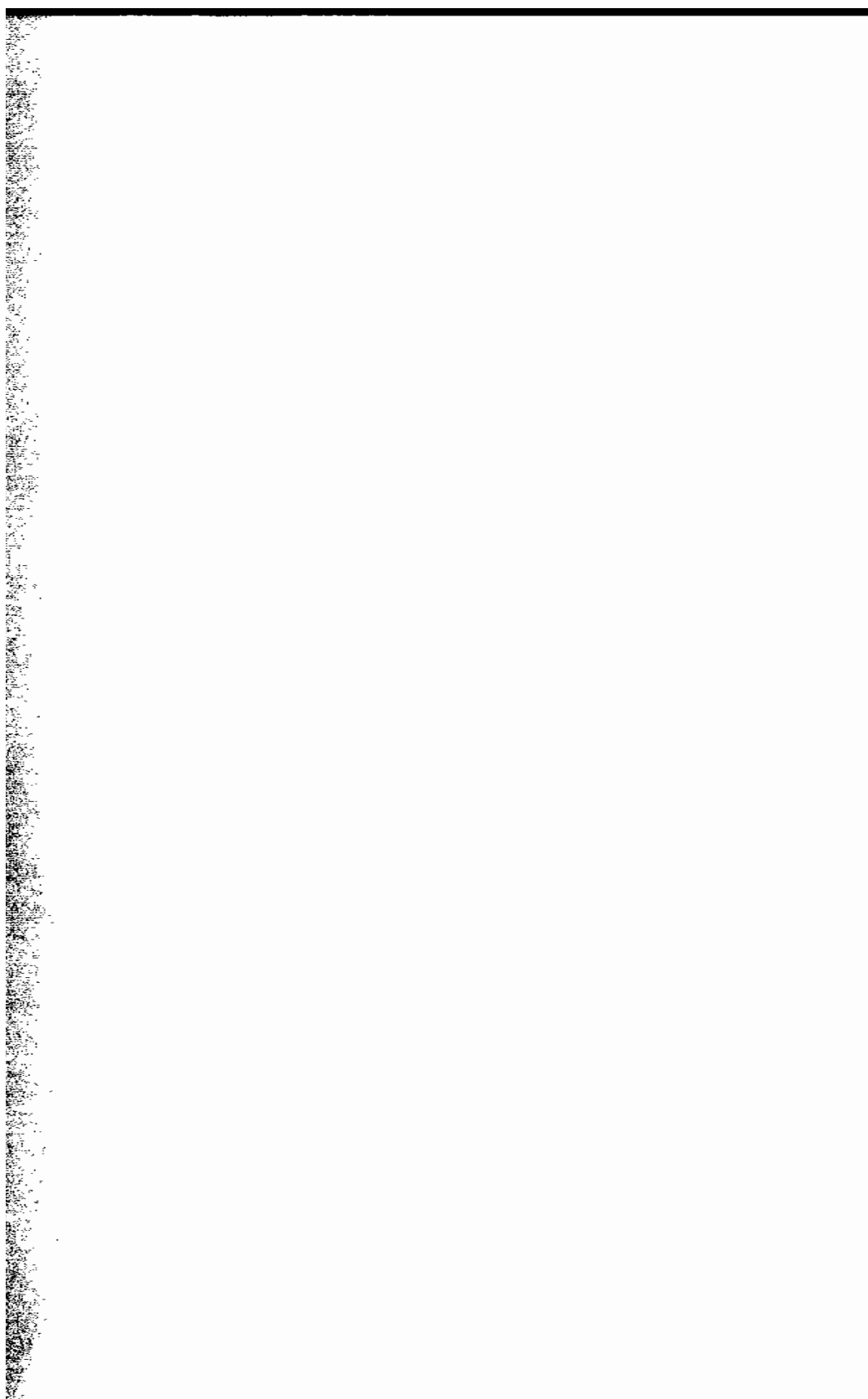
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# Introduction





## Introduction and Aim of the Work

The term “clivus” means slope in Latin, was given by the German physician and anthropologist Blumenbach and it was termed the “clivus of Blumenbach” (*Skinner, 1949*) (Figure 1).



BLUMENBACH

Johann Friedrich Blumenbach (1752–1820) German physiologist and anthropologist.

In addition to his studies in physiology and anatomy, Blumenbach was a distinguished physician. His principal appointment was that of professor of medicine at Göttingen. As a physiologist he published his “*Institutiones Physiologicae*” in 1787. In anatomy he contributed a work on ophthalmology “*Geschichte und Beschreibung der Knoch. des menschlichen Körpers*” in 1796. In this he described the bony slope from basi-occiput to sphenoid ending in the dorsum sellae, which he called clivus and it has frequently been referred to as the clivus of Blumenbach. In the field of comparative anatomy he published “*Handbuch der vergleichenden Anatomie*” in 1804. (Page 1)

The clival region, with its complex collection of blood vessels and nerves, and irregular bony topography, represents an anatomically complicated region. The skull base surgeon must have a three dimensional knowledge of these

structures to be able to visualize their relationships from all angles. This perspective is best gained by a careful study of the cranial base anatomy by repeated cadaver dissections and by careful study of modern imaging modalities. Even though many neoplasms involving the clival region are benign or locally confined malignant lesions, radical resection of extensive lesions remains difficult. Their proximity to vital areas of the brainstem, major blood vessels, and cranial nerves, and the depth of these lesions from the surface posed a variety of obstacles. Advancements in diagnostic and therapeutic interventional neuroradiologic modalities, neurophysiological monitoring methods, and neuroanesthetic techniques have all contributed to the growth and refinement of skull base surgery. Successful skull base surgery requires a team approach. The coordinated involvement of experts in neurosurgery, otolaryngology, plastic and maxillofacial surgery, radiology, anesthesiology,

neurophysiology, nursing, rehabilitative medicine, and critical care medicine is necessary to ensure the best possible outcome. "Interdisciplinary work is essential but difficult to understand. This is cooperative surgery in which each surgeon combine his or her skills with others for benefit of the patient. Those who are willing to work cooperatively have a better future in neurosurgery than those who insist to work alone" *Samii, 1997*.

Implicit in the rationale for performing these extensive procedures is the belief that such treatment improves upon both the natural history of the disease and the results afforded by other forms of treatment. The efficacy of surgical resection in providing long term control or cure of benign and malignant lesions of the cranial base has been proven for some kinds of tumors but remains to be proven for others since many of the recent advances require further time for evaluation.

### **Aim of the work**

The aim of this study is to evaluate different skull base approaches to the clival region based on the extent of exposure of each surgical approach.