SURGERY OF ORBITAL TUMOURS

THESIS
Submitted in Partial Fulfillment
for M.D. Degree in Neurosurgery

BY

Emad El-Din Mahmoud Khattab

SUPERVISED BY

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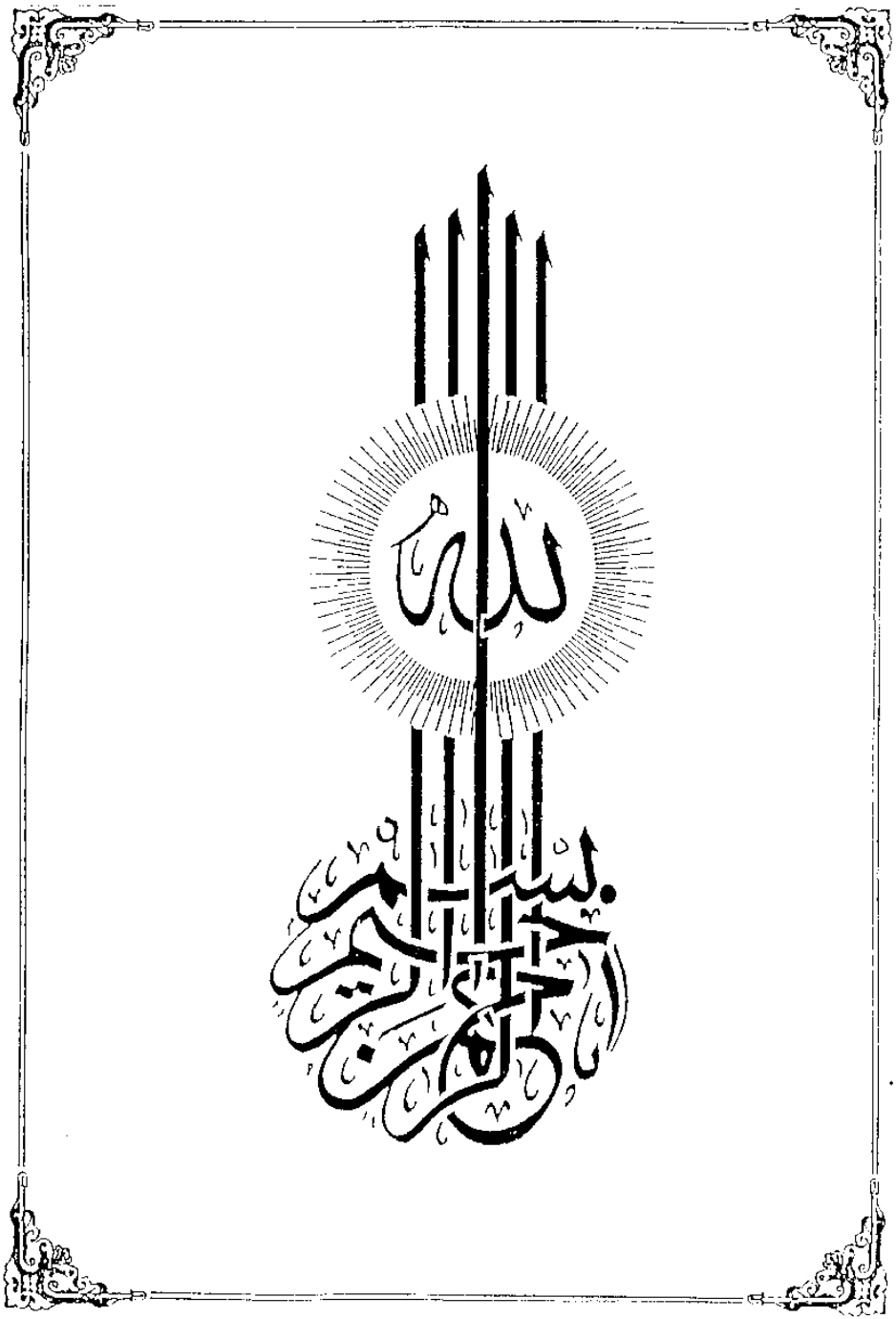

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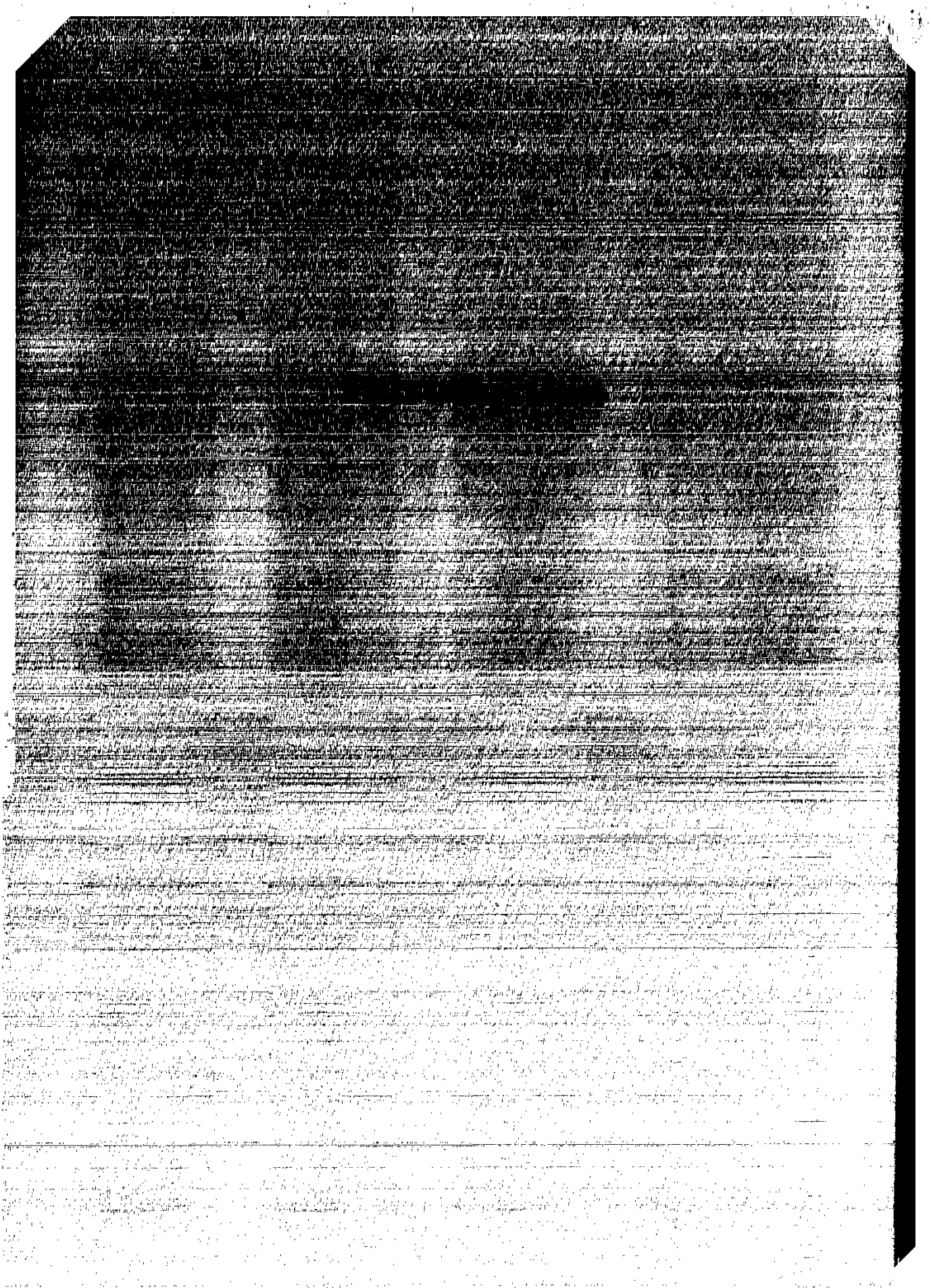
LIST OF ABBREVIATIONS

C-T scan	Computed tomography scan.
MRI	Magnetic resonance imaging.
T_1W	T_1 weighted.
T_2W	T_2 weighted.
N (H)	Number of hyderogen ions (proton denisty).

CONTENTS



INTRODUCTION

The orbit claims the interest of at least three surgical disciplines. Ophthalmology, otorhinolaryngology and neurological surgery. A number of tumours overlap the borders of these specialties. A clear understanding of orbital anatomy will assist the neurosurgeon in selecting those patients with unilateral exophthalmos who can be treated best by a transcranial approach, those who require the cooperation of more than one surgical discipline, and those who do not require operation at all [*Hosepain et al., 1990*].

Aim of the Work

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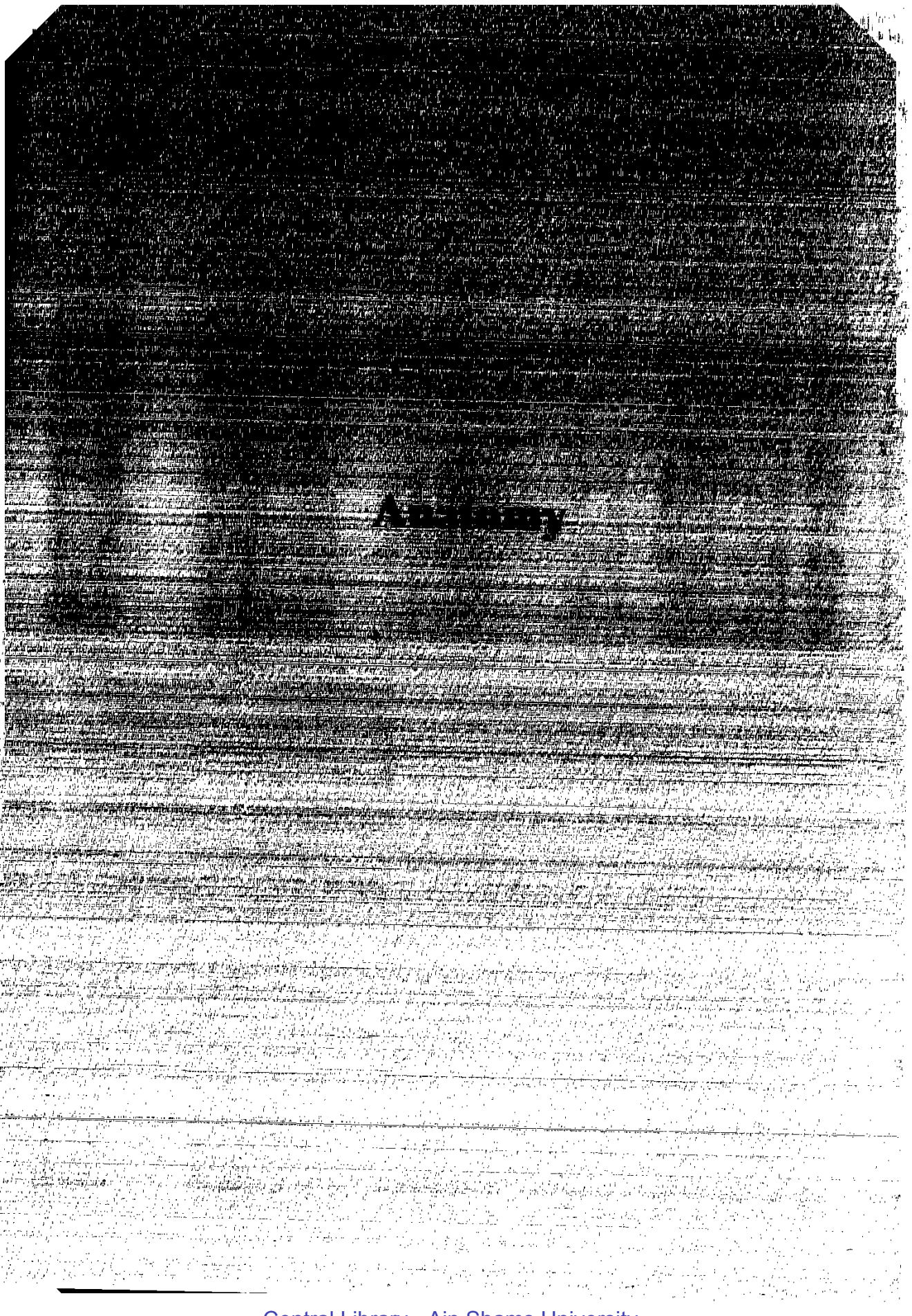
To study orbital tumours aiming to determine the most accurate method of diagnosis and the most convenient methods of surgical removal.



ANATOMY

Surgical Anatomy of the Orbit:

Housepian, et al., (1990) stated that viewed from above the orbit is a pear shaped cavity with its apical portion directed medially. The optic canal, representing the stem of the pear, is 5 to 10 mm long and enters the intracranial cavity medial to the anterior clenoid process. Of principal interest to neurosurgeons is the apical portion of the orbit, which is crowded with structures that cannot be safely approached by anterior or lateral routes. A precise knowledge of the orderly relations of the retro-ocular nerves, arteries, and muscles is essential to provide safe access both to tumours within the muscle cone and to lesions occuring between the muscles and the periosteum of the orbit (the periorbita). Of special importance is the confluence of the periorbita with the dura at the superior orbital fissure and at the optic canal. Once these structures are involved by tumour, it is difficult, if not impossible to obtain total tumour resection without injury to the structures traversing them.

Bony Confines of the Orbit:

Emarah, (1983) stated that the orbit is formed of four bony walls having the shape of quadrilateral pyramid:

- Its apex is at the optic foramen and its base is directed forwards, out wards and slightly down wards. The bones forming the walls of the orbit are:
- The roof: The orbital plate of the frontal bone and the lesser wing of the sphenoid bone.

- The lateral wall: The orbital process of the zygomatic bone and the greater wing of the sphenoid bone.
- The floor: The orbital plate of the maxilla, the zygomatic bone and the orbital process of the palatine bone.
- The medial wall: The frontal process of the maxilla, the lacrimal bone, the orbital plate of the ethmoid bone and a small part of the body of sphenoid bone.

El Rakhawy, (1985) stated that the quadrangular orbital rim is formed by the frontal, maxillary and zygomatic bones. The supraorbital margin is continuous medially with the crest of the lacrimal bone. The roof of the orbit is formed by the orbital plate of the frontal bone, which also forms the major portion of the floor of the intracranial anterior fossa. The floor of the orbit is formed primarily by the orbital plate of the maxillary bone there's a small contribution to the floor by the palatine bone at the orbital apex and anterolaterally by the zygomatic bone.

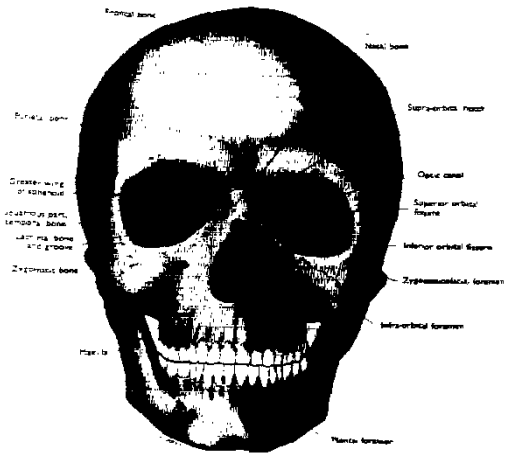


Fig. (1): Bony structures of the orbit (quoted from Cunningham regional anatomy).

Al Mefty, (1989) stated that the optic canal is 5 to 10 mm in length and is situated at the apex of the orbital cavity. It is formed by the two roots of the lesser wing of the sphenoid and passes medialy to the intracranial cavity. The lateral orbital margin is formed by the greater wing of the sphenoid and the front-osphenoidal process of the zygomatic bone. There is a horizontal obliquity to the canal at its cranial end, after which it becomes rounded and. at the orbital end forms a vertical oval.

Al Mefty, (1989) added that the superior and inferior orbital fissures bound the medial margin of the greater wing of the sphenoid. The superior orbital fissure, lying near the apex of the orbit, provides the passage for the occulomotor, trochlear and abducens nerves and the ophthalmic division of the trigeminal nerve from the cranial cavity to the orbit. Sympathetic branches from the cavernous plexus nerves also accompany the ophthalmic artery. Small orbital branches of the middle meningeal artery enter the orbit and recurrent branch of the lacrimal artery and the ophthalmic vein leave the orbit through this space. The recurrent meningeal arteries supply the dura covering the posterior aspect of the greater wing of the sphenoid. The inferior orbital fissure separates the floor and lateral wall of the orbit and transmits the maxillary nerve, the infraorbital vessels, and the ascending branches from the sphenopalatine ganglion. The medial wall of the orbit is formed by a number of fragile bones, including the lacrimal bone and the lamina papyracea of the ethmoid bone.

Optic Nerve:

Last, (1986) stated that in confirmity with the shape and size of the optic canal, the optic nerve has a flattened, horizontal, oval shape in its cranial course and measures approximately 4 by 6mm at this point. After entering the cranial end of the optic canal it is 5mm, circular and, continues to the globe as a vertically oval structure measuring 6 by 4mm. A vascularized pial membrane accompanies the nerve from the chiasm to the sclera.

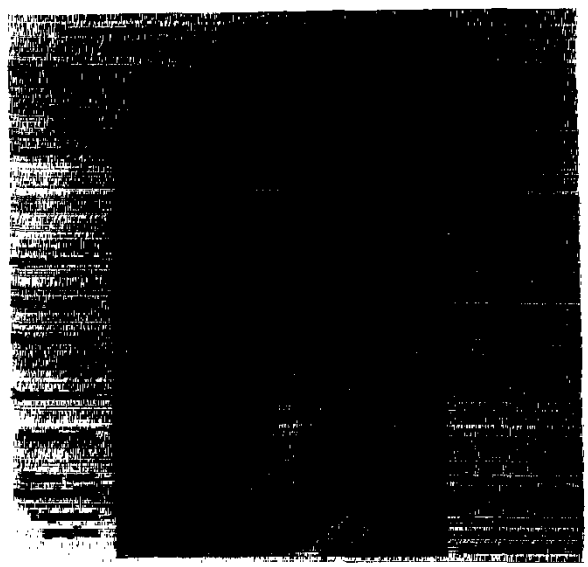


Fig. (2): Dissection of the orbit and middle cranial fossa. The trigeminal nerve and ganglion have been turned laterally (quoted from Cunningham regional anatomy)

The intracranial arachnoid is also a discrete structure investing the optic nerve throughout its course, fusing with the pia at the globe. Loose trabeculations are found in this subarachnoid space. At the apical orbital portion of the nerve, however, the pia and arachnoid are fused dorsomedially and ventrally with the dura and the fibrous annulus tendineus (annulus of zinn), tethering the optic nerve and partially obliterating the subarachnoid space, which is otherwise continuous from the cranial cavity to the scleral margin. Normally the intraocular pressure is slightly higher than the intracranial pressure. Papilloedema thus reflects a rise in