CORRELATION OF PREOPERATIVE DIAGNOSIS OF SELLAR AND PARA - SELLAR MASS LESIONS WITH OPERATIVE FINDINGS AND HISTOPATHOLOGICAL EXAMINATION

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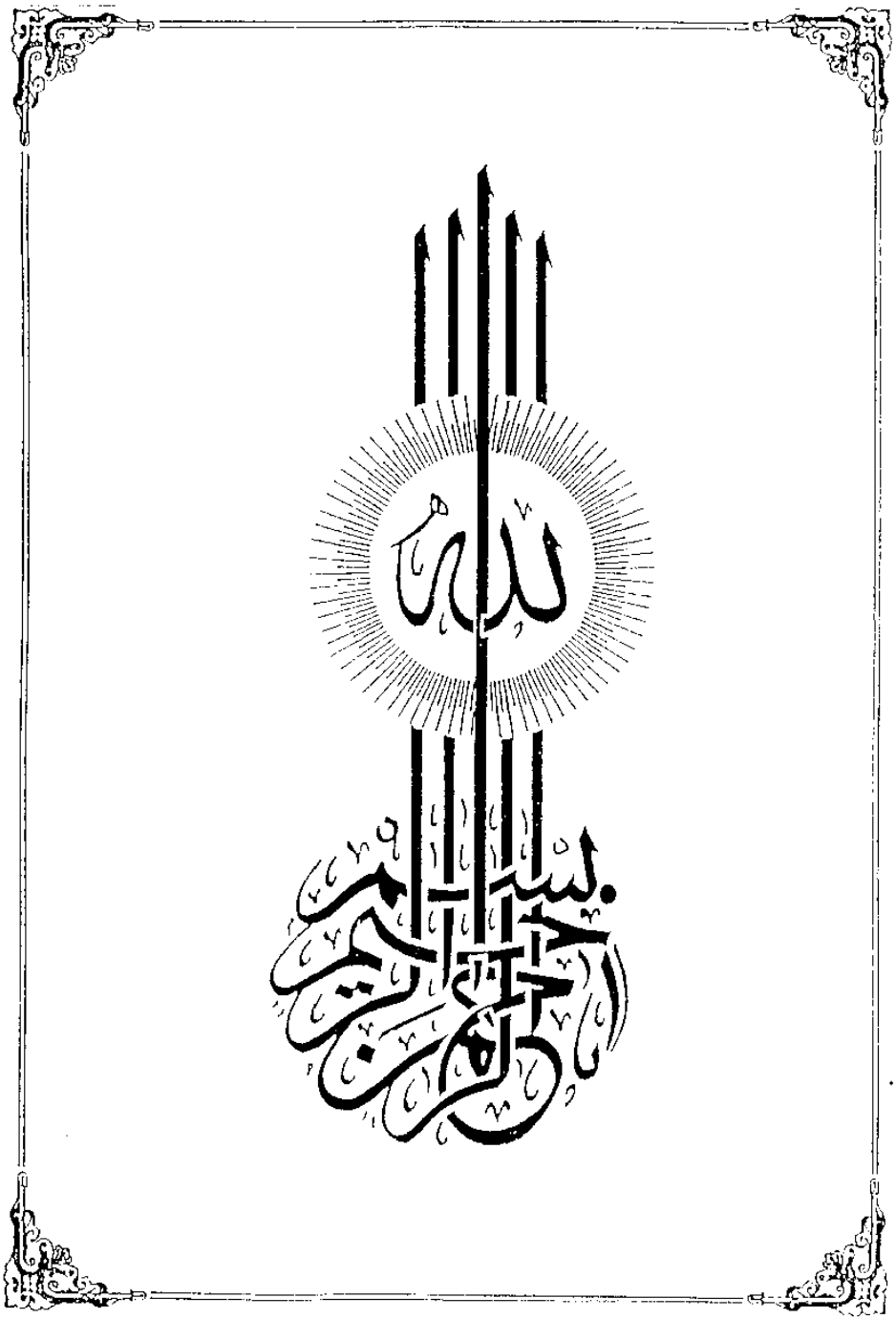

CONTENTS

INTRODUCTION

Mass lesions of the sella turcica and parasellar region are different in their origin and pathological nature. Pituitary adenomas, craniopharyngiomas and meningiomas are the most common.

The clinical features of sellar and para-sellar mass lesions are well characteristic due to their relation to the optic passages. Hormonal disturbances usually point to pituitary adenoma and craniopharyngioma.

The CAT scan is nowadays the main radiological investigation in detection and localization of these lesions, wherever MRI is not available, and it gives a great amount of information about the pathlological nature of the lesion. Cerebral angiography is required to study the position of these lesions and their relation to great cerebral vessels. Also, 4-vessel angiography is required to rule out the presence of cerebral aneurysms.

Hormonal studies are required whenever a pituitary adenoma or a craniopharyngioma is suspected , as these tumours are usually accompanied by hormonal disturbances.

The treatment of sellar and para-sellar mass lesions is basically surgical. Many surgical approaches and procedures are designed for such lesions according to their sites and pathological nature.

The aim of this work is to correlate the preoperative diagnosis of sellar and para-sellar mass lesions, based on clinical findings and neuro-radiological investigations [Mainly CAT scan and cerebral angiography] , with operative results and histopathological examination and to evaluate the various surgical approaches designed for such lesions. To achieve this, one hundred cases of sellar and para-sellar mass lesions were studied. They were admitted to both Ain Shams University Hospital and Maadi Armed Forces in the period from 1984 to 1990. For each case, a proper history taking and accurate clinical examination and neuroradiological investigations were done. Results were presented in tables and several conclusions were reached.

CHAPTER I

ANATOMY

A. Embryology .

B. Osteology .

C. Anatomy of the Pituitary Gland .

D. Micro-surgical Anatomy of Sellar & para-sellar Area.

A. EMBRYOLOGY

I . Embryology of Sphenoid bone.

II. Embryology of the hypophysis cerebri.

1. Embryology of the Sphenoid bone

A. Blastemal (membranous)Stage:

At the end of the first and the begining of the second month of intrauterine life, a mesenchymal condensation extends forwards, dorsal to the pharynx , and reaches the rudiment of the hypophysis cerebri, thus outlining the clivus and the dorsum sellae of the sphenoid bone.

About the 5 th week of intrauterine life, the mesenchyme which surrounds the hypophyseal duct forms the rudiment of the postsphenoid part of the body of sphenoid and sends out a wing like process on each sides,the future greater wing. More anteriorly, processes extend laterally indicating the sites of the lesser wings.

[Warwitch & Williams , 1973]

B. Cartilagenous (Chondral) Stage:

In the second month of intrauterine life, the posterior part of the sphenoid cartilage chondrifies from 2 centers, one on each side of the developing hypophysis cerebri. These unite first behind the duct of the hypophysis and then infront of it, and in this way the cranio-pharyngeal canal (transimitting the hypophyseal diverticulum) is formed, this canal is usually obliterated before the 3rd month. The auditory capsule, the presphenoid, the roots of the greater wings, the lesser wings and, finally , the nasal capsule in turn become chondrified.

[Warwitch & Williams , 1973]

C. Osseous (bony) Stage:

The sphenoid bone, with the exception of the lateral part of each greater wing, is preformed in cartilage. Until the 7 th or 8 th month of intrauterine life the body of sphenoid consists of 2 parts:

1. The Presphenoid part:

This is associated with the lesser wings of sphenoid . About the 9 th week a centre of ossification appears for each of the lesser wings. Shortly afterwards 2 centres / appear in the presphenoidal part of the body. About the 5 th month, a centre of ossification appears for each sphenoid concha.

2. The post-sphenoidal part:

This is comprising the sella turcica and dorsum sellae and is associated with the greater wings and pterygoid processes. About the 8 th week, a centre of ossification for the root of each greater wing appears,below the foramen rotundum. The rest of the greater wing ossifies in membrane and the process extends downwards into the lateral pterygoid plate, About the 4 th month, 2 centres appear in the postsphenoidal part of the body , one on each side of the sella turcica, and fuse about the middle of intrauterine life.

The presphenoidal and postsphenoidal parts of the body fuse about the 8 th month of intrauterine life. At birth, the bone is in 3 pieces

1. A central piece : consisting of the body and 2 lesser wings.
2. Two lateral pieces: each comprissing a greater wing and a pterygoid process.

In the first year after birth, the greater wings and the body unite arround the margins of the pterygoid canal, and the lesser wings extend medially above the anterior part of the body and meet to form an elevated smoth surface, the jugum sphenoidale Certain parts of the sphenoid bone are connected by ligaments which occasionally ossify. The more important of these ligaments are : pterygospinous, interclinoid and carotico-clinoid ligamants.

[Warwitch & Williams , 1973]

II. Embryology of the Hypophysis Cerebri

The hypophysis cerebri consists of an anterior and a posterior lobe; the former is derived from the ectoderm of the stomodeum, the later from the floor of the forebrain.

Previous to the rupture of the bucco-pharyngeal membrane a pouch-like diverticulum appears in the ectodermal lining of the roof of the stomodeum. This diverticulum (Rathke's pouch) is the rudiment of the anterior lobe of the hypophysis and extends upward infront of the cephalic end of the notochord, and comes into contact with the undersurface of the forebrain. It is then constricted off to form a closed vesicle, but remains for a time connected to the ectoderm of the stomodeum by a solid cord of cells. Masses of epithelial cells form on each side and in the

ventral wall of the vesicle, and by the growth of a stroma from the mesenchyme between the masses the development of the anterior lobe is completed.

[Warwitch & Williams , 1973]

Just behind Rathke's pouch a hollow diverticulum grows towards the mouth from the floor of the diencephalon. This neural outgrowth forms a funnel- shapped sac, the walls of which increase in thickness so as to obliterate the contained cavity except at the upper end, where it persists as the infundibular recess of the 3rd ventricle . Formed in this way the posterior lobe becomes invested by the anterior lobe which extends dorsally on each side of it. In addition, the anterior lobe gives off 2 processes from its ventral wall which grow arround the infindibulum constituting the tuberal portion.

[Warwitch & Williams , 1973]

B. OSTEOLOGY

Osteology of the sphenoid bone

I . The body of sphenoid

II . The greater wings of sphenoid

III. The lesser wings of sphenoid

IV . The sphenoid conchae.

Osteology of the Sphenoid bone

The sphenoid bone is situated at the base of the skull, infront of the temporal bones and the basilar part of the occipital bone. In shape it resembles a bat with wings outstretched, and consists of:

A. A central portion or body.

B. Two greater and two lesser wings, which pass laterally from body sides.

C. Two pterygoid processes, which are directed downwards from the adjoining parts of the body and greater wings.

[Rhoton & Hardy 1979]

I. The body of the sphenoid bone:

is more or less cubical in shape; it contains 2 large air sinuses which are separated by a septum.

a. The cerebral (superior) surface of the body: articulates infront with the cribriform plate of ethmoid bone, Anteriorly the surface is smooth and is termed the jugum sphenoidale, it supports the posterior ends of the gyri recti and the olfactory tracts. It is bounded behind by a ridge forming the anterior border of a transverse groove, termed the optic groove (sulcus chiasmaticus) leading laterally to the optic foramen on each side. Posterior to the optic groove there is an oral elevation,termed the tuberculum sellae ; and behind this a deep depression, termed the sella turcica, the deepest part of which lodges the hypophysis cerebri and is known as the hypophyseal fossa.

The anterior boundary of the sella turcica is completed laterally by 2 small eminences, called the middle clinoid processes,while the posterior boundary is formed by a square plate of bone, termed the dorsum sellae , the superior angles of which end in 2 tubercles

termed the posterior clinoid processes, which give attachment to the free margin of the tentorium cerebelli. On each side of the body below the dorsum sellae a small projection articulates with the apex of the petrous portion of the temporal bone and is termed the petrosal process. The slopping area behind the dorsum sellae is termed the clivus and is continuous with the superior surface of the basilar portion of the occipital bone, it supports the upper end of the pons.

[Renn , Rhoton , 1975]

B. The Lateral Surfaces of the body: [Fig. 1,c] are united with the greater wings and with the medial pterygoid plates. Above the attachment of each wing a broad groove, termed the carotid sulcus, lodges the internal carotid artery and the cavernous sinus. The carotid sulcus is deepest at its posterior end, where it is overhung medially by the petrosal process, and is limitted laterally by the lingula which is continued backwards to overlie the posterior opening of pterygoid canal.

[Renn & Rhoton , 1975]

C. The posterior surface of the body: [Fig. 1,a] is quadrilateral in shape and is joined, during infancy and adolescence , to the front of the basilar part of the occipital bone by a plate of cartilage which ossifice between the age of 18 to 25.

[Renn & Rhoton , 1975]

D. The Anterior surface of the body: [Fig. 1,d] presents in the median plane a triangular crest, which forms a small part of the nasal septum and is termed the sphenoidal crest. The anterior border of the crest articulates with the perpendicular plate of the ethmoid bone. On either side of the crest a rounded opening leads to the corresponding sphenoidal sinus, which are two

large irregular cavities in the body of the bone separated from each other by a bony septum.

[Renn & Rhoton , 1975]

The sphenoid sinus varies considerbly in size , shape and internal structure among adults , but 3 main types can be classified according to the extent to which the sphenoid bone is pneumatized:

[Hamberger et al , 1961]

1) The conchal type sinus: doesn't extend into the sphenoid body. It is small and separated from the sella turcica by spongy bone of up to 10 mm. thickness. This type is found in children, but in only 3% of adults.
2) The presellar type sinus: which is found in 11% of adults, doesn't penetrate beyond a plane perpendicular to the planum sphenoidale through the tuberculum sellae, Thus, the anterior wall of the sella doesn't bulge in the sphenoid sinus in the presellar type as it does in the sellar type.
3) The sellar type sinus: occurs in 86% of adults, the thickness of the floor is 1.0 mm or less in 72-82% and even less than 0.5 mm, in 40% of specimens. In this type the sinus can extend into the upper clivus. and occasionally into the dorsum sellae.

The sphenoid sinus is divided by a sagittal septum that is rarely located exactly at the midline, but is usually displaced towards one side or the other. The cavity is frequently divided by additional minor septae. The carotid arteries bulge into the superolateral wall of the sinus in 71% of cases.These arteries are usually covered by bone, but no bone separate them from the sinus mucosa in about 4 % of cases.

[Samii & Draf , 1989]