THE ROLE OF RADIOLOGY OF THE SKULL IN EVALUATION OF BONE LESIONS

THESIS
SUBMITTED IN PARTIAL FULFILMENT FOR THE MASTER DEGREE OF RADIODIAGNOSIS

By

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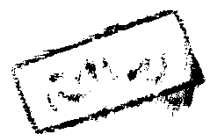

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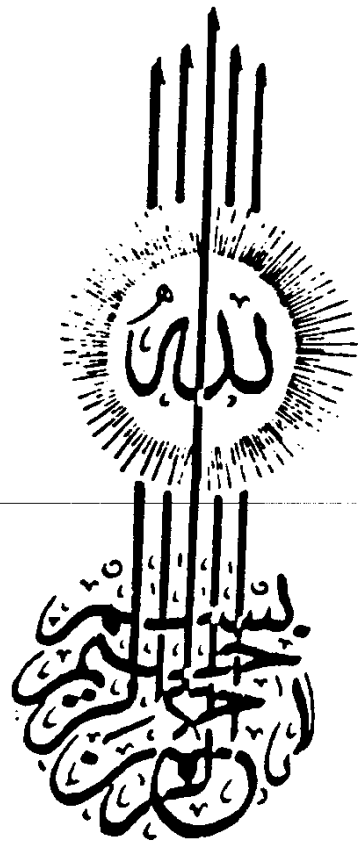

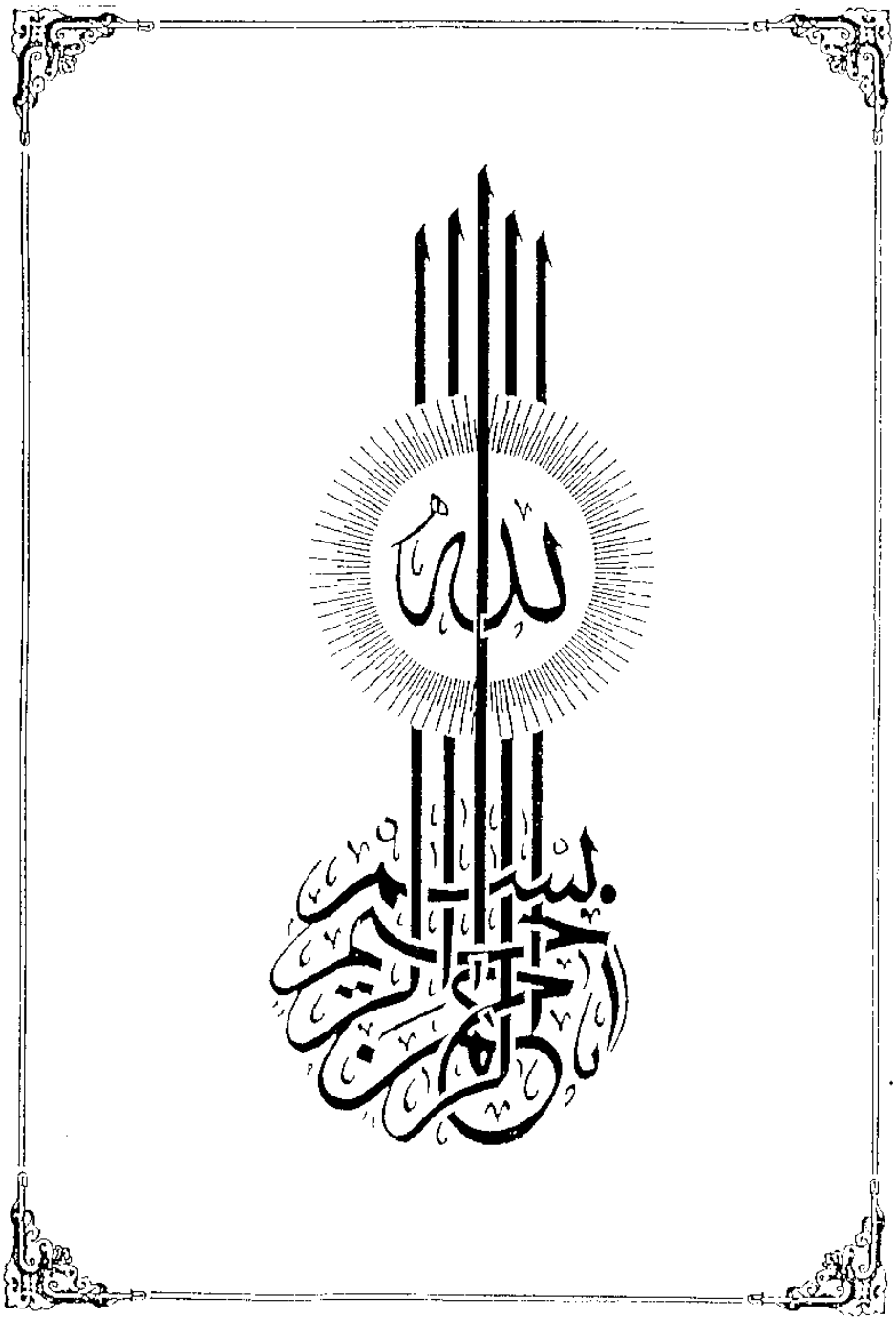

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INDEX

INTRODUCTION AIM OF WORK

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Although radiology has its place in the diagnosis of many medical and surgical diseases yet it is of utmost importance for the discovery and diagnosis of various systemic diseases guided by local changes in the skull x-ray.

While revising and studying the routine plain films of the skull, it was found that the diagnosis of many systemic diseases can be ultimately based upon this simple study.

Thus, the aim of this work is to demonstrate the role of localized changes in the bone of the skull in the diagnosis of different systemic diseases.

ANATOMY

ANATOMY OF THE SKULL

The skull is the name given to the bones which make up the skeleton of the head. The only movable bone of the skull is the mandible. The rest of the bones are joined together at immovable joint called sutures **(Dean, 1975).**

The skull is divided into an upper box-like portion called the calvarium and a lower irregular portion called the skeleton of the face.

A. The calvarium contains the brain and is made up of eight bones:

1. One frontal bone
2. Two parietal bones.
3. Two temporal bones
4. One occipital bone.
5. One sphenoid bone
6. One ethmoid bone.

B. The facial skeleton is made up of 14 bones

1. Two zygomatic bones
2. Two maxillae.
3. Two nasal bones
4. Two lacrimal bones.
5. One vomer
6. Two palatine bones.

7. Two inferior nasal conchae
8. One mandible

(DEAN, 1975).

(A) THE SKULL VIEWED FROM ABOVE

The skull seen from above has a rounded smooth appearance and oval outlines. Anteriorly is the frontal bone, laterally are the left and right parietal bones, and posteriorly is the occipital bone. (Fig. 1).

The important sutures can be recognized from above:

1. **The coronal suture:** between the frontal and the two parietal bones.
2. **The sagittal suture:** between the two parietals.
3. **The lambdoid suture:** between the two parietal bones, and the occipital bone. **(Dean, 1975).**

(B) THE SKULL VIEWED FROM THE FRONT

The skull viewed from the front is wider above than below. The upper portion is smooth and made up of the frontal bone; the lower portion is irregular. (Fig. 2).

On either sides, below the frontal bone, are the orbital cavities; whereas the opening of the nasal cavity is seen in the midline. **(Gray, 1967).**

Above the medial half of the orbital openings, there are smooth rounded elevations known as the superciliary arches which

are joined together in the midline by a prominence called the glabella. Below the glabella the frontal bone recedes to form the root of the nose (the nasion). **(Dean, 1975).**

The orbits:

They are roughly pyramidal in shape containing the eye balls, and their associated muscles, vessels and nerves as well as the lacrimal apparatus. Each orbit presents a roof, a floor, medial, lateral walls, an apex and a base. **(Gray, 1967).**

a) The roof:

It is thin and slightly concave from side to side, formed entirely by the frontal bone, but a small area posteriorly is formed by the lesser wing of sphenoid. Anteriorly, near the lateral margin, the lacrimal fossa which contains the lacrimal gland is situated. At the junction of the roof and the posterior part of the medial wall is the optic foramen through which the optic nerve and the ophthalmic artery enter the orbit from the middle cranial fossa. **(Gray, 1967).**

b) The medial wall:

It is formed from the front to the back by the frontal process of the maxilla, the lacrimal bone, the orbital plate of ethmoid and a small portion of body of sphenoid. The medial wall slopes gently downwards and laterally from the roof to merge with the floor of the orbit. In its anterior part the lacrimal sac

is situated and the nasolacrimal duct runs downwards to enter the nasal cavity **(Gray, 1967).**

c. The floor:

It is triangular in shape, slopes upwards and medially to merge with the medial wall. It is formed entirely by the maxilla, but the zygomatic bone shares by a small area anterolaterally as well as the orbital process of the palatine bone posteriorly. The posterior part of the floor is separated from the lateral wall by a narrow slit known as the inferior orbital fissure which communicates with a space at the base of the skull called the infratemporal fossa **(Gray, 1967).**

d. The lateral wall:

It is somewhat thicker than the other walls. It is formed mainly by the anterior surface of the greater wing of sphenoid in addition to a small area anteriorly formed by the zygomatic process of the frontal bone and the frontal process of the zygomatic bone. Posteriorly, the lateral wall and the roof are separated by a slit called the superior orbital fissure which transmits the occulomotor, the trochlear, and the abducent nerves that supply the extrinsic muscles of the eye **(Dean, 1975).**

e. The Apex:

It represents the medial end of the superior orbital fissure.

f. The Base:

It represents the orbital opening in the face. Both orbital

openings are roughly quadrilateral, their upper margins are formed almost entirely by the frontal bone which bears the supraorbital notch on its medial third, that is often enclosed with bone forming the supraorbital foramen **(Dean, 1975).** The lateral margins are formed by the union of the zygomatic processes of the frontal bone and the frontal processes of the zygomatic bones. The inferior margins are made up of the zygomatic bones laterally and the maxillae medially. The medial margins are formed by the frontal bone above and the frontal processes of the maxillae below **(Dean, 1975).**

THE NASAL CAVITY

The anterior opening of the nasal cavity in the face is roughly triangular in shape. The apex and the upper part of the sides are formed by the nasal bones; but the base and the lower part of the sides are formed by the maxillae **(Dean, 1975).**

The nasal cavity is an irregular-shaped cavity which lies above the floor of the mouth and below the anterior cranial fossa. The cavity is divided into two halves right and left by the nasal septum, its anterior portion is formed in the living by a cartilaginous plate and the rest is a bony plate **(Dean, 1975).**

Each half of the nasal cavity has a roof, a floor, a lateral and medial walls.

1) The roof of the nasal cavity:

It is horizontal in its central portion where it is formed by the cribriform plate of ethmoid, but anteriorly and posteriorly it slopes downwards. The anterior part of the roof is formed by the nasal bones and the posterior part of the body of sphenoid **(Dean, 1975).**

2) The floor of the nasal cavity:

It is formed by the upper surface of the hard palate which separates the nasal cavity from the mouth **(Dean, 1975).**

3. The medial wall of the nasal cavity:

It is represented by the bony septum which is formed by the perpendicular plate of ethmoid above and the vomer below **(Dean, 1975).**

4. The lateral wall of the nasal cavity:

The internal aspect of the lateral wall is irregular owing to the presence of three bony projections: the inferior, middle and superior nasal conchae, each forms the roof of a passage called, the inferior, middle and superior meatuses of the nose **(Gray, 1967).**

The lateral wall is formed infront and below by the nasal surface of maxillae, behind by the perpendicular plate of the palatine bone and above by the nasal surface of the ethmoid labyrinth which is a mass of air cells in the region of ethmoid bone that separates the orbit from the nasal cavity. The lacrimal bone forms a small part of the lateral wall between the maxilla and ethmoid **(Gray, 1967).**