# DIAGNOSIS AND MANAGEMENT OF INTRACRANIAL EPIDURAL HAEMATOMA

## THESIS

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OF THE MASTER DEGREE IN

**(GENERAL SURGERY)**

**BY**

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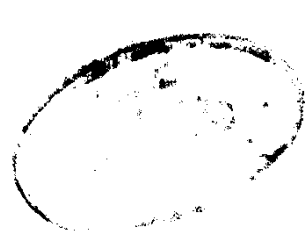

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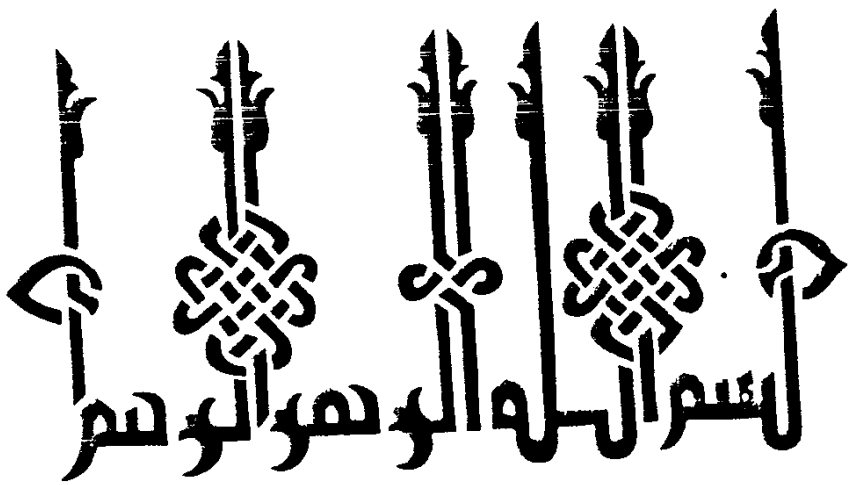

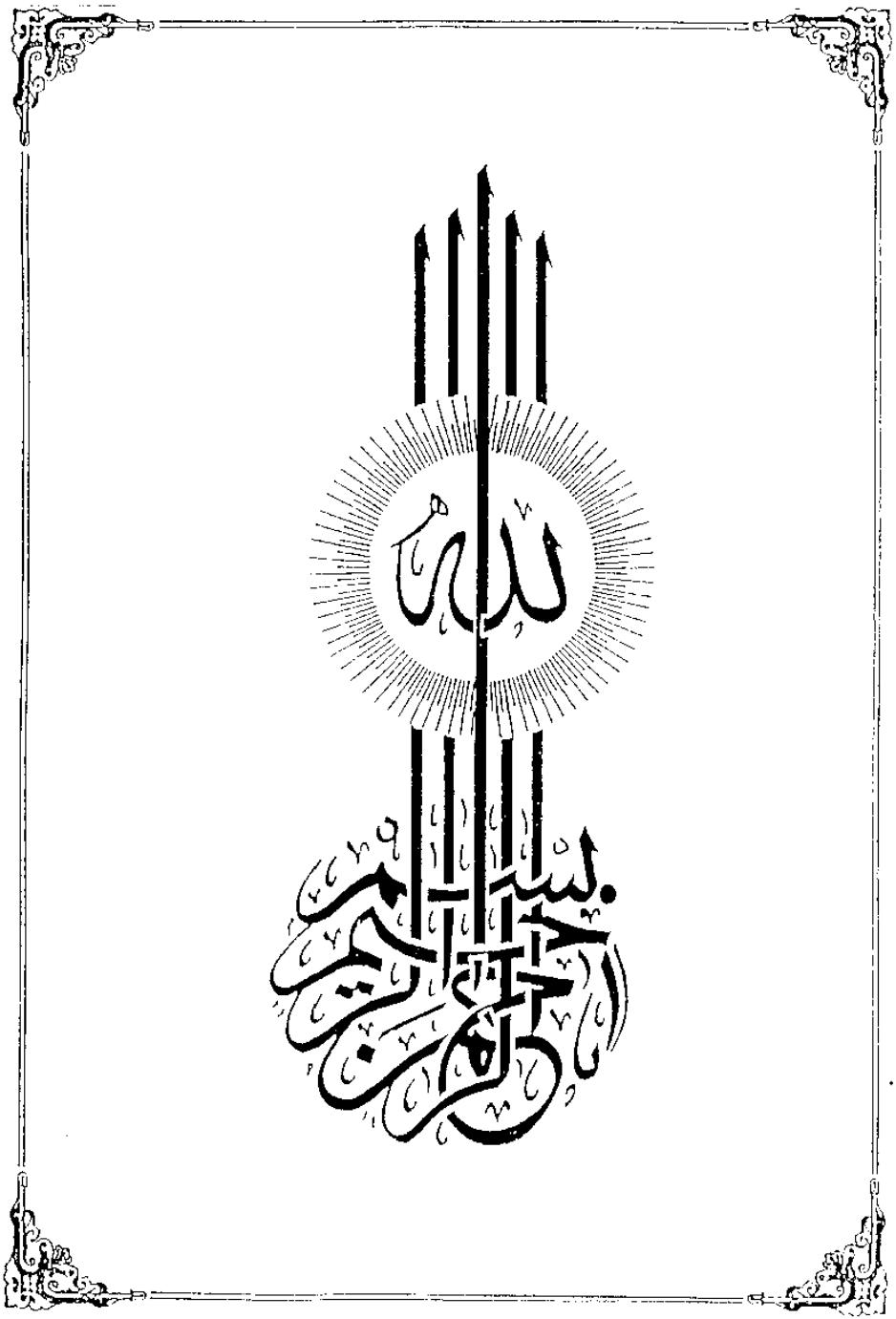

TO MY PARENTS

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MOHAMED ASHRAF GHOBASHY

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# C O N T E N T S



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# REVIEW OF LITERATURE

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- Pathophysiology
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# REVIEW OF LITERATURE

## The Anatomical Consideration

- Dura mater :

It is a thick inelastic membrane. The cerebral dura mater is the part surrounding the brain but the spinal dura mater is the part enclosing the spinal cord.The cerebral dura mater is formed of two layers : an outer or endosteal layer and an inner or meningeal layer.They are closely united except along certain lines where they separate to enclose the dural venous sinuses. (Gray, 1973).

The dura mater adheres to the inner surface of the skull bones and sends blood vessels and fibrous processes into them which are torn when the dura is detached from the skull bones (last, 1973).

The endosteal layer is continous through the sutures and the foramina of the skull with the periosteum & via the superior orbital fissure with the periorbita. However, else-where, the dura mater is more or less easily detached from the skull bones.

N.B. : There is no marked histologial differences between the endosteal and the meningeal layers of the dura mater (Gray, 1973).

Because of the attachement of the dura mater to the inner table of the skull, there's no intracranial epidural space in normal persons (Zimmerman & Danziger,1982).

Dural venous sinuses :

They lie between the two layers of the dura mater and are lined by endothelium. They have no valves.Examples of them are :

Superior Sagital Sinus :

It starts in the front at the foramen caecum, runs backwards at the upper convex border of the falx cerebri and at the internal occipital protuberance, it curves usually to the right, sometimes to the left to continue as the transverse sinus.

The inferior Sagital sinus :

It occupies the posterior two-thirds of the lower concave border of the falx cerebri and posteriorly it unites with great cerebral vien to form the straight sinus.

The Straight sinus :

It lies at the line of attachement between falx cerebri and tentorium cerebelli and posteriorly it curves to the left, sometimes to the right,to continue as the transverse sinus.

The two transverse sinuses :

Each one starts at the internal occipital protuberance as discussed before and runs horizontally at the line of attachement of the tentorium cerebelli and the occipital bones. Laterally, each sinus curves downwards to continue as the sigmoid sinus.

The two sigmoid sinuses :

Each one passes downwards and medially grooving the mastoid part of the temporal bone (behind the mastoid antrum), then passes forwards then downwards through the posterior compartment of the jugular foramen to continue as the internal jugular vien (Snell, 1981).

The occipital Sinus :

It's a small sinus occupying the attached margins of the falx cerebelli (Lanksch and Gramme, 1979).

The meningeal veins :

They lie in the endosteal layer of the dura ( in contrast to their name). The middle meningeal vein follows the artery and lies lateral to it and drains into the pterygoid plexus of veins (Gray, 1973).

The meningeal arteries :

They are numerous arteries lying between the two layers of the dura, supplying the dura from internal carotid artery, maxillary artery, occipital artery, ascending pharyngeal artery and vertebral artery.

From the clinical point of view, the most important is the middle meningeal artery (Snell, 1981).

The middle meningeal artery :-

It's a branch from the upper border of the first part of the maxillary artery. It passes upwards and medially deep to the lateral pterygoid between the two roots of auriculo-temporal nerve. Then, it enters the middle cranial fossa, through the foramen spinosum, with the nervous spinosum. In the cranial cavity, it is embedded in the outer layer of the dura mater and grooves the inner surface of the skull. This is why it may be torn in fractures of the skull. It runs forwards and laterally on the greater wing of the sphenoid and divides into :

(A) Anterior division :

It passes upwards and forwards in a groove or even a canal in the inner surface of the greater wing of the

sphenoid till the pterion then upwards and backwards grooving the inner surface of the anterior part of the parietal bone.

(B) Posterior Division :

It passes upwards and backwards grooving the inner surface of the squamous part of the temporal bone and the posterior part of the parietal bone (Last, 1973).

## PATHOPHYSIOLOGY

Epidural haematoma is a collection of blood between the inner table of the skull and the dura mater.

(Lindenberg,1977)

Epidural haematoma is usually traumatic in origin. It's due to stripping of the outer layer of the dura from the overlying skull bones by direct trauma.Usually the trauma will cause fracture of the skull bones.These fractures occur due to the effect of impact

whose impacting surface is intermediate in size,i.e it's sufficiently large so that skull penetration does not occur and sufficiently small so that the contact phenomena is not distributed widely allover the head. The edges of this fracture may injury the meninegeal blood vessels or dural venous sinus or may cause oozing from diploic veins at the edges of the fracture.

This vascular disruption occurs due to contact related skull fracture or contact related skull deformity. This torn meningeal vessel or dural venous sinus or oozing diploic veins will bleed and the blood will collect between the skull and the dura mater at the site where the dura was stripped. By this vascular

phenomena, a haematoma is formed, usually in relation to skull fracture (Roda et al., 1983; Wilkins, 1985).

As the haematoma collects, it gradually strips the dura from the skull to form a large ovoid mass which progressively indents the adjacent brain.

With the expansion of the haematoma, further separation of the dura will occur, with continued bleeding, not only from the original source of haematoma but also from the connecting veins between the diploic veins and the dural surface which will be torn by the gradual stripping of the dura. Although they are usually considered as acute lesions but subacute and chronic forms do occur and are recognized with increasing frequency i.e. the delayed epidural haematoma (Hirsh, 1980).

The rate of growth of epidural haematoma depends on many factors. Examples of these factors are :

1- Whether the source of bleeding is arterial or venous.
2- Whether the injuried artery goes into spasm or not.
3- Whether the epidural haematoma is decompensated via skull fracture or via the scalp or not.

(Robert and Larissa, 1982).

In areas where there's loose attachement of the dura mater to the skull bones, the dura could be easily stripped from the skull after trauma, with persistent venous oozing from that dural surface. This collecting haema - toma strips the dura and that oozing will continue to form what we call delayed epidural haematoma which usually slowly increases in size. The loose attachement of the dura to the temporal bone plays an important role in the development and pathogenesis of delayed epidural haematoma. This's why delayed epidural haematoma is more common in the temporal region. It's well believed that chronic course of epidural haematoma is due to the speed of bleeding and not due to secondary pathological changes as in case of subdural haematoma (Pozzati et al., 1980).

Extremes of age and females are relatively immune to delayed epidural haematoma as the dura is more firmly attached to the skull (Schechter et al., 1966).

The dural venous sinuses are the main source of bleeding in delayed epidural haematoma. The use of hyperosmolar fluids e.g. manitol will help its formation due to loss