CLINICAL STUDY OF SPONTANEOUS INTRACEREBRAL HEMORRHAGE

THESIS

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General Surgery

BY

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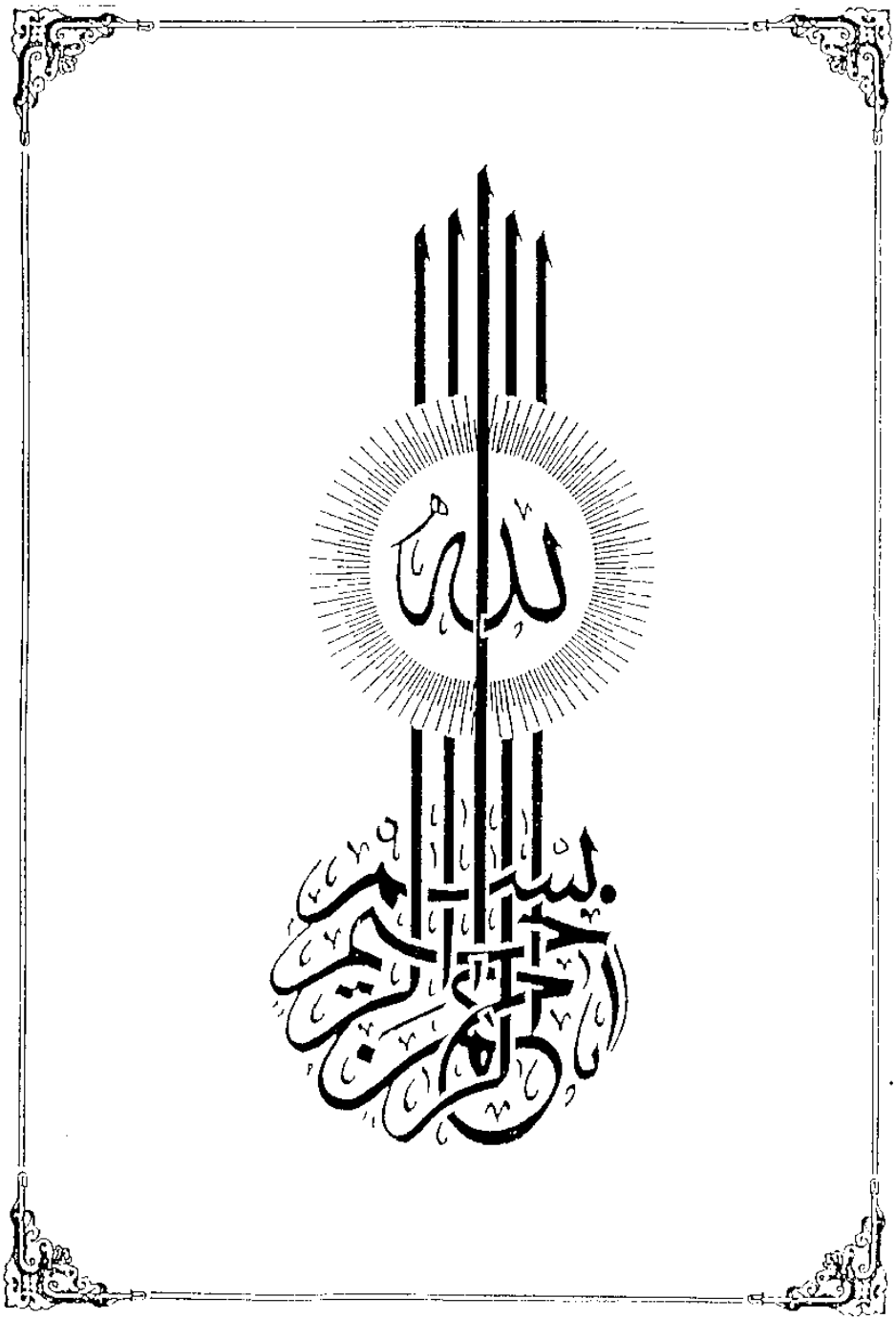

To my parents

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A N A T O M Y

ANATOMY OF THE CEREBRAL VESSELS

INTERNAL CAROTID ARTERIES:

The internal carotid artery supplies the greater part of the cerebral hemisphere, the eye and its accessory organs, and sends branches to the forehead and nose.

It begins at the bifurcation of the common carotid artery, where it usually presents a localised dilatation, termed the carotid sinus at the level of the superior margin of the thyroid cartilage. It ascends to the base of the skull, and enters the cranial cavity through the carotid canal of the temporal bone. it then runs forward through the cavernous sinus, lying in the carotid groove on the side of the body of the sphenoid bone, and ends below the anterior perforated substance of the brain by dividing into the anterior and the middle cerebral arteries.

The anatomists divide the internal carotid artery into four parts:

a. Cervical.

b. Petrous.

c. Cavernous.

d. Cerebral.

a. The Cervical portion:

This artery begins at the bifurcation of the common carotid artery, at the upper border of the thyroid cartilage, and ascends in front of the transverse processes of the upper three cervical vertebrae to gain the lower end of the carotid canal in the petrous portion of the temporal bone (Gray's 1980)

b. The petrous portion:

When the internal carotid artery enters the carotid canal in the petrous portion of the temporal bone, it first ascends, and then curves, forwards and medially. As it leaves the canal to enter the cranial cavity, it runs upwards and medially across the upper part of the foramen lacerum and above the fibrocartilage which it contains. Finally, it passes between the lingula and petrosal process of the sphenoid bone. (Gray's 1980). The petrous portion is divided anatomically into the ascending portion, knee and the horizontal part. This horizontal or third part is the longest and runs anteriorly, upward and medially.

c. Cavernous portion:

It is situated in the cavernous sinus, but is covered by the lining endothelium of the sinus, it lies between layers of the dura mater forming the cavernou:

sinus, where it is batned in venous blood—the only site in the body where such a situation exists. The artery ascends and then runs along the carotid sulcus, and again curves upward on the medial side of the anterior clinoid process and perforates the dura mater to enter the subarachnoid space. (Youmans 1982). Occasionally the anterior and middle clinoid processes form a bony ring round the artery.

The artery is surrounded by a sympathetic plexus, and the oculomotor, trochlear, ophthalmic and abducent nerves are on its lateral side. (Gray's 1980).

d. The cerebral portion:

After perforating the dura mater at the medial side of the anterior clinoid process, the internal carotid artery turns backwards below the optic nerve and then passes between the optic and oculomotor nerves to the anterior perforating substance at the medial end of the lateral cerebral sulcus, where it divides into the anterior and middle cerebral arteries (Gray's 1980).

The course of the internal carotid artery including the intracavernous portion and the supraclinoid portion has been referred to as the "Carotid Siphon" (Moniz, 1927).

BRANCHES OF THE INTERNAL CAROTID ARTERY:

From the cervical portion ——— No Branches

From the petrous portion
1. Caroticotympanic.
2. Pterygoid.

From the Caveronous ,,
3. Cavernous.
4. Hypophyseal.
5. Meningeal.

From the cerebral ,,
6. Ophthalmic.
7. Middle cerebral.
8. Anterior cerebral
9. Posterior communicating
10. Anterior choroid.

(Gray's 1980).

1. Carotico tympanic branch:

It enters the tympanic cavity and anastemoses with the anteriotympanic branch of maxillary artery and with the stylomastoid artery.

2. A small, inconstant pterygoid branch:

Anastemoses with a branch of the greater palatine artery.

3. Cavernous branches:

Are numerous small vessels which supply the trigeminal ganglion, and walls of the cavernous and

inferior petrosal sinuses. Some of them anastomose with branches of tne middle meningeal artery.

4. Hypohyseal branches:

Are one or two minute vessels which supply the hypophysis cerebri.

5. Meningeal branch:

Is a minute branch which passes over the lesser wing of the sphenoid to supply the dura mater of the anterior cranial fossa; it anastomoses with the meningeal branch from the posterior ethmoidal artery.

6. The Ophtnalmic artery:

It is the first intradural and most important branch of the cavernous portion of the internal carotid artery (ruptured aneurysms at the site of origin of the opnthalmic artery will result in subarachnoid hemorrhage).

It arises medial to the anterior clinoid process and passes forward with the optic nerve through the optic foramen into the orbit. It has numerous branches in the orbit , including the central artery of the retina and a number of important anastomotic connections with branches of the external carotid system.

Branches:

1. Central artery of the retina.
2. Lacrimal artery.
3. Muscular branches.
4. Ciliary brunches.
5. Supra orbital artery.
6. Anterior and posterior ethmoidal arteries.
7. Meningeal branch.
8. Medial palpebral arteries.
9. Supratrochlear artery.
10. Dorsal nasal artery.

Occasionally the anterior meningeal artery takes origin from the ophthalmic artery. (Gabriele, O.F. and Bell, D. 1967).

7. The posterior communicating artery:

It is the next major branch of the internal carotid artery and arises from dorsal a spect of the carotid siphon and courses posteriorly and medially to unite with the posterior cerebral artery; the both consitute part of the circle of Willis. This vessel, because of its tiny lumen, may not be opacified in the cerebral angiogram. When opacified, however, it may be seen as a fine hadow; occasionally it is well developed. Occasionally the posterior cerebral artery appesrs to ari se

directly from the internal carotid artery. The posterior communicating artery or posterior cerebral artery fills in a large proportion of cases, at the origin of the posterior communicating artery, one sometimes sees infundibular widening of the carotid artery - it has not been conclusively established whether this represents an aneurysm or a preaneurysmal state. (Hassler and Saltzman 1963) .

Hassler found anatomical defects in the wall of this widening in a few cases. The significance of this founding becomes important when one is looking for a cause of subarachnoid Hemorrhage.

It is frequently larger on one side than on the other - from its posterior half are given off several small central branches, which, with similar vessels from the posterior cerebral artery, pierce the posterior perforated substance and supply the genu and anterior one third of the posterior limb of the internal capsule, the anterior one third of the thalamus and the walls of the third ventricle.

8. Anterior choroidal artery:

This is the next branch of the internal carotid artery, arising just distal to the posterior communicating artery, and can be identified in over 90% of cases.

From its origin, which may show infundibular widening similar to that seen in the posterior cerebral artery, the anterior choroidal artery passes posteriorly and laterally and usually has a convex upward course. It finally enters the temporal horn and supplies the internal capsule and the choroid plexus of the inferior horn of the lateral ventricle.

The vessel gives off numerous small branches in its course to supply the optic tract, the cerebral peduncle, and the lateral portion of the lateral geniculate body. Perforating branches supply the posterior two thirds of the posterior limb of the internal capsule and the infra-and retrolenticular portion of the internal capsule, including the optic radiation. The artery also supplies the choroid plexus in the inferior horn of the lateral ventricle after transversing the choroidal fissure, and the tail of the caudate nucleus and amygdala.

9. Anterior cerebral artery:

This arises at the division of the internal carotid artery into its two major branches. It passes forward and medialward across the anterior perforated substance, above the optic nerve, to the commencement of the longitudinal fissure. The anterior communicating artery usually connect the anterior cerebral artery of one side

to that of the opposite side. From this point the two vessels run alongside each other in the longitudinal fissure. Curving over the genu of the corpus callosum as the pericallosal artery, and finally anastomosing with the branches of the posterior cerebral artery (youmans 1982).

In its course the anterior cerebral artery gives off central and cortical branches.

a. Anterior communicating artery:

It has an average length of about 4 mm. and connects the two anterior cerebral arteries across the commencement of the longitudinal fissure; sometimes it is double. it gives off a few anteromedial central branches.

b. Central branches:

Are a group of small arteries which arise from the commencement of the anterior cerebral artery; they pierce the anterior per-forated substance and lamina terminalis, and supply the rostrum of the corpus callosum, the septum lucidum, the anterior part of the putamen of the lentiform nucleus and the head of the caudate nucleus.