# "HISTORY OF VASCULAR SURGERY"

T H E S I S

SUBMITTED IN PARTIAL FULFILMENT FOR MASTER DEGREE

IN GENERAL SURGERY

B Y

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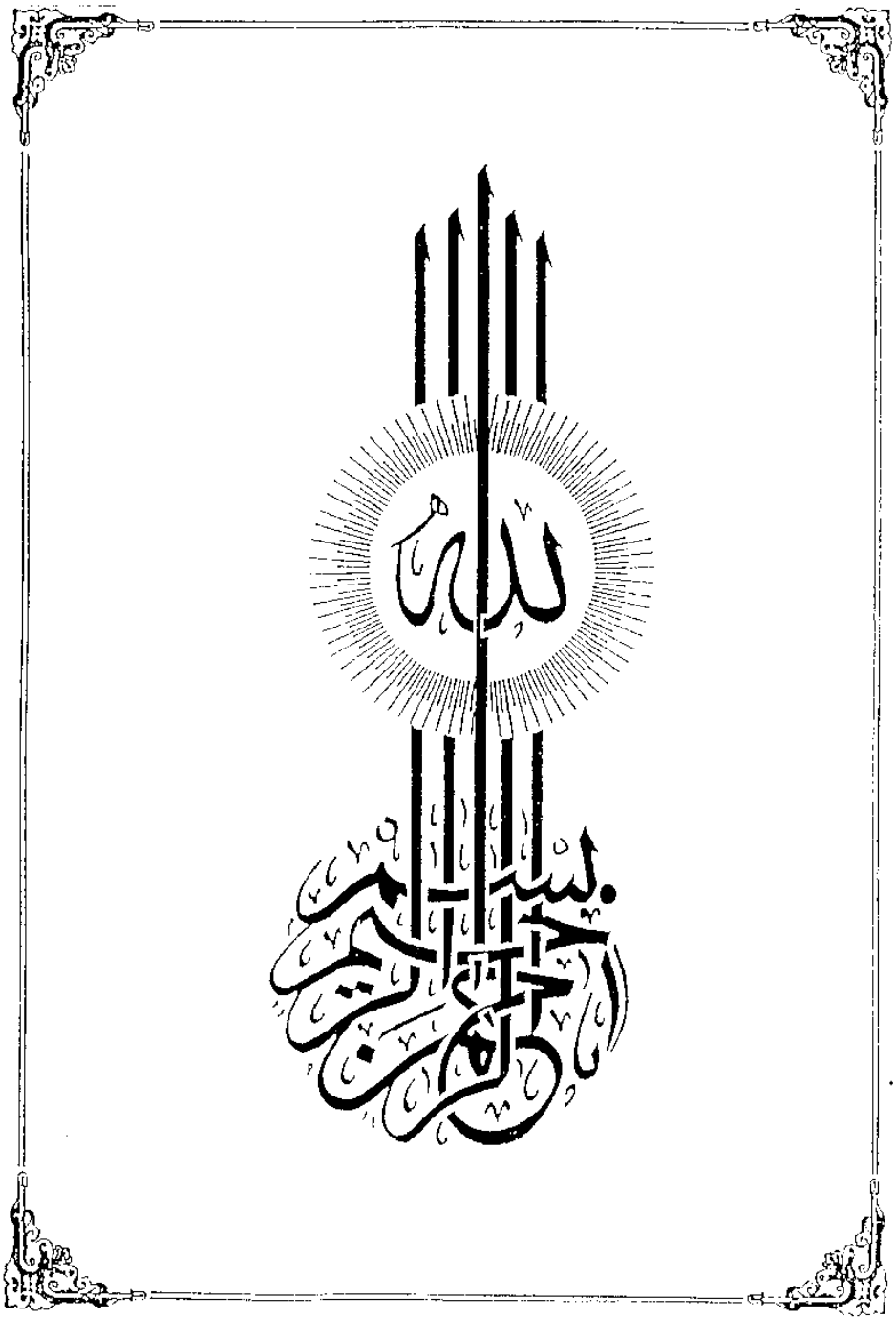

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# C O N T E N T S

# INTRODUCTION AND AIM OF WORK

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Vascular surgery, with its spectacular clinical achievements, is of relatively recent date although the history of its development spans several centuries ago.

The reports dealing with vascular problems up to the eighteenth century, were mostly confined to the management of arterial hemorrhage and less often to that of aneurysm. Begining with the nineteenth century a notable era of progress was ushered in with the introduction of laboratory-designed techniques for suturing vascular wounds and anastomosing blood vessels.

At the turn of this century, many of the basic principles of vascular techniques had already been worked out. However, the golden era of vascular surgery could not have been accomplished without new and brilliant contributions in other medical fields . The major developments include advances in angiography, antibiotics , anticoagulants , blood transfusions , serviceable arterial substitutes , and others.

The history of vascular surgery is roughly divided into three major periods, the old, classic and modern

period and special emphasis will be upon arterial surgery, since the great progress in this field has over shadowed the progress in venous and lymphatic surgery.

The objectives of this work will be limited to a brief survay of the early pioneering milestones , and will deal mostly with some of the basic principles and techniques and their incidence of discovery.

# REVIEW OF LITERATURE

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## THE OLD ERA OF VASCULAR SURGERY

The history of vascular surgery probably began in the first century A.D. The vascular problems which were dealt with from this time to the eighteenth century, were mostly confined to the management of arterial hemorrhage and less often to that of aneurysms (Callow,1978).

Rufus of Ephesus controlled hemorrhage by digital compression, application of styptics and cautary,arterial torsion, and even arterial ligature. Antyllus in the second century, introduced biterminal ligation and evacuation of the sac for the cure of aneurysm. In his work, as recorded by Oribasius, stated: "There are two kinds of aneurysms, the one where there is a local dilatation of the artery, and the other from a rupture of the artery and discharge of blood into the flesh beneath it. Those due to dilatation are longer than the others, which are rounder" (Osler, 1975).

Cosmas and Damian, surgeons of Asia Minor, in A.D. 303, probably attempted the first arterial and venous anastomosis when they substituted the healthy leg of a just-dead slave for the cancerous, gangrenous leg of

their patient. Of course, the trial failed. Aëtius of Amida, regarded aneurysms as being most common in the neck. However, Aëtius's opinion included the familial, pulsating neck swelling caused by the tortuous or kinked lower common carotid artery. He suggested avoiding operation on these neck lesions and attempted ligation of the brachial artery above an aneurysmal sac with evacuation of the sac. Thus, Aëtius established , 14 centuries ago, the basic principle of proximal control before incising the sac. The aneurysm that Aëtius was able to cure, probably is the iatrogenic brachial aneurysm. It was a complication of the general practice of blood letting at the elbow at that time (Osler , 1915; Callow, 1968 and Eastcott, 1982).

Galen, a Roman doctor, recognized pulsation as a characteristic of aneurysms and observed that they could be emptied by compression. He recognised the risk of unskilled phlebotomy at the elbow where the brachial artery might be injured. He also knew how to prevent this early example of iatrogenic aneurysm by skillful binding of the part (Eastcott, 1982).

These were probably the last of surgical writing for several centuries.

Roger of Palermo in A.D. 1080, utilized what he called the "mediate ligature" applied with a threaded needle to check arterial hemorrhage (Callow, 1978).

Five hundred years later, in 1552, Ambroise Paré rediscovered the ligature when, having exhausted his supply of boiling oil for cauterization, he left the gunshot wound alone and ligated the bleeding vessels. He invented the artery forceps from his "bec de corbin", a bullet extracting instrument modified to grasp and pull out the ends of the vessel to be ligated. He also warned against the treatment of inflammed aneurysm by incision or cautary as a supposed abscess (Gastiglioni, 1947).

The first known attempt to control arterial hemorrhage and preserve the lumen of the vessel was performed by Hallowell, encouraged by Lambert, in 1759. He closed a brachial artery wound damaged during phlebotomy, uniting the edges of the wound with a pin around which he twisted several times a figure-8 stitch.Subsequent attempts failed due to resulting thrombosis. In 1773 , Assmann, Tested Hallowell's method of repair but the lumen was invariably obliterated. He published

his negative results reinforcing the widespread belief that any irritation of a blood vessel is followed by thrombosis and permanent obliteration of its lumen. Le Conte, in 1774, attempted to preserve the lumen of damaged arteries by wrapping them in a thin section of goose quill, encircling the quill with a ligature, and sealing the site with a Varnish made of "turpentine and balm of Araeus". The quill sheath was removed after 3 to 4 days. The wound was always infected, and although hemostasis was obtained, the lumen was obliterated (Callow, 1978).

In 1761, William Hunter described that the arm artery proximal to the false aneurysm became enlarged, while the pulse at the wrist is weakened and stated that the disorder of blood flow could be checked at once by proximal arterial compression or compression over the point of the lesion (Garrison, 1929; Eastcott, 1982).

In trying to make use of the collateral circulation, John Hunter, in 1785, advocated the ligature of the artery at a distance well above the lesion for treatment of aneurysms. Thus, for a popliteal aneurysm he

placed the ligature within the facial tunnel of the thigh, known since then as "Hunter's Canal". When the patient died 15 months later, the sac was thoroughly thrombosed. Hunter also reported the importance of arterial elasticity, aortic valve function as well as the role of the coats of the arterial wall in determining the form of true and false aneurysms (Garrison, 1929; Eastcott, 1982).

His former pupil, Sir Astly Cooper, in 1808, higated the external iliac artery for femoral aneurysm and the common carotid artery, also for aneurysm . Both patients survived many years Later. In 1817, Astley cooper ligated the abdomenal aorta transperitoneally for leaking left iliac aneurysm. The patient died on the second post operative day (Cooper, 1825).

Despite the inadequacy of this means of controlling aneurysms, the method continued in practice for about 100 years until replaced by the endo-aneurysmorrhaphy of Matas in 1902. Thus, the old method of ligation of tne arteries became obsolete. The main feature of this technique is suturing the arterial openings in

the aneurysmal sac. Matas devised three types of operations: restorative endoaneurysmorrhaphy, used for saccular aneurysms; reconstructive endoaneurysmorrhaphy in which a new vessel is made out of the old one;and obliterative endoaneurysmorrhaphy for fusiform aneurysms. Matas first performed this technique on a large aneurysm of the brachial artery in the middle third of the arm resulting from a gunshot wound. After opening the sac and removing the clots, three orifices were detected at the bottom of the sac, stitched with fine silk,and thus were sealed completely by 1940, Matas reported personal experience with 620 operations for aneurysms (Matas , 1888 and 1940).

In 1805, Jones studied the nature of healing process of the injured arterial wall. He correctly identified the intima, renamed it endothelium in place of the former epithelium , described its regenerative properties, and demonstrated that wounds less than one-third the circumference of the artery were capable of healing leaving little or no obstruction. He demonstrated the sensitivity of the intima to injury and pointed the way toward the principle of intima-to-intima opposition for