# ARTERIAL INJURY

## THESIS

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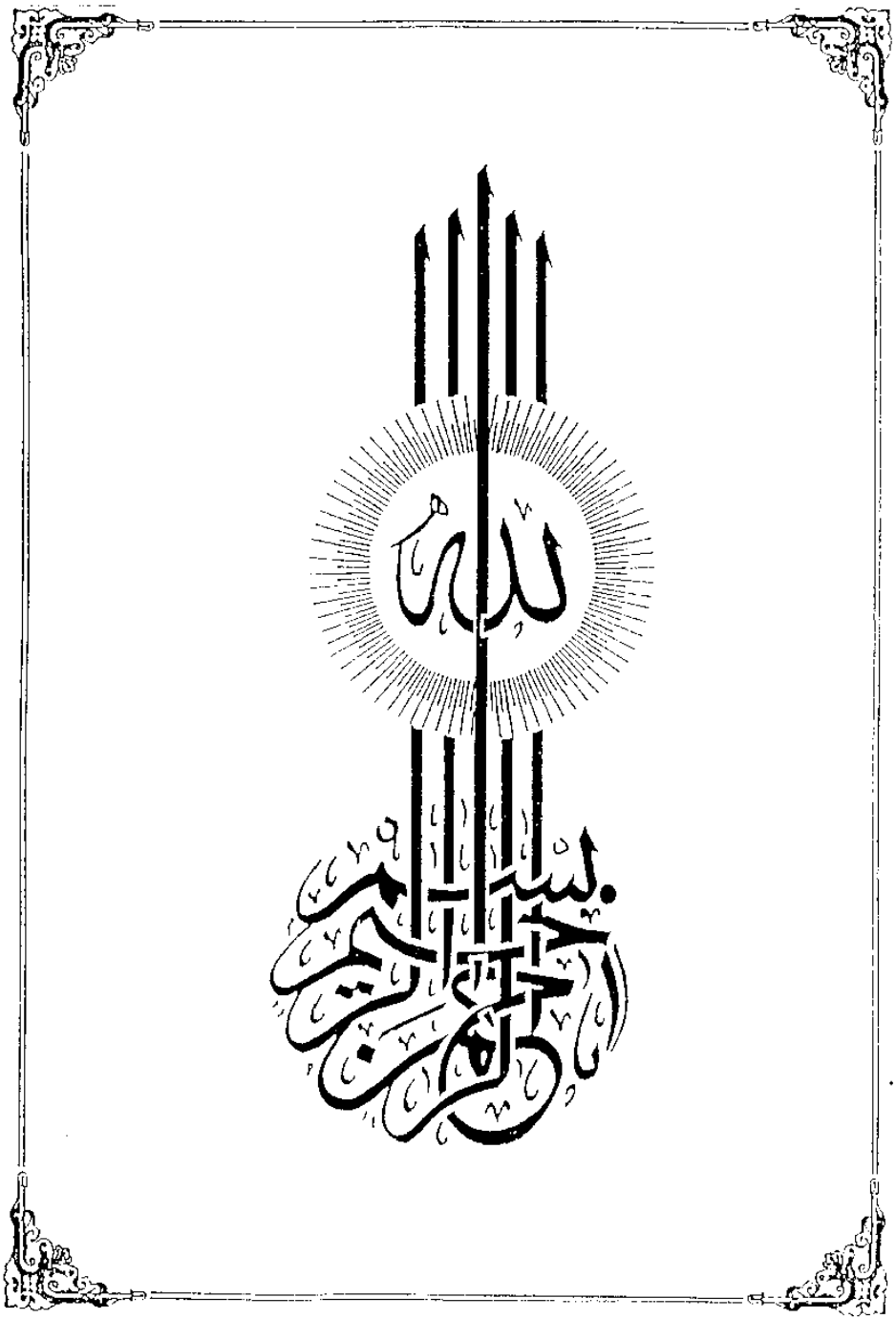

CONTENTS

# INTRODUCTION

The treatment of arterial injuries has changed very much as a result of the experience gained in Korean War. The progress that happned enabled us to treat arterial injuries in Civilian practice with better results. The objective now is not only to save life and limb but to restore normal arterial and venous circulation in the interest of preserving normal function for the limb.

The aim of this work is to study the pathology of arterial injuries , their investigations and the methods used for their treatment.

# HISTORY

## H I S T O R Y

Throughout the ages, penetrating wounds in war have divided arteries. Ambroise Paré, in the sixteenth century, established the ligature for lifesaving control of arterial haemorrhage. This method was described hundreds of years earlier by Galen. The more simpler, though less effective, heated cautery was used instead of ligation before. Hallowell in Yorkshire in 1759, repaired a brachial artery by transfixing it tangentially with a pin, and winding silk about it as a figure of eight. (East Cott', 1973).

However, it was not until the latter part of the nineteenth century that successfull repair of the arterial wounds could be systematically or more frequently accomplished either by small ivory clamps done by Gluck in 1881 or by sutures done by Jassinowsky in 1899. The later used a stitch which avoided penetrating the intima. Dörfier in 1899, concluded that aseptic silk thread in the lumen of the vessel does not necessarily lead to thrombosis and therefore, the penetration of the intima was not contra-indicated.

(Haimovici, 1976).

John B. Murphy of Chicago, in 1897 seems to have been the first to reconstruct a completely transected human artery, though Carrel and Guthrie in early years of the twentieth century, achieved consistently good results with experimental vascular repairs and grafts in animal. (Eastcott, 1973).

Prior to World War II; Matas, Reid and Holman were the recognised authorities in the management of traumatic arterial aneurysms and arteriovenous fistulas. Matas treated large numbers of aneurysms by his obliterative technique with endoaneurysmorrhaphy. In addition, he also advocated reconstruction and restorative procedures. Matas, in discussing Soubbotitch's report of Serbo-Turkish and Serbo-Bulgarian Wars, emphasized that one of the most notable features was the suture, both circular and lateral repair,and the fact that it had been utilized more frequently in the Blkan conflict than in previous wars. (Rich;1973).

The incidence of arterial injury in the First and Second World Wars was about 1 percent of all wounds.

The practice of ligation remained general with about a 50 percent incidence of amputation following this method, which was the only one that could be used in the operational conditions of the bitter campaingns during which these wounds were sustained. (DeBakey and Simeone, 1946).

The Korean War opened with similar experience in vascular injuries, which became more common than during the World Wars. The work of Carrel was rediscovered again in that time. In some clinical unites, reconstruction was shown to be simple and practical for dealing with arterial defects, and it was decided to try these methods out in casualties. In spring of 1952 repair was undertaken wherever possible. The results were stricking. The amputation rate fell from 50 to 13 percent . (Hughes, 1958).

The injured arteries primary repaired during the Korean War showed structural and functional good results. The improved management of acute vascular injuries, established during the Korean Conflict, represents one of the most outstanding achievements

in the war surgery. (Jahnke, 1958).

The experience during the Vietnam war has confirmed the superiority of reconstruction at the same time of injury. The amputation rate was still of approximately 13 percent. (Rich & Hughes, 1969).

Morris, et al. (1960), were able to amass the unusual total of 220 arterial injuries during a period of only 10 years. Except for this experience, few have had sufficient opportunity for personal study of groups of cases large enough to permit formulation of therapeutic policy. Therefore, reference must be made to military experience where wounds occur in-epidemic form and where properly collected data can be analysed. Moris et al. postulated that, the results of therapy in civilian practice can be better than in military because circulation can be restored much earlier than in military practice. Surgeons may lose this great advantage if they temporise to see if "spasm" will not spontaneously resolve or if enough collateral circulation will not develop to maintain the viability of the limb. (Morris et al., 1960).

Although the techniques for arterial surgery has been well established at the beginning of this century, it was not until the 19+0a that the modern era of vascular surgery could develop, expand and flourish. This gap of several decades was due primarily to the lack of availability of important developments in many other medical disciplines, such as radiological, haematologic, and antibiotic. Once available, they made it possible for arterial surgery to fulfil its great potential. (Haimovici, 1976).

# PATHOLOGY OF ARTERIAL INJURY

## PATHOLOGY OF ARTERIAL INJURIES

The nature of the wounding mechanism can strongly affect the pathologic feature of the arterial injuries and influences the potential development of the complication. Arterial injuries caused by sharp instruments are less difficult compared to high-velocity missile wounds because of the massive tissue destruction. The penetrating injuries are the commonst type. Blunt trauma occurs in less frequent manner, but it causes serious lesion. Arterial injuries may be acute with or without loss of arterial wall continuity or chronic injuries which usually appear some days after the injury.

In battle field casualties the majority of wounds are found to be penetrated due to gunshot fragments. In Vietnam war, it was found that arterial injuries due to penetrated wounds were present in more than 90 percent of the cases. Blunt trauma was responsible for only 1 percent of the total arterial injuries. (Hewitt et al., 1969).

In civilian experience the penetrating injuries to major arteries due to gun-shot wounds are the

commonest. In a large civilian series Drapanas and co-workers found that penetrating injuries occurred in 90.2 percent and blunt trauma caused the arterial injuries in 9.8 percent. Among the penetrating injuries to the major arteries in their series, 56.4 percent were due to low velocity gun-shot wounds and 43.6 percent were due to puncture wounds or lacerations. (Drapanas et al., 1970).

Fractures and dislocations are common causes of vascular trauma. Frequently, this is a form of blunt trauma to the vessel, however, sharp specules of bone can also lacerate arteries. (Smith et al., 1969) , (Kirkup, 1963).

Arterial trauma can be caused by diagnostic procedures such as catheterization for angiographic studies which may lead to traumatic thrombosis and ischaemia. (Fogarty & Krippaehne, 1965).

Vascular injuries can be associated with unrelated operative procedures such as excision of a hernial nucleus pulposus resulting in an iliac arteriovenous fistula. (Rich, 1973).

The most common injured arteries are those of upper and lower extremities, especially common and superficial femoral, popliteal and brachial arteries. Other arterial injuries including common carotid , subclavian, and other neck vessels may be including in penetrating injuries for the neck. Abdominal aorta and its major branches are rarely, but very dangerous, to be injured (Robbs & Baker, 1978).

The commonest types of injury are complete transections and lacerations, followed in descending manner by contusions with thrombosis and spasm which is not always discovered. Arteriovenous fistula and false aneurysm may be recognised at the time of injury or discovered few weeks after the injury. These chronic lesions are more common to occur in upper extremities. (Lozman et al., 1978).

The arterial lesions depend on the nature of the wounding agent. Arterial trauma can vary from a single, small, sharp laceration with no adjacent damage, to transection with gross and microscopic changes in