PRESENTING FEATURES AND SURGICAL OUTCOME OF POPLITEAL ARTERY TRAUMA IN A CIVILIAN SET-UP

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Abstract- Popliteal artery injuries are mainly seen in military experience. This study was undertaken in a civilian vascular surgical unit with a large trauma workload dealing with traffic accidents. A retrospective review of patients treated between 1995 and 2001 was undertaken. 145 cases of popliteal artery injuries were treated. These cases included 46.89% compound and lacerated injuries due to traffic accident, 24.82% blunt trauma and 6.20% of iatrogenic nature. Associated fractures occurred in 14 (9.65%) patients and 19.34% had popliteal vein injuries. Treatment of the arterial injury included vein graft inter-position in 101, primary reanastomosis in 28, prosthetic graft interposition in six, lateral suture in 12, vein patch in five and ligation in one. Eithy four fasciotomies were performed. No perioperative death occurred. There were 9 primary and 11 secondary amputations. Factors associated with amputation were compound and lacerated injuries, delay in revascularization in excess of 7 hours, arterial transection, associated fracture, and compartment syndrome or muscle infarction. Usually the traffic accident trauma leading to popliteal artey injuries is associated with a high amputation rate. Prompt resuscitation and revascularization appear to be the only factors that may improve limb salvage rates.

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Key Words: Vascular surgery, popliteal artery trauma, traffic accident

INTRODUCTION

It is well recognized that among peripheral vascular traumas, injury to the popliteal artery has a relatively poor outcome compared with other lower limb vessel injuries.15% of the civilian series of the patients with infra popliteal arterial injuries require amputation(1). Vascular injuries to the leg constitute 15 to 20% of battle field arterial traumas but less than 5% of reported civilian injuries. Most series of significant size contain a preponderance of injuries due to blunt trauma (2,3) or military experience in a war combat (3-8). The high rate of traffic accidents resulting in lacerated multiple injuries along with the communated and compound fractures of bones and vasccular involvement is a challenge to the vascular surgeon in the new millenium. Rapidly enlarging urbanization, increasing motor vehicles, hurried traffic in a city of third world country results in more severe traffic accidents. The present study reviews a single-center experience of popliteal artey trauma in a civilian practice and management of popliteal injuries in a university surgical hospital with a large trauma workload dealing with traffic accidents in a thickly populated area.

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MATERIALS AND METHODS

Patients with blunt trauma and accidental wounds and the patients with clinically obvious arterial injuries managed during the five years interval between 1995 and 2001 were included in this retrospective study. Information on vital status and demography of the cases was extracted from the medical files. All cases were regularly monitored in hospital and in our postoperative clinic. The variables studied included age, clinical presentation, type of injury, type of surgery, operation time, blood loss, and immediate and late complications. Statistical analysis was performed using statistical package for social sciences. Surgical technique: The patients with vascular trauma were taken to the operating theatre without preliminary angiography. Direct angiography was performed on table before exploration when the level of injury was uncertain. Where vascular injury was suspected but not obvious and no limb threat existed, formal angiography was performed in the radiography suite. The medial approach to the popliteal artery was preferred where surgery was necessary. Rapid control and wide exposure was

afforded by division of the pes anserinus, which was reattached to the periosteum overlying the tibial condyle at the end of the procedure. Heparin was instilled locally and no patient received systemic anticoagulation. Arterial repair was performed according to standard practice. Fasciotomy was the initial procedure in patients with clinical evidence of compartment syndrome. This assessment was made clinically, on the basis of increased muscle turgor; compartment pressures were not measured. Primary amputation was performed where muscle infarction in more than two calf compartments was found.

RESULTS

One hundred forty five patients included in this study. Men accounted for 113 patients (78 per cent). They were generally young and otherwise fit, with a median age of 38.2 years. Only 24 patients had surgery within 6 hours of sustaining the wound. Etiology of the popliteal artery trauma has been shown in Table 1. Traffic accident caused the wounds in 68 patients (47.5 per cent), Nine injuries (6.21%) arose from iatrogenic wounds, 36 (24.82%) from penetrating devices and 22 (15.18%) from blunt trauma. The type of injury was transection of the artery in 86 patients (59.3%), lateral perforation in 26 (17.86%), thrombosis due to proximity percussion injury in ten (7%), spasm in three (2.61%) and unknown in three (2.61%). 28 patients (19.34 percent) had associated venous injuries. There were associated fractures in 14 patients (9.65%). Twoelve patients (8.27%) were documented to have tibial nerve injuries (Table 2). Operative techniques applied in these cases have been listed in Table 3.

There was no perioperative death.Complications appeared in some patients and are listed in Table 4.

The early arterial /graft occlusion rate (within 24 hours) was 7.58 per cent.

Persistent foot-drop was arrtibuted to primary nerve injury in one patient and to the late effects of compartment syndrome in another one (0.67 %). There were 9 primary and 11 secondary amputations, giving an overall total of 20 amputations. Indications, were graft occlusion with a non-viable leg, dead muscle despite patent arterial repair and insensate leg after nerve injury. Traffic accident injuries were associated with a higher amputation rate than blunt trauma (P=0.006) or iatrogenic (P=0.09) wounds. Increasing delay was associated with a poor outcome, with statistical significance being reached at 7 hours.

Table 1. Etiology of vascular injury

	n	%
Traffic accident	68	46.89%
Penetrating device	36	24.83%
Blunt trauma	22	15.18%
Gun shot	10	6.89%
Iatrogenic cause	9	6.21%

Table 2. Surgical pathology of wound

	n	%
Transection	86	59.3%
Partial laceration	36	24.83%
Psuedo aneurysm	36	24.83%
A-V fistula	22	15.18%
Popliteal vein injury	28	19.34%
Nerve injury	12	8.27%
Associated fracture	14	9.65%

Some cases had more than one lesions

Table 3. Operative techniques*

	n	%
Autogenous saphenous vein grafts	101	69.6%
Resection & end to end anastomosis	14	9.65%
Synthetic grafts insertion	6	4.13%
Lateral repair	12	8.27%
Ligation	22	15.18%

In some cases more than one operation was required

Table 4. Complications

	n (%)
Graft occlusion	11 (7.58%)
Muscle necrosis	9 (6.21%)
Superfical sepsis	4 (2.75%)
Foot drop	1 (0.67%)
Primary Amputation	9 (6.21%)
Secondary Amputation	11 (7.58%)

DISCUSSION

Popliteal artery trauma remains a challenge for the vascular surgeons, and results in a disproportionate rate of leg loss or dysfunction. Most series of studies regarding popliteal artery trauma originate from the military sector (5-8). The present study reports popliteal artey injury along with the lower limb trauma in a civilian set up caused by the traffic accident. The need for surgical exploration of penetrating wounds of the popliteal fossa with clear evidence of vascular trauma is widely recognized.

Controversy exists regarding the management of patients with penetrating proximity extremity trauma and no signs of arterial injury (8). Angiography prior to surgery has been routine in many surgical units. The yield from routine angiography varies between 8 percent (9) to 24% (10), reflecting differences in the definition of proximity and in the policy regarding management of patients with an abnormal angiogram. Preliminiary angiography (usualy direct angiography in the operating room) was performed when multiple potential sites of injury were present, such as multiple traffic accident wounds or iatrogenic injuries. Formal angiography was reserved for patients with'soft' signs, such as non-pulsatile haematoma or a history of transient pulse deficit. Autogenous saphenous vein grafts were required in 101 cases while 6 patients needed prosthetic graft insertion.Similar study in England also suggested that the procedure of choice for popliteal artery trauma was repair without prosthetic grafts (11). Based on an analysis of pooled experience derived from the Vietnam vascular registry, Rich et al. (12) have advocated an aggressive opproach towards venous repair. The place of fasciotomy in the management of lower extremity vascular trauma continues to evoke debate. Several authors credit liberal and extensive fasciotomy as a major factor contributing to the successful management of popliteal injury (13). In contrast, Abouezzi et al (l4) reappraised the indications for fasciotomy and concluded that neither combined vascular injury nor the need for venous ligation necessitated fasciotomy. However, the indication for fasciotomy is recognized as being greatest after popliteal vessel trauma. Results of the present study suggested that there was no need for fasciotomy in popliteal artery trauma. Where injures required multidisciplinary involvement, priority was awarded to revascularization. Orthopaedic manipulation or fixation may then follow in an unhurried fashion (15). Temporary arterial shunting has been advocated for complex injuries for which fracture fixation or extensive debridement is indicated (13,16). We conclude that deficiencies in primary health care provision and interhospital transport create a situation analogous to that of a military conflict. Definitive management is often delayed. The importance of prolonged ischemia as a significant risk factor for limb loss must be emphasized. Most factors associated with amputation were related to the severity of the initial injury or degree of ischemia. Finidings in the present study regarding types of wounds associated with the popliteal artey injury and complications were similar to those published previously (4, 5), as well as recent experiences reported from Serbian (8) and Turkish study (17). Prompt resuscitation and revascularization surgery appear to be the only correctable factors that may improve the rate of limb salvage.

Contributors

M. A. Mohammadzade has operated the cases and planned the study.

M H Akbar carried out the analysis and wrote the paper. M Mohammadzade is the main author and will act as guarantor for the paper.

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