



THE ANALYSIS OF DELAYED PRESENTATION OF EXTREMITY FRACTURES WITH ARTERIAL INJURY FROM RURAL INDIA: A RETROSPECTIVE STUDY.

Orthopaedics

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ABSTRACT

Extremity fractures with arterial injury from rural population is an unsolved problem as 6 hrs. ischemia time is considered critical for revascularization procedures. This retrospective study of 10 such patients presenting delayed after 6 hrs. of trauma are analyzed. Outcome assessed are limb survival and amputation. This study found that 2 out of 8 lower limb injuries needed amputation while both of 2 upper extremity injuries survived. This study indicate that there is need to create awareness about this problem at rural population to avoid amputation and improve quality of life.

KEYWORDS

Extremity fracture, Arterial injury, Delayed presentation.

INTRODUCTION

Extremity fractures with arterial injury from rural population is an unsolved problem as 6 hrs. ischemia time is considered critical for revascularization procedures. Gustilo Anderson Gr III C fractures are associated with vascular injury. Vessels and nerves accompany each other in neuro vascular bundle. Arterial injuries when present in association of fracture creates a havoc in oncall team because of 6 hrs golden concept. In contrast Isolated Nerve injury in association with fracture, time can be bought as time needed to confirm whether its neuropraxia or neurontemesis or axontemesis.

Extremity fractures with vessel injury is first attended by orthopedic team at A & E department. Plastic surgery or CVTS oncall may not always immediately available in A and E dept. due to limited availability of super specialisation services in developing contries.

There are no studies in literature analysing the delayed presentation of extremity fracture with arterial injury. In developing countries like India, it's not uncommon especially patients from rural areas to present late. Hence this study was done.

Review Of Literature

Sher 1975(Sher, 1975), concluded that the clinical recognition of the associated vascular injury and its verification by arteriography, Doppler study or surgical exploration resulted in early vascular repair and limb salvage. Results with the injuries seen justify the principle of bone stabilization followed by vascular repair, particularly since a team effort resulted in little time lost prior to circulatory restoration.

Gustilo et al 1984(Gustilo et al., 1984), concluded that Grade IIIB and C had high incidence of wound infection and amputation.

Ashworth et al. 1988 (Ashworth et al., 1988) in lower extremity vascular trauma, concluded that out of 37 vascular injuries, 22 arterial injuries were repaired, majority by saphenous vein bypass, 3 tibial vessels were ligated. 13 patients required fasciotomy, 9 required subsequent debridement.

While Feliciano et al 1988(feliciano et al., 1988), operated 220 patients with presumed vascular injury. Arterial repair accomplished with end to end anastomosis or insertion of graft. Venous repair done by lateral venorrhaphy, ligation or insertion of conduit.

Eren et al 1990 (Eren Ö zqen et al., 1990), in 67 cases treated for peripheral vascular injuries associated with fractures, found that the ratio of limb amputation was 13%in patients operated upon within the first 8 hours after the injury. The same ratio was 39% in cases where the surgical Intervention was delayed beyond 8 hours.

Alexander et al 1991 (Alexander et al., 1991) used comprehensive and integrated approach to vascular, orthopedic, and plastic reconstruction. Of the 32 patients studied, 1 (3.1%) died as a result of remote injury and sepsis. Amputation was required in 9 patients (28%), while 13 (56%) of the patients with limb salvage showed persistent functional or neurologic deficits. The authors favor an aggressive

approach to limb salvage with IIIC injury but recommend early amputation in the presence of significant nerve disruption.

Seligson et al (Seligson et al., 1994) found involved anatomic areas as humerus 4, forearm 10, femur 8, tibia 31, ankle 10 and foot 9. Overall (primary+ secondary) amputation rate was 41%.

Martin et al 1994 (Martin et al., 1994) treated 188 patients with lower extremity arterial trauma with vascular repair. There were 10 repair failure in postoperative period. Graft failure was associated with 8 of 23 patients in blunt trauma and always resulted in amputation while 2 failure in 165 penetrating trauma redone successfully with no amputation.

Guerrero et al 2002 (Guerrero et al., 2002) performed a retrospective review of 151 patients underwent revascularization or ligation for arterial injury. The incidence of limb loss was higher in patients who developed compartment syndrome and in those who did not receive intra- or immediately postoperative anticoagulation.

Timothy et al 2002 (Timothy McHenry et al., 2002) treated 17 lower and 10 upper extremity injuries, with a mean Mangled Extremity Severity Score of 4.1. A temporary vascular shunt was used in 13 and definitive vascular repair used in 9 patients.

Dar et al 2003 (Dar et al., 2003) in 272 popliteal artery injuries found that the patients who underwent repair more than 12 hours after sustaining injury had a significantly greater amputation rate.

Rozycki et al 2003 (Rozycki et al., 2003) concluded that the amputation rate in 65 injured extremities with blunt vascular trauma was 18%, which is at least three times that for those who sustain penetrating injury; and delays in diagnosis and treatment are uncommon in these patients with multiple injuries.

Kohli et al 2008 (Kohli & Singh, 2008) did surgical procedures consisted of end-to-end anastomosis, an interposition graft, lateral arteriorrhaphy, ligation and venous patch plasty. Good blood flow was obtained after repair in 62% patients, 26% had collateral compensation, 5 underwent primary amputation and 5 required secondary amputation.

In literature, data on delayed presentation of fracture with arterial injury is distinctly sparse.

METHODS

This is a retrospective study of 10 patients of arterial injury associated with extremity fracture presented after more than 6 hrs. of ischemic time from rural areas to urban tertiary care center.

All patients were stabilized hemodynamically, intra venous antibiotics, analgesics were started immediately. USG Doppler done in all patients of suspected arterial injury.

No documentation of venous injury in Doppler and hence no attention

paid for vein injury.

Cardiovascular and thoracic surgery (CVTS) consultation for above knee and above elbow arterial injury and distal arterial injuries are attended by Plastic surgery department for consideration of microvascular repair.

All patients were started injection Enoxaparin 60 mg subcutaneously twice a day by CVTS or Plastic surgery dept.

Patients outcome are observed as limb survival or amputation. All patients are followed up for 6 months duration.

OBSERVATIONS

Sr. No.	age	sex	Extremity fracture	Arterial injury as per arterial doppler	Intervention and status of limb	Mode of injury
1	38	M	Right Shaft of Humerus	Brachial, radial, ulnar Artery	Rush pin for humerus, limb survived	RSA
2	22	M	Left proximal tibia	Distal popliteal artery	A/K slab followed by percutaneous C.C. screws, limb survived with malunion tibia	RSA
3	60	M	Left proximal both bones leg	Popliteal artery	A/K amputation after demarcation	RSA
4	40	M	Left comminuted open both bones leg	ATA, PTA	Wound debridement, ext. fix. application, limb survived	RSA
5	27	M	Right talo-navicular dislocation	Dorsalis pedis artery	Closed reduction of dislocation and ext fixator, limb survived	RSA
6	33	M	Right shaft of femur, tibial plateau lat. condyle and patella	ATA, PTA	Open Nailing for femur, 6.5 cc screws for lateral tibial condyle, TBW for patella , limb survived	RSA
7	35	M	Left Shaft of humerus and left both bones forearm	Brachial artery	Rush pin for humerus, square nailing for bbfa, saphenous vein bypass after 2 weeks by CVTS team, limb survived with little finger gangrene and amputation	RSA
8	25	M	Right both bones mid leg with right 2,4,5 MT shaft	ATA, PTA	Initial external fixator and k wire fixation Secondary b/k amputation	Fall from height
9	34	M	Left proximal both bones leg	ATA, DPA	External fixator application, limb survived	RSA
10	60	F	Left distal both bones leg	ATA	External fixator application, limb survived	RSA

RESULTS

Out of 10 patients, 9 were males while 1 female. All are blunt injury with RSA as main mode of injury. There were 2 upper limb whereas 8 lower limb injuries. Two pts had secondary amputation, one secondary partial amputation, and rest 7 limbs fully survived. Out of 7, one required prolonged wound care with wound coverage later.

No patient had compartment syndrome and no patient underwent fasciotomy.

One patient underwent saphenous bypass procedure 2 weeks after injury.

Two patients with amputation rehabilitated with appropriate prosthesis.

DISCUSSION

Delayed presentation of vascular injury with extremity fracture is common in India where patients are referred from rural areas to tertiary care center. But no study in literature have given detail attention towards this group of patients.

In such patients more than 6 hrs. ischemia time is usually present. Six hrs. is ischemia time beyond that revascularization option is not considered by vascular surgeons.

This study is retrospective study of 10 patients referred from rural area to tertiary center. Because of many reasons ischemia time is more than 6 hrs. by the time patient reach tertiary center. But observation of this study indicate that only 2 out of 10 patients needed amputation. This rate is comparable to other studies which considered vascular repair.

Compared to other similar studies, this study did not found any clinically evident compartment syndrome. Author believe that fasciotomy after 48 hrs. increase chance of infection and wound healing problems as necrosed muscles are exposed to external environment.

All patients in this study had blunt traumatic injury as mode of injury mostly involved in road side accidents, while one patient had fall from height. Literature suggests Blunt injury associated with poor prognosis compared to penetrating injury and results are comparable to other similar studies.

Anticoagulation started after CVTS/ Plastic surgery consultation in all patients. Literature suggest better results in anticoagulated patients though studies have involved revascularization procedure.

conclude the study significantly.

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Large sample size is needed and longer follow up are needed to