



POST TRAUMATIC FEMORAL ARTERY INJURIES - A RETROSPECTIVE CLINICAL STUDY OF SURGICAL MANAGEMENT & OUTCOME ANALYSIS

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ABSTRACT **Aim & Objectives:** To study and analyse the outcome of femoral artery injuries that were managed after presenting to the hospital. The outcome was analysed based on the duration of ischaemia, level of femoral artery injury, presence of other trauma, use of vein graft and presence of medical co morbidities. **Material & Methods:** Over a period of four years, ten cases of femoral artery injuries of varied aetiology and were managed primarily by the same surgical team were included. Most common cause was road traffic accident, most common associated injury was fracture of the femur and most common site of injury was middle third of the femoral artery. The duration of ischaemia was from 2 to 14 hours and vein graft was used in five cases. The follow up period was from one to four months. **Results:** Seven limbs were salvaged successfully. Primary above knee amputation was done in one case and secondary above knee amputation was done in two patients. One patient in whom the limb was salvaged initially underwent trans metatarsal amputation after three months due to gangrene of toes. **Conclusion:** Favorable outcome was seen with lower ischaemia time, younger age and with proximally located femoral artery injuries. Unfavorable outcome was noted with longer ischaemia time, older age and with distally located femoral artery injuries. Presence of other major trauma influenced the outcome in only one case. Medical comorbid conditions, associated fracture of the femur and type of repair [Primary vs vein graft] did not have any effect on the outcome.

KEYWORDS : Femoral Artery; Arterial Injury; Vein Grafting; Primary Arterial Repair; Lower Limb Injury

INTRODUCTION

Femoral artery injuries are major surgical emergencies which require immediate surgical intervention. They can occur alone or along with other injuries and delay in intervention might endanger the involved limb or sometimes the life of the injured person. The surgical intervention could range from arteriotomy & clot removal, direct arterial repair, use of vein graft [natural / synthetic] depending on the severity of damage and general condition of the patient.

MATERIAL & METHODS

Over a period of four years [2022 – 2025], ten cases of femoral artery injuries of varied aetiology which were managed primarily by the same

Table – 1 General Details of the Patients

Case No	Age in years	Sex	Side	Cause	Segment	Ischemia time in Hours	Medical comorbidity	Smoking	Procedure done	Concomittant procedure
1	55	M	L	RTA	M	4	Diabetes	None	Vein grafting	None
2	65	M	L	RTA	D	10	IHD	None	Artery repair	Fasciotomy + Femur # fixation
3	2	M	L	DOMESTIC	P	2	None	None	Artery repair	Femur # fixation
4	22	M	R	RTA	M	5	None	None	Primary AK amputation	None
5	29	M	R	RTA	M	8	None	Yes	Vein grafting	Femur # fixation
6	32	M	L	RTA	D	14	None	Yes	Vein grafting	Fasciotomy
7	35	M	L	RTA	M	12	None	None	Vein grafting	Fasciotomy
8	63	M	L	RTA	D	12	Diabetes	None	Vein grafting	None
9	30	M	L	RTA	M	8	None	Yes	Artery repair	None
10	22	F	R	RTA	P	2	None	None	Artery repair	Fasciotomy

RESULTS

Seven limbs were salvaged successfully. Primary above knee amputation was done in one case and secondary above knee amputation was done in two cases. One patient in whom the limb was salvaged initially underwent trans metatarsal amputation after three months due to gangrene of toes was considered as favorable outcome as the patient was able to walk on his own.

Case Scenario

A 35 years old male had a road traffic accident following which he

surgical team were included [Table – 1]. Most common cause was road traffic accident, most common associated injury was fracture of the femur [4 cases] and most common site of injury was middle third of the femoral artery [5 cases]. Out of the four cases presented with fracture femur one patient underwent primary above knee amputation and the remaining were managed with external fixation. The duration of ischaemia was from 2 to 14 hours and vein graft was used in five cases. Fasciotomy of the distal limb was done in four cases. The follow up period was from one to four months. In cases presenting with open wounds in the thigh, absence of distal pulses was significant enough to suspect femoral artery injury and CT angiogram was done only in patients with closed trauma with absence of distal pulses [3 cases].

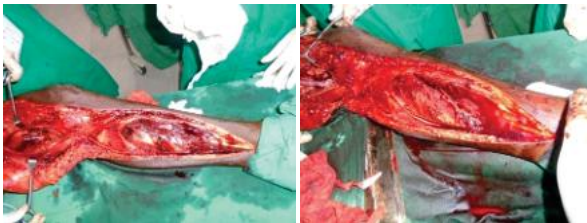
had dislocation of the left knee joint which was reduced successfully under intravenous sedation. After ten hours, the patient complained of limb swelling and pain. On examination, the limb was cold and the distal pulses were absent. CT angiogram of the limb was suggestive of occlusion of the distal femoral artery with minimal distal enhancement and clinically the limb was ischemic with suspected compartment syndrome of the leg. Fasciotomy of the left leg was done prior to revascularization in order to reduce the compartment pressure and thereby preventing ischemic injury of the leg muscles.



On exploration, the injured segment of 12cm was identified involving the distal third of the left femoral artery. The clot was removed followed by examination of the luminal viability. As the entire injured segment was found not viable, it was excised and replaced with a reversed long saphenous vein graft, following which the distal flow was restored.



The distal limb muscles especially of the leg were well vascularised after vascular repair as it can be seen from the clinical pictures taken before and after revascularization.



DISCUSSION

Peripheral vascular injuries account for 2-3 % of limb injuries and femoral artery injuries comprise 20 – 72 % of these peripheral arterial injuries.¹ Femoral artery injuries are major surgical emergencies which require immediate surgical intervention. They can occur alone or along with other injuries and delay in intervention might endanger the involved limb or sometimes the life of the injured person. The common causes of femoral artery injury are road traffic accidents, penetrating injury from sharp objects, gunshot wounds and less commonly from iatrogenic injuries. Pathologically, the underlying cause of distal limb ischaemia could be occlusion of the arterial lumen due to clotting, partial rupture / tear of the arterial wall causing an expanding or pulsating hematoma or complete transection of the vessel wall. The diagnosis of femoral artery injury can be made from the presence of hard or soft signs of arterial injury.² The hard signs of arterial injury are decreased or absent distal pulse, active arterial bleeding, expanding or pulsatile hematoma and presence of a thrill or bruit at the site of injury. The soft signs of arterial injury are proximity to the site of injury and non pulsatile hematoma. While presence of soft signs call for investigations such as angiogram or doppler ultrasonography to confirm the severity, presence of hard signs call for immediate intervention in the operating room. The surgical intervention could range from arteriotomy & clot removal, direct arterial repair, use of vein graft [natural / synthetic] depending on the severity of damage and general condition of the patient.

In this study, a series of ten cases that presented to the unit over a period of four years due to varied aetiology and was managed surgically were retrospectively studied and the results are analysed and presented [Table – 2]. Concomitant procedures such as Fasciotomy³ and fixation of the femur fracture did not alter the outcome in our study.

Table – 2 Outcome Analysis

Case No	Complications	Outcome	Concomitant procedure
1	Nil	Viable	None

2	Recurrent Thrombosis	Above knee amputation	Fasciotomy + Femur # fixation
3	Nil	Viable	Femur # fixation
4	Not salvageable	Primary above knee amputation 4	None
5	Wound infection	Viable	Femur # fixation
6	Infection	Above knee amputation	Fasciotomy
7	Nil	Viable	Fasciotomy
8	Toe gangrene after 3 months	Trans metatarsal amputation	None
9	Nil	Viable	None
10	Nil	Viable	Fasciotomy

Favorable outcome^{4,5} was seen with lower ischaemia time, younger age and with proximally located femoral artery injuries [Table – 3].

Table – 3 Analysis of Favorable Results

Age in years	Segment	Ischemia time in hours	Repair type	Other trauma	Complications	Additional surgeries
55	Middle	4	Vein graft	Nil	Nil	Skin grafting
2	Proximal	2	Direct repair	Nil	Nil	Nil
29	Middle	8	Vein graft	# Femur, Tibia & Humerus	Wound infection	Nil
35	Middle	12	Vein graft	Nil	Nil	Skin grafting
30	Middle	8	Direct repair	# Femur	Nil	Nil
22	Proximal	2	Direct repair	40% Burns	Burn infection	Skin grafting
63	Distal	12	Vein graft	Nil	Gangrene of toes	Trans metatarsal amputation

Unfavorable outcome was noted with longer ischaemia time, older age and with distally located femoral artery injuries.^{4,5} Presence of other major trauma influenced the outcome in only one case. Medical comorbid conditions, associated fracture of the femur and type of repair [Primary repair vs vein graft] did not have any effect on the outcome [Table – 4].

Table – 4 Analysis of Unfavorable Results

No	Age	Segment	Ischaemia time in hours	Repair type	Other trauma	Complications	Additional surgeries
1	65	D	10	Artery repair	Nil	Recurrent arterial thrombosis	AK Amputation
2	22	M	5	Primary AK amputation	# Femur, both bones of leg, Extensive soft tissue injury	Nil	Nil
3	32	D	14	Vein graft	# Tibia	Wound infection	AK Amputation

CONCLUSION

To conclude, in this study, favorable outcomes with repair of the injured femoral artery were noted in younger individuals, with short ischemia time and in injuries involving the proximal and middle segments of the femoral artery. Unfavorable outcomes were noted in older age groups, long ischemia time and in injuries involving the distal parts of the femoral artery [Table – 5]. However we would like to acknowledge the limitations of the this study are 1.Lower volume of cases & 2. Lower duration of follow up compared to similar type of studies.

Table – 5 Comparison of Analytical Data

Results	Ischaemia time	Age of patient	Level of injury
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Favourable	Avg – 6 hours	Avg – 28.83 years	Proximal & middle third
Unfavourable	Avg – 10 hours	Avg – 48 years	Lower third

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