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### RESEARCH ARTICLE

#### EXTREMITY VASCULAR INJURIES – A PROSPECTIVE STUDY.

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##### Keywords:-

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#### Abstract

**Introduction:** Extremity vascular trauma is common in civilian population following RTA. The aim of this study is to evaluate the results following intervention in extremity vascular trauma cases admitted in Rajiv Gandhi Government General Hospital, Chennai, during period 1<sup>st</sup> July 2016 to 31<sup>st</sup> June 2018.

**Method Of Study:** Prospective study

**Results:** Of 94 cases, Commonly injured artery was popliteal artery (31.9%). Most of the cases were treated with interposition vein bypass (88.29%) and remaining with primary repair (6.38%), ligation (4.25%) and thrombectomy (1.06%). Failure following repair was 6.66%. Limb salvage rate was 96.8%.

**Conclusion:** Early intervention with interposition vein bypass with proper technique and proper case selection with adequate fasciotomy and wound care yield better results.

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#### Introduction:-

Extremity vascular injuries account for 40 to 75% of vascular injuries treated in civilian trauma centers. Their management is specially challenging due to associated soft tissue injury, orthopedic trauma, nerve damage and contamination. The clinical diagnosis of extremity vascular trauma is classically associated with diligent search for hard and soft signs<sup>(3)</sup>. Hard signs are an absolute indication for vascular exploration where as soft signs are an indication for angiography. The reported amputation rate following isolated limb arterial injuries is 4% where as in combined injuries is as high as 61%.

#### Materials and methods:-

Over a two year period, 94 patients with extremity vascular trauma were prospectively studied.

##### Inclusion criteria:-

All patients with Extremity vascular injuries with or without associated orthopedic and soft tissue injuries with salvageable limb.

##### Exclusion criteria:-

1. Associated head injuries or major injuries to abdomen necessitating urgent attention first.
2. Non-salvageable limb (with major tissue loss/mangled limbs).

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Diagnosis was made mainly on clinical basis. Preoperative hand held Doppler examination was routinely performed, while angiography was reserved for hemodynamically stable patients with doubtful diagnosis, provided no further delay was incurred. All acute injuries were initially treated with local hemostasis, iv fluids, blood transfusion, tetanus prophylaxis and antibiotic therapy followed by urgent exploration. Definitive management was carried out in collaboration with orthopedic and plastic surgeon. Primary amputation was excluded from the study.

### Results:-

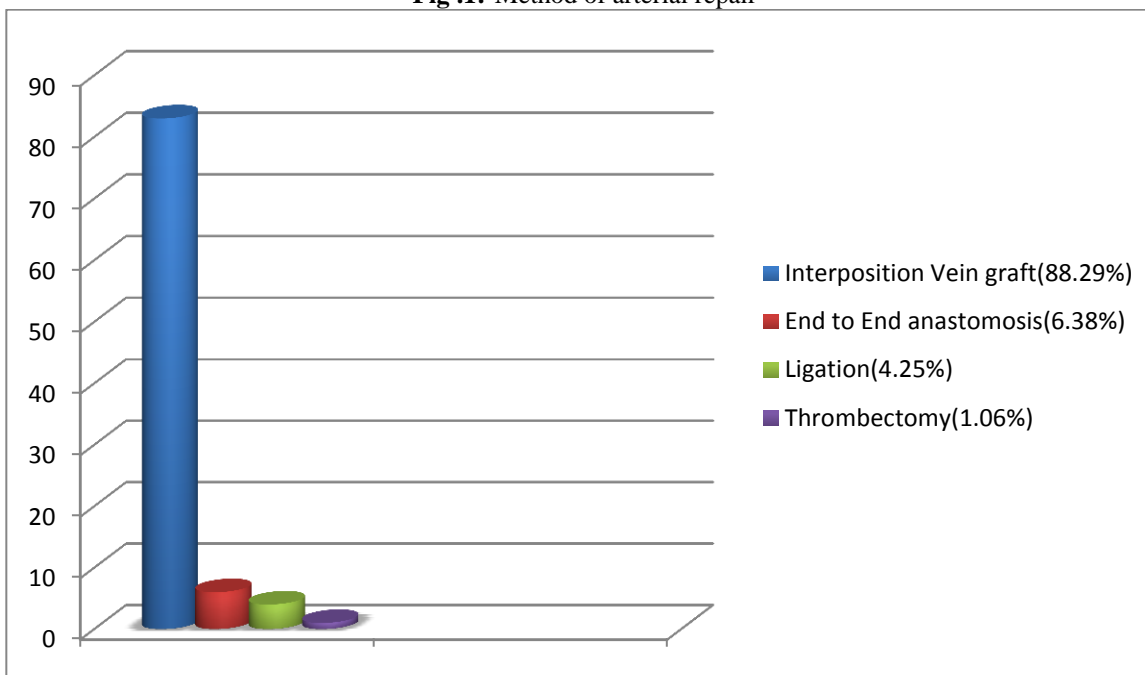
**Table 1:-**Summary of study results

ARTERY INJURED	MODE OF INJURY	NO OF INJURIES	METHOD OF ARTERIAL REPAIR	VEIN INJURY	METHOD OF VENOUS REPAIR	BONE INJURY	NERVE INJURY	FOLLOWUP
CCA	C-1	1	IVG-1	-	-	-	-	
AA	C-1	1	IVG-1	1	V-1	-	1	
BA	B-11 C-4	15	IVG-14 THROMBECTOMY-1	6 (2 thrombosed)	L-2 <b>IVG-2</b>	10	5	Amputation-1 Failure – 1
RA	B-1 C-14	15	IVG-10 <b>E TO E-3</b> L-2	-	-	-	2	<b>Failure – 2</b>
UA	C-17	17	IVG-13 <b>E TO E-3</b> L-1	-	-	-	8	<b>Failure – 1</b>
RA+UA	C-5 B-3	8	IVG-8	-	-	1	3	
CIA	B-1	1	IVG-1	1	V-1	-	-	
CFA	B-1	1	IVG-1	1	V-1	-	-	
SFA	B-1	1	IVG-1	-	-	1	-	
<b>POP. A</b>	B-29 C-1	<b>30</b>	IVG-29 L-1(Pseudoaneurysm)	18 (9 thrombosed)	<b>IVG-2</b> L-7	24	-	Non func limb-1 Blowout -2 Amputation-2 Failure-2
TPT	B-1	1	IVG-1	-	-	1	-	
TA	C-3	3	IVG-3	3 (3 Thrombosed)	-	2	-	
<b>TOTAL</b>	B-48 C- 46	94	IVG – 83 <b>E TO E- 6</b> L -4 THROMBECTOMY-1	30 (14thrombosed )	IVG-4 V-3 L-9	<b>39</b>	<b>21</b>	Non functional limb-1 Blowout-2 Amputation-3 Failure-6

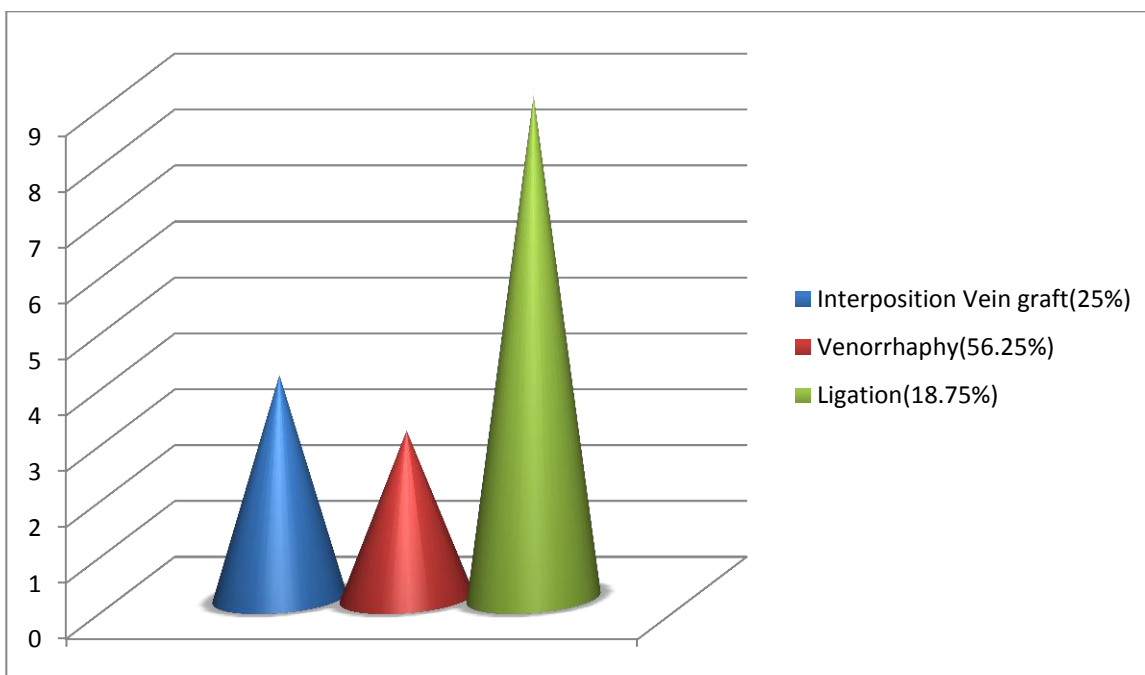
CCA- Common Carotid Artery, AA- Axillary Artery, BA- Brachial Artery, RA- Radial Artery, UA- Ulnar Artery, CIA- Common Iliac Artery, CFA- Common Femoral artery, SFA-Superficial Femoral Artery, POP.A- Popliteal

Artery, TPT- Tibio Peroneal Trunk, TA- Tibial Artery, B-Blunt injury, P-Penetrating injury, IVG –Interposition vein graft, E TO E –End to end anastomosis, L-Ligation, V-Venorrhaphy.

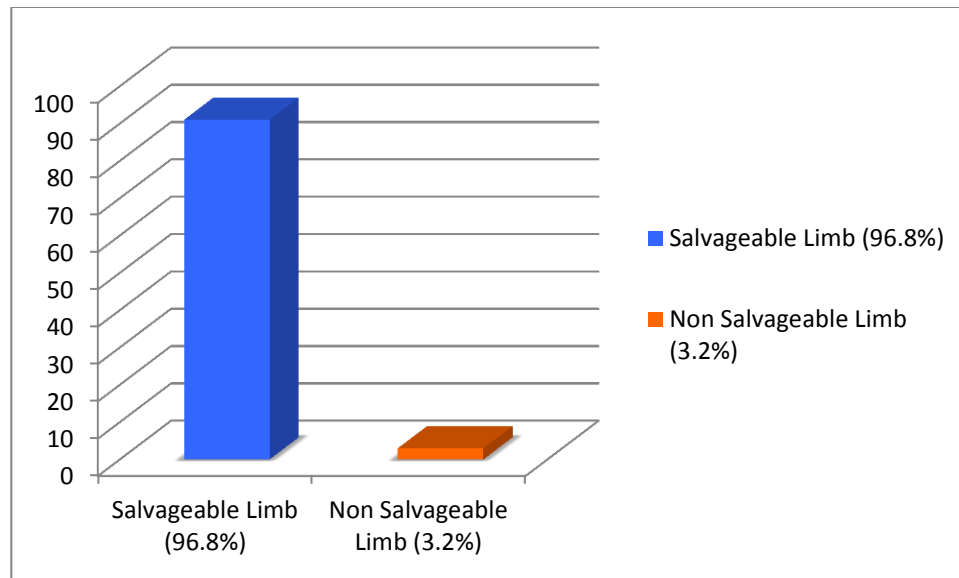
**Fig .1:-Method of arterial repair**



**Fig.2:-Method of Venous repair**



**Fig.3:-Limb salvage rate**



### Discussion:-

In our study, extremity vascular trauma is common in young males <sup>(1),(2),(4)</sup> of age 13 to 58 years with blunt injury being more common than cut injury. Commonly injured extremity was upper extremity <sup>(1)</sup> and the commonly injured artery was popliteal artery <sup>(4)</sup>. Combined injuries were seen in 55.31% of cases. The sequence of repair was vascular repair followed by fracture stabilization with external fixator<sup>(2)</sup>, nerve and soft tissue repair by plastic surgeon, except for four cases for which shunting was done first(due to unstable fracture) followed by fracture stabilization and definitive arterial repair.

Type of arterial repair included end to end anastomosis, interposition vein bypass and occasionally ligation. There was no failure following interposition vein bypass and high failure rate following end to end anastomosis. Ligation was done for 4 cases, 3 cases with one patent vessel in upper extremity, 1 case with popliteal artery pseudoaneurysm (patient was in shock). 31.9% of cases had associated vein injury. Vein injuries were repaired with inter position vein bypass, venorrhaphy and ligation. All were thrombosed after 24 to 48 hours of reconstruction which recanalised during followup (4-6 weeks).

There was no failure in early intervention <sup>(5)(6)</sup> (less than 6 hours) and 9.5% failure following late intervention (more than 6 hours). Redo bypass was done in two patients, which later ended up in amputation. Total failure following repair was 6.66% (6/90). Fasciotomy was done for patients who underwent repair for Axillary artery, brachial artery, femoral artery, popliteal artery and tibioperoneal trunk injury <sup>(1),(3),(7)</sup>.

Postoperatively patients were treated with Antiplatelets/Anticoagulants. Daily wound care was given with debridement, irrigation and dressing. Duration of hospitalization on an average was 7 to 10 days. Fasciotomy wounds which required SSG were handed over to plastic surgeon.

During follow-up, there were two blowout, three secondary amputation and 15 patients with upper limb dysfunction (related to nerve injury), one lower limb was left non functional (due to associated extensive soft tissue and nerve injury), Nil amputation rate in isolated arterial injury, 3.2% amputation rate in combined injuries. Limb salvage rate was 96.8% with nil mortality.

### Conclusion:-

Early intervention with interposition vein bypass with proper technique and proper case selection with adequate fasciotomy and wound care yield better results. In spite of thrombosis, venous reconstruction for single axial vein is advisable giving a chance for recanalization <sup>(1),(2)</sup>.

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