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RESEARCH ARTICLE

BRACHIAL ARTERY REPAIR IN TRAUMA PATIENTS - OUTCOME ANALYSIS

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Abstract

Introduction: RTA occurs commonly in young adults, so polytrauma including vascular injury is commonly managed in our institution, and this study is to analyse the outcomes of brachial artery injury repair.

Methods: This is a prospective study from August 2015 to May 2018. All patients admitted with upper limb vascular trauma with brachial artery injury (n=27) included in our study.

Results: Though graft thrombosis or anastomotic thrombosis seen in two patients, on 3rd or 4th post-operative day, the limb salvage rate is 100% in our study.

Conclusion: Since brachial artery injury commonly occurs in young individuals, timely intervention saves the upper limb in most cases so that they can do their work, which is essential for their family because they are the breadwinners of the family.

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Introduction:-

RTA occurs commonly in young adults, so polytrauma including vascular injury is commonly managed in our institution, as we have renowned Plastic surgery and Hand Reconstructive Surgery Department in our Hospital and this study is to analyse the outcomes of Brachial artery injury repair.

Materials & Methods:-

This is a prospective study from August 2015 to May 2018, and it is an ongoing study. All patients admitted with upper limb vascular trauma and Brachial artery Repair done were included in our study. Those Patients whose limbs were completely mangled and were unable to reconstruct by our Plastic surgery team, undergone primary amputation as a life saving measure are not included in this study. Most of our patients in the age group of 15 to 45 years (20 patients, 20/27=74%), more than 45 years 3 patients (3/27=11%) and less than 14 years 4 patients (4/27=15%). There are 23 male patients (23/27=85%) and 4 female patients (4/27=15%).

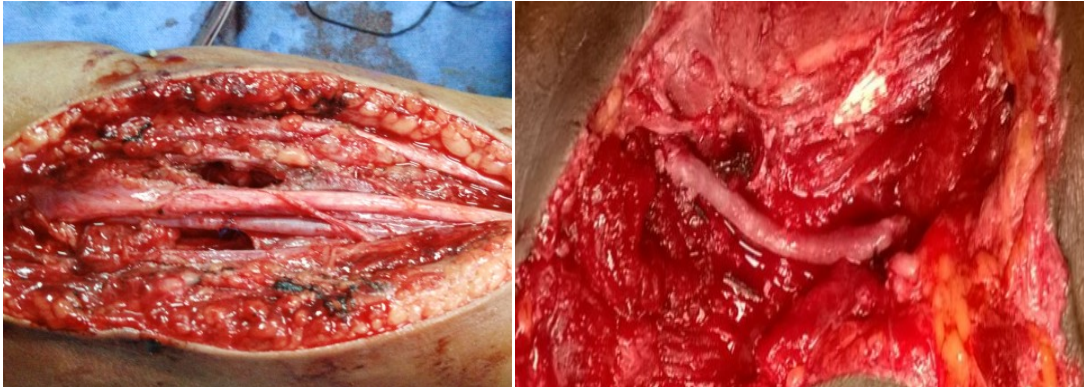
RTA is the main mode of the injury in 20 patients (20/27=74%) followed by machinery injury in 4 patients (4/27=15%) and history of fall (3/27=11%). The blunt type of injury in 18 patients (18/27=67%) and penetrating type of injury in 9 patients (9/27=33%). 22 patients presented after 6 hours (22/27=81%) and 5 patients presented within 6 hours (5/27=19%). Associated bony injuries were seen in 16 patients (16/27=60%), muscles and venous injuries were seen in all patients (100%), nerve injuries seen in 10 patients (10/27=37%) and skin loss associated in 7 patients (7/27=26%). Isolated brachial artery injury was seen in 22 patients (22/27=81%), combined brachial and radial artery injury was seen in 3 patients (3/27=11%), brachial and ulnar artery injury in 2 patients (2/27=8%).

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Most of the patients are in younger age group, so no comorbidities in most of the patients, only two patients whose age were 47 and 51 had Diabetes Mellitus. Our patients were evaluated by clinical examination (Hard and Soft signs) and using Hand Held Doppler. Hand held Doppler was our main tool and we have not done CT angiogram in the emergency situations. Using Hand held Doppler, no flow was seen in 4 patients (4/27=15%), wrist pressure less than 50 mmHg seen in 20 patients (20/27=74%) and wrist pressure more than 50 mmHg in 3 patients (3/27=11%).

In all patients we used Reverse Saphenous Vein as conduit, if interposition graft or extra anatomical bypass planned. Synthetic grafts were not used to prevent infection. Interposition Reverse Vein Saphenous graft were done in 21 patients (24/27=89%), primary end to end anastomosis done in 3 patients when the defect was less than 2 centimeters (3/27=11%) and extra anatomical bypass using Reverse Saphenous Vein in 3 patients in severely crushed limbs where anatomical bypass not feasible (3/27=11%).



Brachial artery repair figure 1 – end to end anastomosis, figure 2 interposition reverse saphenous vein graft



Extra anatomical bypass figure 3 and figure 4.

We did fasciotomies in most of patients, for those who had no flow status and those who were presented after 12 hours. We did skin cover by relaxing incisions, and Split Skin Graft primarily or secondarily.



Skin cover with primary Split Skin Graft after Brachial Artery Repair - figure 5 and figure 6.

Results And Discussion:-

1. Limb salvaged in all patients (100%)
2. Graft thrombosis (3rd & 4th day) 2 patients (1 patient severely crushed limb, 1 patient chronic smoking and one patient with Diabetic Mellitus).
3. Wound infections occurred in many patients, which was mostly minor, treated with appropriate antibiotics and dressings.
4. Blow out happened in one patient, brachial artery ligated on 5th pod, even then the limb was salvaged.

Literature Review:-**Table 1:-**

Author	Period	Centre	No. of patient	Blunt	Penetrating	Follow up	Limb salvage
Fitridge	1994	Adelaide	114	46%	54%	14 months	86%
Wali	1996-2001	Saudi arabia	27	-	-	-	96%
Van dersluis	1997	Toronto	25	76%	24%	24 months	100%
Manor D	1998	New orleans	46	39%	61%	43 months	98%
Brown	2001	Milwaukee	71	30%	70%	6 months	94%
Toepel	2009	Regensburg	33	30%	70%	42 months	98%
Klocker	2014	Innsbruck	108	80%	20%	63 months	98%
Ours	2017	Chennai	27	67%	33%	10 months	100%

Most of our patients were presented more than 6 hrs of injury, arterial repair done first, followed by fracture stabilisation and nerve repair later by orthopedic surgeon and plastic surgeon.

We are using Hand Held Doppler only in determining the procedure. We haven't used Colour Doppler or CT Angiogram in emergency settings. We have ligated the veins in case of venous injury, we didn't repair veins, it doesn't affect limb salvage. Faciotomy done in majority of cases (> 6 hr, associated venous injury). If both radial and ulnar artery injured with brachial artery we repair both, because palmar arch integrity couldn't be assessed pre operatively. If one artery (either radial or ulnar) injured with brachial artery and palmar arch intact, we repair brachial artery and then we ligate the injured forearm vessel, if palmar arch incomplete we repair the injured forearm artery along with brachial artery repair.

Though graft thrombosis was seen in 2 patients, limb was salvaged. One patient was in younger age, severely crushed upper limb from mid arm but hand viable and brachial artery injured proximal to profunda brachii, we did extra anatomical bypass from axillary artery to distal brachial artery, graft thrombosis occurred in 4th day at distal anastomosis and we did extension bypass to radial artery, that was also thrombosed in next two days, but he has developed collateral flow in posterior interosseous artery, and limb salvaged. Another patient, aged more than 45 years, whose injury was beyond profunda brachii, had wrist pressure more than 50mmHg, smoker and uncontrolled Diabetic, graft was thrombosed on 3rd day, but the limb was salvaged. With all these efforts we achieved high limb salvage rate comparable to others, in our institution.

Conclusion:-

Since upper limb vascular trauma with brachial artery injury commonly occurs in young individuals Brachial Artery Repair along with Orthopedic and Plastic Surgery management saves the upper limb in most cases in our institution, so that they can do their works which is essential for their family because they are the breadwinners of the family.

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