International Journal Dental and Medical Sciences Research
Volume 5, Issue 1, Jan-Feb 2023 pp 288-290 www.ijdmsrjournal.com ISSN: 2582-6018

Late Revascularisation And Limb Salvage In Traumatic Upper Limb Injuries – Our Centre Experience.

Dr Soumya Agrawal, Dr. Harishankar Singh , Dr. Anand Gautam, Dr Arun Bhatnagar, Dr. Ashish Luthra

MCh Resident Dept of Burns and Plastic surgery GMC Bhopal 9579892855 email- som4539@gmail.com
Asst Professor Dept of Burns and Plastic surgery GMC Bhopal
Professor Dept of Burns and Plastic surgery GMC Bhopal
Professor and Head Dept of Burns and Plastic surgery GMC Bhopal
Resident Dept of Burns and Plastic surgery GMC Bhopal

Submitted:17-01-2023 Accepted: 30-01-2023

ABSTRACT
Traumatic brachial artery injuries are very common in the developing world owing to their vulnerable location in cubital fossa and since brachial artery is the major vascular supply for upper limb its repair if not done can lead to devastating ischemic complications sometimes even loss of limb. Usually, warm ischemia muscle time of 6 hours is advisable for repair but in the developing world due to deficiencies in transportation and less number of equipped centres such injuries present late to the tertiary centres. Here we present our experience as a tertiary care centre in management of brachial artery injuries presenting late to our centre. 10 cases were operated in the period 2021-2022, all the cases were operated for brachial artery repair after 6 hours of injury either by direct repair or by reverse interposition saphenous vein grafts, all the 10 cases had complete limb salvage with return of peripheral circulations and with no post operative complications. We conclude that irrespective of the ischemia time such injuries should be explored and brachial artery repair should be done to prevent chronic ischemic complications and for functional limb survival.
Keywords- Brachial artery, trauma, cubital fossa, ischemia time, reverse interposition saphenous vein graft

I. INTRODUCTION-

Traumatic brachial artery injuries constitute a relatively large proportion of peripheral arterial injuries[2]. Most commonly area being vulnerable cubital fossa and supra condylar region. Specially in the developing world occupational accidents, assault by hard and sharp objects, high velocity crush injuries of the limb mostly in road traffic accidents are common causes of such injuries. Brachial artery being the major vascular supply of upper extremity owing to its anatomical location in the superficial cubital fossa is one of the most frequently injured anatomical structure in upper extremity injuries[2]. Vascular reconstruction and repair are a mainstay for such injuries to restore blood circulation and for the salvage of distal limb. The golden time for revascularization of the extremities is considered to be within 6 to 8 h after the injury[4]. And in the developing world due to the late presentation of such injuries to a tertiary care centre usually the warm ischemia time of the muscle is lost. Owing to rich collateral circulation of the extremity, limb survival is reported in the literature even when definitive repair is not done but leads to complications such as irreversible ischemia, functional deformities and in some severe cases loss of limb and post op reperfusion injuries[3]. At our centre usually such vascular injuries present late and the warm ischemia time has already passed. We present a observational case review of brachial artery and associated structures repair with late presentation and their survival/outcome and prognosis with follow up.

Anatomy of cubital fossa& vascular supply of upper limb :

Figure 1. Arteries of forearm(Richard Drake, A. Wayne Vogl, Adam Mitchel)l. (2019). **Gray's Anatomy for Students**. (4th edition.). (Elsevier).

International Journal Dental and Medical Sciences Research
Volume 5, Issue 1, Jan-Feb 2023 pp 288-290 www.ijdmsrjournal.com ISSN: 2582-6018

II. MATERIALS AND METHODS

10 patients who presented to our centre after 6 hours of injury and underwent brachial artery repair during 2021–2022 were analysedin this study.All the patients were assessed clinically for peripheral circulation and doppler ultrasound and radiographs were used to rule out any other injuries. All the patients were operated in emergency. Demography, mode of injury, associated injury and operative findings were noted, post operative monitoring of peripheral circulation was done and if any complications was also noted, patients were followed up to assess the prognosis and final results.

III. OBSERVATIONS

Out of 10 patients included in study. 7 were males (70%) and 3 were females(30%). The mean age was 31 years (range 9–50years). Most common mode of injuries were due to occupational trauma (50%) and assault injuries due to hard and sharp objects (20%) followed by road traffic accident(10%), fall from height with associated supracondylar fracture(10%), and assault by gun shot injury with pellet impacted deep within cubital fossa(10%). Most of patients were from remote rural areas &belonged to the low socio economic group. Out of 10 patients end to end brachial artery anastomosis was done in 6 patients and reverse interposition saphenous vein grafts were done in 4 patients. All the patients had associated median nerve injury which was repaired concomitantly. 4 patients required forearm fasciotomy due to long ischemia time &risk of impeding compartment syndrome. 1 patient was operated for supracondylar humerus fracture fixation, simultaneous nerve repair was done in and 2 patients who had associated radial nerve injury and one patient who had associated sensory branch of musculocutaneous nerve injury. Primary wound closure was achieved in all the cases.2 out of 5 patients were operated within 12 hours of injury and 3 patients were operated between 48 - 72 hours. All the patients had an uneventful recovery with complete limb salvage with return of peripheral circulation. None of the cases had post operative reperfusion injury.Fasciotomy wounds were closed secondarily after 2 weeks. Avg length of stay of the patients was 10 days. Functional assessment was not done as most of the patients are lost to follow up, last follow up for 2 patients were post op 3 months which is not sufficient to assess for r neurological recovery.

Figure 2. Gun pellet injury into the cubital fossa(brachial artery repaired with reverse interposition saphenous graft along with median nerve).

Figure 3. Post crush injury brachial artery end to end repair along with median nerve repair.

Figure 4. Sharp cut injury over cubital fossa brachial artery repaired by reverse saphenous interposition vein graft and median nerve repair.

IV. DISCUSSION:-

Brachial artery being the main vascular supply of upper limb lies very superficial in the cubital fossa[1], and owing to its vulnerable location it is one of the most common injuries of upper limb trauma[2]. Loss of major vascular supply in the limb is catastrophic and can lead to loss of forearm.Though collateral circulation sometimes prevent the limb loss but leads to many chronic ischemic complications such as Volkman ischemic contracture, neurological deficits due to associated injuries and contractures[3]. With increased warm ischemia time beyond 6 hours risks and complications associated with vascular repair are increased[4]. In the developing world workplace injuries to the limb, assault injuries, and high velocity injuries to the limb are very commonand due to deficiencies in transportation and deficient health care in peripheral centres such injuries are not managed in time due to time taken in transportation and referrals usually such vascular injuries present to the tertiary care centre very late and by the time revascularisation can be done critical ischemia time has already elapsed. At our centre we noted that most of the patients present after 6 hours of injury and that most common mode of trauma is due to occupational hazards and most commonly affected being males as compared to females. All patients were operated for revascularisation irrespective of ischemia time and brachial artery repair were done along with repair of associated structures most frequently median nerve in cubital fossa[5]. All the 10 patients had complete revascularisation recovery with return of peripheral pulsations and all the patients were discharged without any complications and are now being followed up for assessment of functional recovery.Our results are consistent with the other studies related to peripheral vascular trauma and late revascularisation of extremity[6-9] and we suggest irrespective of ischemia time such injuries should be operated and revascularisation should be attempted.

V. CONCLUSION

Brachial artery is the most commonly injured artery in the upper limb and it is vital for functionality and vitality of the upper limb. Although ideal time for vascular repair is within ’6 hours’, upper limb can survive longer periods of ischemia due to rich non defined vascular inter connections and collateral circulation. Limb surviving only on collaterals and on inadequate circulation can lead to development of chronic ischemia of upper limb with VIC/ muscle fibrosis/ resting pain/ nerve deficits and functional impairment as the sequales. It is therefore necessary to establish adequate circulation in the limb through main vascular branches. We conclude that irrespective of ischemia time and golden hour concept such injuries should be explored and should be repaired for limb salvage.

REFERENCES

[1]. Bashir O, Kusel K, Bell D, et al. Arterial supply of the upper limb. Reference article, Radiopaedia.org (Accessed on 05 Jan 2023) https://doi.org/10.53347/rID-17107.
[2]. Hunt CA, Kingsley JR. Vascular injuries of the upper extremity. South Med J 2000;93:466-8.
[3]. Malcom O Perry. Complication of missed arterial injuries. J Vasc Surg. 1993;17(2): 399-407.
[4]. Andreev A, Kavrakov T, Karakolev J, Penkov P. Management of acute arterial trauma of the upper extremity. Eur J Vasc Surg 1992;6(6):593–8.
[5]. Zellweger R, Hess F, Nicol A, Omoshoro-Jones J, Kahn D, Navsaria P. An analysis of 124 surgically managed brachial artery injuries. Am J Surg 2004;188(3):240–5.
[6]. Shaw AD, Milne AA, Christie J, Jenkins AM, Murie JA, Ruckley CV. Vascular trauma of the upper limb and associated nerve injuries. Injury 1995;26(8):515–8.
[7]. Degiannis E, Levy RD, Sliwa K, Potokar T, Saadia R. Penetrating injuries of the brachial artery injury 1995;26(4): 249–52.
[8]. Orcutt MB, Levine BA, Gaskill HV, Sirinek KR. Civilian vascular trauma of the upper extremity. J Trauma 1986;26(1):63–7.
[9]. Majid Moini, Kaveh Hamedani, Mohammad R Rasouli, Mohsen Nouri. Outcome of delayed brachial artery repair in patient with traumatic brachial artery injury:. Prospective study. Int J of Surg 2008 (6):20-2.