

CASE REPORT

TRAUMATIC ISOLATED BRACHIAL ARTERY AND MEDIAN NERVE TRANSECTION IN A CHILD

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Abstract

Traumatic pediatric vascular injuries are rare and complicated. The brachial artery is more vulnerable because of its anatomy. Supracondylar fractures of the humerus followed by penetrating trauma are the common causes of such injuries. Median nerve, because of its close proximity to brachial artery, is also involved in such injuries. We present a case of isolated traumatic transection of brachial artery and median nerve in a boy managed by primary interposition grafts.

Key words: Transection, Brachial artery, Median Nerve, Graft

Introduction

Traumatic pediatric vascular injuries are rare. They present a therapeutic challenge for the surgeon. (1) These injuries are complicated because of the pediatric anatomy and physiology. (1) The vessels are small and thin-walled with poor tissue support and have a pronounced tendency for vascular spasm. (1) Additionally, the small intravascular volume is of great importance in the treatment of pediatric vascular lesions. (1) In upper extremity, brachial artery is more vulnerable to injury because of its anatomy. (1) A supracondylar fracture of the humerus is the most common upper extremity fracture in children with concurrent neurovascular complications followed by penetrating trauma. (1,2) The median nerve courses with the brachial artery throughout its length. The radial and ulnar nerves parallel portions of the brachial artery. Therefore, as in all upper extremity vascular injuries, there is a high incidence of associated nerve injuries with brachial artery injuries. (3,4) We describe a case of traumatic transection of brachial artery and median nerve in a boy managed by primary interposition grafts.

Case Report

An 8 years-old boy was admitted with history of avulsion injury to right axilla and right upper arm due to a fall from first floor of his house while playing. He was brought to the hospital within half an hour of trauma. There were no other injuries. The patient was haemodynamically stable. There was a large triangular defect of size 7 x10 cm with avulsed skin flap involving right axilla and upper half of medial side of arm. Right brachial artery was in spasm and pulsating and upper end was transected. Upper end of the median nerve was also transected. The lower ends of the artery and nerve could not be seen because of the presence of haematoma at the lower end of the wound. The affected limb was warm; distal pulsations could be felt and the sensorimotor examination was normal. The patient was resuscitated and intravenous broad spectrum antibiotics and a pain killer were administered. The wound was cleaned thoroughly with saline and dressed. Patient was taken up for immediate neurovascular reconstruction with cardiovascular and plastic surgery standby. The wound was reassessed under general anaesthesia. There was complete

transection of right brachial artery for a distance of about 5cm. The median nerve was transected with a gap of 3cm between the two ends. The brachial artery was repaired primarily with a 6cm graft taken from great saphenous vein (GSV) of left thigh. The median nerve was repaired using sural nerve graft. The wound was sutured. The shoulder was adducted and arm immobilized with elbow in 90 degrees flexion. Post-operative course was uneventful. The wound healed with minimal surgical site infection. A doppler ultrasound done after 7 days showed good triphasic arterial flow. The hand movements were normal. On three years of follow-up, the patient has remained asymptomatic.

Discussion

It is known that the elbow has extensive collateral circulation and after the application of a ligature to the brachial artery in the upper third of the arm, the circulation is carried on by branches from the humeral circumflex and subscapular arteries anastomosing with ascending branches from the profunda brachii. If the artery is tied below the origin of the profunda brachii and superior ulnar collateral, the circulation is maintained by the branches of these two arteries anastomosing with the inferior ulnar collateral, the radial and ulnar recurrentis, and the dorsal interosseous. (5) This collateral circulation may mask the signs of acute arterial injury; however, it is debatable whether this circulation is adequate. (3) Therefore, it has been recommended that all brachial artery injuries should be repaired. (3) Surgical repair of brachial artery injuries can be accomplished by a variety of techniques, including lateral repair, resection with end-to-end anastomosis, or by interposition grafting. (2-4,6) Whenever possible, end-to-end anastomosis is preferable (2,3,6) The saphenous vein interposition graft is the autograft of choice - it has better patency rates and better resistance to infection compared with synthetic grafts like polytetra-fluoroethylene (PTFE). (2,3) Kumar et al have presented brachial artery injuries in a 10 and 13-year-old successfully repaired with GSV grafts. (2,7) Goz et al. preferred GSV grafts in all pediatric peripheral injuries including brachial artery repairs. (2,8) Recently, reports describing autogenous grafts for the brachial artery injury can also be performed with the basilic vein because of its similar anatomy as the brachial artery. (2) It is advantageous as that it can be taken from the location of the injury due to its anatomical proximity to the brachial artery. (2) Endovascular techniques are being increasingly used in the management of penetrating injuries and may have some advantages even in blunt trauma. (3) They are especially ideal for managing blunt axillary artery injuries that are anatomically difficult to repair. (3)

Because of its close proximity to the brachial artery, median nerve is often also injured in such injuries. So, even after a successful arterial repair, the functional results may not be as good as expected. (3) The

rate of such functional disability ranges from 27% to 44% when injury to the upper extremity includes nerve injuries. (3,9) Such injuries therefore require special attention for nerve repair. Primary nerve repair has been recommended for penetrating trauma like lacerations and stab wounds. (3,10). However, when such injuries are associated with gunshot wounds, acute nerve repair is rarely indicated because of the degree of contusion. (3)

Thus we conclude that prompt and appropriate diagnosis of the brachial artery injuries, attention to associated neurological injuries and an effective management by early vascular repair helps in survival of the patient and salvage of the upper extremity with good function.

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References :

1. Mommsen P, Zeckey C, Hildebrand F, Frink M, Khaladj N, Lange N et al. Traumatic extremity arterial injury in children: Epidemiology, diagnostics, treatment and prognostic value of Mangled Extremity Severity Score. *J Orthop Surg Res.* 2010; 5: 25.
2. Kim HG, Bhatia M, Moore SA, Fitzwater JW, Santana D. Brachial Artery Repair Using the Basilic Vein as a Reliable Conduit in a 3-year-Old Child. *J Ped Surg Case Reports.* Article in press 2015. doi: <http://dx.doi.org/10.1016/j.epsc.2016.06.008>

3. Ekim H, Tuncer M. Management of traumatic brachial artery injuries: A report on 49 patients. *Ann Saudi Med.* 2009; 29: 105-109.
4. McCready RA. Upper-extremity vascular injuries. *Surg Clin North Am.* 1988;68:725-740.
5. Gray H. *Anatomy of the Human Body.* 20th edn. Philadelphia. Lea & Febiger. 2000. Available from www.bartleby.com/107/ [last accessed 2016 June 18].
6. Klocker J, Falkensammer J, Pellegrini L, Biebl M, Tauscher T, Fraedrich G. Repair of arterial injury after blunt trauma in the upper extremity – Immediate and long-term outcome. *Eur J Endovas Surg.* 2010;39:160-164
7. Kumar R, Trikha V, Malhrota R. A study of vascular injuries in pediatric supracondylar humeral fractures. *J Orthop Surg.* 2001; 9: 37-40
8. Goz M, Cakir O, Eren N. Peripheral Vascular Injuries Due to Firearms in Children. *Eur J Endovas Surg.* 2006; 32: 690-695.
9. Hardin WD Jr, O’Connell RC, Adinolfi MF, Kerstein MD. Traumatic arterial injuries of the upper extremity: determinants of disability. *Am J Surg.* 1985;150:266-270.
10. Nichols JS, Lillehei KO. Nerve injury associated with acute vascular trauma. *Surg Clin North Am.* 1988;68:837-852.

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