MANAGEMENT OF POSTOPERATIVE VASCULAR COMPROMISE IN SUPRACONDYLAR FRACTURE OF THE HUMERUS IN CHILDREN

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ABSTRACT

Supracondylar fracture in children is frequently associated with neurovascular complication. It constitutes an orthopaedic emergency when it is associated with vascular compromise. Vascular complication is rarely seen with open reduction and k wire fixation. We retrospectively analysed results of two patients where vascular compromise was identified clinically and by pulse oximeter after open reduction and internal fixation and managed. Thus early recognition and adequate treatment provides good prognosis. Separate anterior incision for surgical exploration of vessel is recommended to avoid posterior skin necrosis. Regional anaesthesia should be avoided in supracondylar fracture as it hampers assessment of nerve function postoperatively.

Keywords: supracondylar fracture, vascular compromise, pulse oximeter.

INTRODUCTION

Supracondylar fracture is the most common elbow fracture in children. It is associated with neurological (3% to 22%) and vascular injury (10%). There is no controversy in surgical exploration for a pulseless, cool, pale hand. The observation is recommended for pink hand with absent pulses.[1] Particularly in patients with black skin, pulse oximeter which is easily available in operation theatre may provide a valuable information regarding ischaemia of limb.

The purpose of this article is to determine the role of pulse oximeter to detect the ischaemia in the operated limb.

MATERIAL AND METHOD

We retrospectively analysed management and results of vascular compromize of two patients. A 5 year old male child presented in outdoor patient clinic with one week old Gartland type III supracondylar fracture. There was clinically no neurovascular compromise preoperatively. Child was given supraclavicular block with sedation. After failure of close reduction, fracture was opened with posterior Cambelles' approach with pneumatic tourniquet in arm and ends of fracture was cleaned and reduced and fixed with cross K wires. Wound was closed in layers and dressing was done. Pneumatic tourniquet was deflated and the pulsation of radial artery was found absent. The capillary refill was inconclusive. The forearm and hand of operated limb was between cold and warm. Pulse oximeter was used to check the oxygen saturation of the operated limb that showed variable oxygen saturation (30% to 80%) that changed with position of elbow. Vascular spasm was suspected and all the posterior stitches were removed and waited for half an hour with warming the patient with heater fan. But the oxygen saturation would not return to 100% contrary to the opposite limb. In CT angiography, vascular supply break at the site of fracture was noticed although dye was going to both radial and

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ulnar artery through collateral circulation. Surgical exploration of antecubital fossa was done with the help of plastic surgeon. Intraoperatively kinking of brachial artery with median nerve was found adjacent to the fracture site due to soft tissue impingement. Brachial artery and medial nerve were released and 5 ml of Xylocaine (1%) is irrigated around the vessel to relieve spasm. Brachial artery started pulsating in 2-3 minutes and radial pulsation returned and oxygen saturation became 95 to 100%. Anterior wound is closed in layers and posterior wound is closed secondarily after one week. Postoperatively lomodex was given for 24 hr to prevent thrombus formation. Stitched wounds were healed. Fracture was united in 6 weeks. K-wires were removed and elbow mobilization was started. Postoperatively function of median nerve injury was recovered in 6 month of time.

Another 8 year old female child presented in outdoor patient clinic with 12 days old Gartland type III supracondylar fracture with normal distal neurovascular status. Close reduction was tried and failed. Open reduction with Cambell's approach was done and Cross k wire fixation was done. Postoperatively radial artery pulsation was found absent. Pulse oximeter showed variable oxygen saturation with position of elbow. Brachial vessel was explored with extension of the same incision with the help of plastic surgeon. Thrombus in brachial vessel was found which was removed with window. Window was repaired and radial artery pulsation was returned and oxygen saturation became 95 to 100% in the operated limb.

Lomodex was given for 24 hr to prevent occlusion of vessel. Postoperatively no neurological complication was noted. There was necrosis of posterior skin which was managed with skin grafting. Fracture was united in 8 weeks and k wires were removed and elbow mobilization was started with loss of terminal extension.

DISCUSSION

Dormans et al reported 5 vascular injuries in his retrospective studies of 200 childrens with supracondylar fracture extension type 3, one of them associated with median nerve injury.[2]

Kumar et al successfully managed 4 out of 5 vascular injuries with surgical exploration in in his retrospective studies of 194 childrens with supracondylar fracture extension type 3.[3]

Appearance of pain, pulselessness, parasthesias, paralysis and pallor can be helpful in guiding the management of vascular injury.[4] The presence or abscece of radial pulse does not necessarily means ischaemia.[5] Vascular exploration in pulseless hand depends upon status of perfusion. Well perfused pulseless hand can be conserved.[6,7,8]

Blackey et al recommend urgent exploration of the vessels in a child with supracondylar fracture with a pink pulseless hand with increasing pain.[9]

Mangat et al recommend early anterior exploration vessel with a coexisting anterior interosseous or median nerve palsy in a child with Gartland type III supracondylar fracture.[10]

In our first case we encountered difficulty in assessessing nerve function due to regional anaesthesia with sedation.

Arterial spasm is usually self-limiting but ischaemia after trauma is usually due to arterial injury.[11]

Freidman and Jupiter suggested use of arteriography in defining the nature of a vascular injury although Shaw et al. and Copley et al. favoured exploration without arteriography.[12,13,14]

In our first case we did arteriography to localize the vascular lesion as oxygen saturation in the limb was variable with position of elbow and also to explain patients' relative about prognosis in better way. It was readily available in our institute. After that case we started to take consent of vascular exploration preoperatively. That's why we explored vessel in second case without arteriography.

But in children with black skin it is difficult to assess status of perfusion by color of skin. Successful outcome depends upon the early

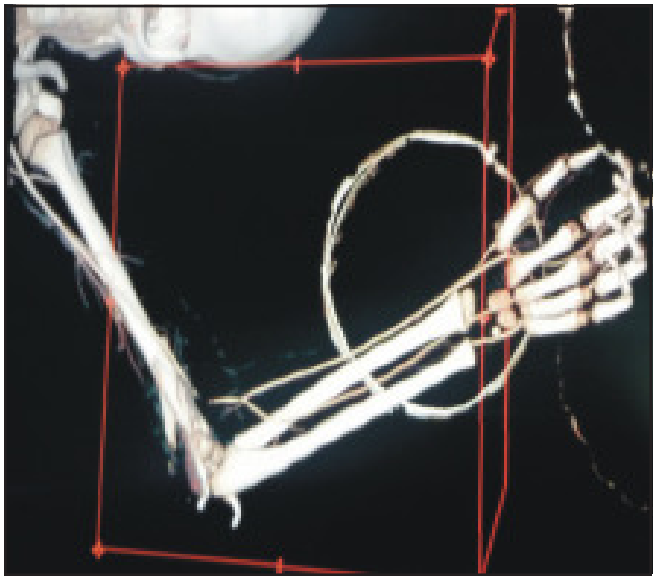

Figure 1 : CT angiography showing vascular cut-off with collateral circulation

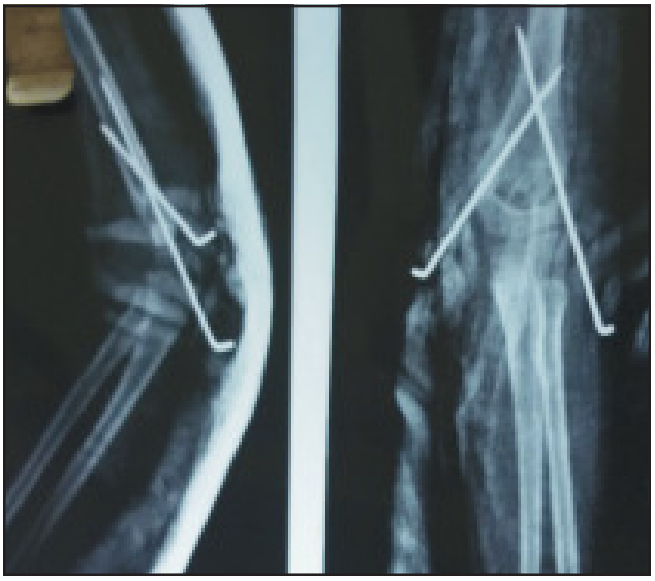

Figure 2 : Postoperative skiagram of fracture supracondylar humerus

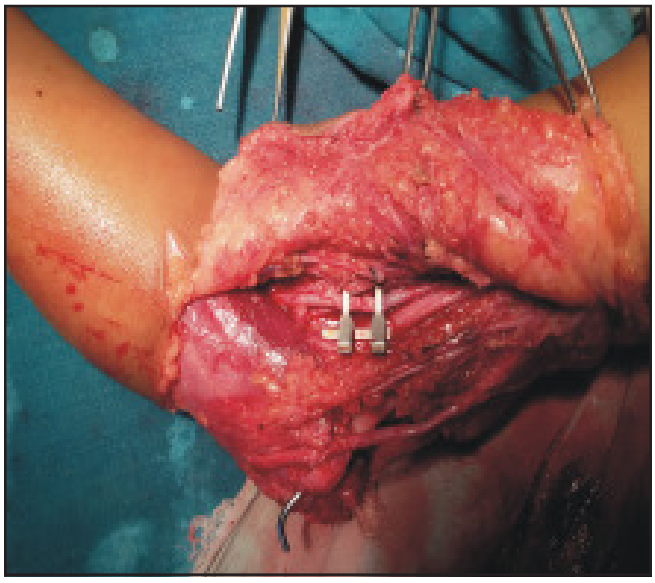

Figure 3 : Intraoperative photograph of vascular exploration in second case

Figure 4 : Postoperative cilical picture of elbow with skin grafting in second case

recognition and decision. Due to collateral circulation sometimes it is difficult to assess exact warm and cold status of limb and capillary refill. We used pulse oximeter to assess ischaemia of the limb that gives a quantitative value of oxygen saturation and helps in taking decision of early exploration.

CONCLUSION

Early identification and intervention of the vascular compromise in supracondylar fracture of humerus saves the limb. In addition to clinical

examination,pulse oximeter can be used to recognize the vascular status of limbs after operationby oxygen saturation. Anterior incision for surgical exploration of vessel is recommended to avoid posterior skin necrosis. Regional anaesthesia should be avoided in supracondylar fracture as it hampers the assessment of nerve function postoperatively.

LIMITATION OF THE STUDY

Morenumber of patients are required to draw the significant conclusion.

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