

A Very Rare and Serious Complication of Pediatric Supracondylar Humerus Fracture Reduction: Pulseless Upper Extremity and Surgical Treatment

Pediyatrik Suprakondiler Humerus Fraktür Redüksiyonun Çok Nadir ve Ciddi Bir Komplikasyonu: Nabızsız Üst Ekstremitte ve Cerrahi Tedavisi

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ABSTRACT

In pediatric cases with supracondylar humerus fractures, one of the serious complications that may occur after closed reduction is vascular injuries. Since it can cause serious complications like extremity loss, is an important issue to be considered. There are different opinions in terms of conservative and surgical approach in the event of a pulse failure after reduction. It should be kept in mind that if there are conditions requiring surgical intervention such as coldness, paleness and pulse failure in the extremity, the repair of the damaged vessel segment may be insufficient and it may be necessary to change the entire damaged vessel segment to eliminate endothelial damage caused by traction. In this case report, a surgical approach to iatrogenic brachial artery injury is presented in a 5 years old child who has no radial and ulnar pulse after supracondylar humerus fracture.

Keywords: Humeral fractures; brachial artery; upper extremity; vascular system injuries.

ÖZ

Suprakondiler humerus fraktürü gelişen pediyatrik olgularda oluşabilecek ciddi komplikasyonlardan biri kapalı redüksiyon sonrası oluşabilecek vasküler yaralanmalardır. Ekstremitte kaybı gibi ciddi komplikasyonlara neden olabilecek olduğundan, bu durum üzerinde durulması gereken önemli bir konudur. Redüksiyon sonrası nabız yetersizliği durumunda konservatif ve cerrahi yaklaşım açısından farklı görüşler vardır. Ekstremitede soğukluk, solukluk ve nabız yetmezliği gibi cerrahi müdahale gerektiren durumlar varsa, hasarlı damar segmentinin onarımının yetersiz olabileceği, traksiyon nedeniyle oluşabilecek olan endotel hasarını ortadan kaldırmak için tüm hasarlı damar segmentinin değiştirilmesi gerekebileceği akılda tutulmalıdır. Bu olgu sunumunda, suprakondiler humerus kırığı sonrası radial ve ulnar nabız olmayan 5 yaşındaki bir çocukta iyatrojenik brakial arter hasarına cerrahi yaklaşım sunulmaktadır.

Anahtar kelimeler: Humerus kırığı; brakial arter; üst ekstremitte; vasküler sistem yaralanmaları.

INTRODUCTION

Supracondylar humerus fractures are the most common fractures in children under 7 years of age and require the most frequent surgery among pediatric traumas (1). The frequency of vascular injury after supracondylar fracture in children is 12% (2). To determine the approach in cases of vascular injury; The color of the limb, heat and the condition of the pulse are important. A conservative approach is preferred in some cases of vascular injury, and in some cases early aggressive surgical interventions may prevent loss of limb or prevent long-term volkmann ischemic contracture as a complication (3). In this case report, we discussed the importance of intervention to vascular injury after supracondylar fracture reduction.

CASE REPORT

A five-year-old male patient was admitted to our emergency room with complaints of pain and swelling of the left arm. At radiogram, supracondylar fractures were

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diagnosed by orthopedics (Figure 1). And closed reduction and fixation was performed. There were no radial and ulnar pulses after closed reduction. The hand was slightly cold and pale compared to the other hand. Monophasic flow was detected in arterial doppler ultrasonography. Vascular surgical intervention was decided. Brachial artery exploration was performed in the patient who does not have radial and ulnar pulses. The 1.5 cm segment was resected and embolectomy and end-to-end anastomosis was performed. Patient who could not receive postoperative radial and ulnar pulses had a monophasic flow seen as a result of Doppler USG and the patient was operated again. The patient underwent re-embolectomy. It was seen that there were transverse multiple lacerations involving fibrin on the endothelial tissue due to traction. Approximately 4 cm of the brachial artery was resected (Figure 2). And the saphenous vein graft interposition was performed until the undamaged segment was reached. Radial and ulnar pulses were available after the operation. The patient was admitted to the intensive care unit without any complications. Heparin infusion continued for the first 24 hours. Radial and ulnar pulses are palpable in the postoperative period. The patient was discharged on the 4th postoperative day.

DISCUSSION

Supracondylar humerus fractures are common traumas in children. Of these children, 2.6% don't have pulses on radial and ulnar artery (4). Surgical exploration is usually recommended in the presence of cold and pale hands in the absence of radial pulse (5). There is also an indication for emergency surgical intervention in cases of poor perfusion and severe circulatory disorders (6). Treatment planning should be performed in patients with circulatory failure after reduction, considering thrombosis, vascular spasm, partial tear, as well as the degree of traction applied to the vessel endothelial wall.

It is reported that brachial artery injury is mostly seen in fractures with posterolateral separation. In supracondylar humerus fractures, arterial injury may be spasm, embolism, thrombosis, intimal tear, laceration and pseudoaneurysm. If the circulation cannot be restored after fracture reduction, open reduction internal fixation and brachial artery exploration are performed. If the patient has cyanotic and cold hands, emergency surgical intervention should be planned. Firstly, reduction should be done in the emergency department. Elbow hyperflexion that compresses the brachial artery more in the emergency department should be avoided. If there is no improvement in vascular status despite reduction, preparation for open surgery and revascularization is required. Often perfusion is restored following the necessary reduction and nailing. Although the hand is warm, pink and capillary filling, radial pulse may not be obtained. In this case, there are different opinions about the approach to the patient. However, close follow-up is generally recommended in such patients without immediate vascular surgery. There is a significant relationship between the degree of separation and vascular injury.

One of the issues discussed in the treatment is that the fracture should be reduced and stabilized as soon as possible (7). There is also agreement that surgery for vascular injury should be performed for patients with impaired



Figure 1. X-ray image of the supracondylar humerus fracture

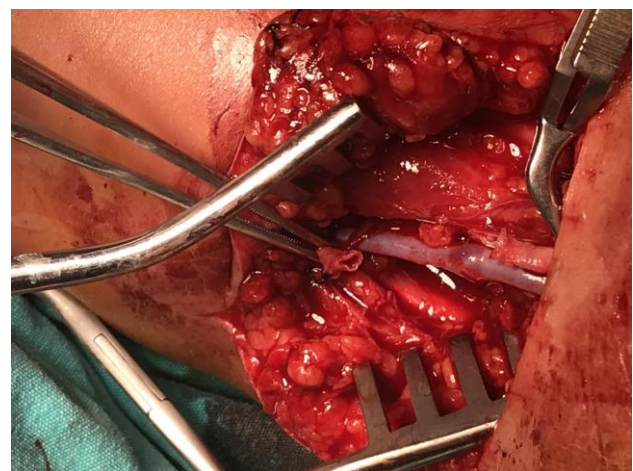


Figure 2. Intraoperative view of the brachial artery lumen after resection of the damaged brachial artery segment

circulatory limbs after reduction. The real discussion continues on patients with no pulse after reduction but good circulation in the distal extremity. There are several different trends. In order to eliminate the possibility of vascular injury after reduction, despite the urgency of urgent surgery for vascular injury; immediate reduction and then close follow-up should be applied.

There is no consensus reached for the methods that should be used to diagnose vascular injuries. Interventional (angiography) and non-invasive (MR angiography, Doppler USG, color Doppler USG) imaging methods are used in this regard (8). There are some authors who recommend that interventional methods such as angiography should be performed against those who say that non-invasive methods are sufficient for diagnosis. Pre-operative routine use of angiography is not recommended by many specialists because of the allergic reaction to the contrast agent, its reduction and delay in vascular repair. However, it can be used to determine the site of injury and to plan the surgery in patients who will undergo vascular repair.

Both invasive and non-invasive methods are available in vascular lesion research. Angiography is the diagnostic test that gives us the strongest benefit. In addition to angiography, which is an invasive procedure, Doppler and magnetic resonance imaging is also a noninvasive test. Doppler ultrasonography is recommended as the first test for any vascular injury suspicion and is considered to be sufficiently useful for the assessment of arterial patency. If necessary, or in cases where ultrasonography is inadequate, angiography can be used to make a definitive diagnosis and decide on the intervention. However, since it is an invasive procedure and requires a specialist team, computed tomographic angiography is a more common and safe method.

In the light of the present findings, we believe that it is sufficient to perform fracture reduction and stabilization immediately after tight fracture monitoring in patients who do not have a circulatory disorder despite the absence of pulse at the distal extremity after fracture. We suggest surgery for vascular injury in cases of circulatory disorders in the extremities, persistent pain or impaired neurological examination. In such a case, the embolectomy performed on the thrombotic segment is insufficient for circulation and the damaged segment must be replaced.

Informed Consent: Informed consent was obtained from patient about case presentation.

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