

Long-term follow-up results of a pediatric brachial plexus laceration

Sinan Öksüz, M.D., Hüseyin Karagöz, M.D., Yalçın Külahçı, M.D., Ersin Ülkür, Asım Uslu, M.D.

Department of Plastic and Reconstructive Surgery and Burn Unit, GATA Haydarpaşa Training Hospital, Istanbul

ABSTRACT

A rare case of pediatric brachial plexus laceration is presented. A five-year-old boy who sustained a sharp laceration on his right axillary region was immediately operated. The axillary artery, radial, ulnar and musculocutaneous nerve branches of the brachial plexus, and the lateral root of the median nerve were totally lacerated. The medial root of the median nerve was partially transected. All of the lacerated brachial plexus elements and axillary artery were immediately repaired. Significant functional recovery was determined even six months after the repair. Motor and sensory functions of the affected extremity were almost totally restored at the postoperative 21st month, except for the ulnar nerve motor functions. There was no cold intolerance or trophic change at the injured extremity. Primary repair of a brachial plexus laceration injury in the pediatric population can be expected to produce successful functional recovery results, even in a relatively short period after the repair.

Key words: Brachial plexus laceration; isolated; pediatric.

INTRODUCTION

Obstetric brachial plexus injuries constitute the majority of the reported peripheral nerve injury cases in the pediatric population. However, isolated sharp laceration injuries of the brachial plexus and the outcomes after repair are rarely reported. We report a rare case of pediatric brachial plexus laceration and the long-term follow-up results after repair.

CASE REPORT

A five-year-old boy presented with a skin laceration on the axillary region of the dominant right extremity, 10 hours after the injury. The skin had been lacerated by glass. Radial and ulnar artery pulses could barely be determined by hand-held Doppler. Nevertheless, there was no evident major circulation problem. However, total motor and sensory neurologic functional loss was determined at the affected extremity. The existing laceration was extended and subcutaneous structures were exposed for exploration (Fig. 1a).

The short head of the biceps brachii and coracobrachialis muscles were totally lacerated at the injury site. The pectoralis major muscle was also partially injured at its insertion. The axillary artery was completely lacerated. The radial, musculocutaneous and ulnar nerve branches of the brachial plexus and the lateral root of the median nerve were totally transected. The medial root of the median nerve was partially (30%) lacerated as well (Fig. 1b, c).

The proximal ends of the nerve elements could be anatomically identified by means of early exploration. Distal nerve elements were determined with the assistance of a nerve stimulator. The clear-cut nature of the injury did not cause any tissue loss. All of the lacerated brachial plexus elements were repaired under microscope magnification with primary epineural sutures after the axillary artery repair. The muscle injuries were also repaired at the end of the operation. The radial and ulnar arteries could be well palpated postoperatively.

The right upper extremity was immobilized for two weeks in a long arm cast. Passive mobilization of the hand and wrist was commenced on the postoperative 3rd day. An intensive physiotherapy program was applied for the entire upper extremity two weeks later. Throughout the postoperative first three months, splints were applied to prevent deformities, except during the physiotherapy sessions.

Significant functional motor recovery was determined at the injured extremity even six months after the repair. The tendency to flexion posture at the fourth and fifth digits was

Address for correspondence: Sinan Öksüz, M.D.
Selimiye Mah., Tıbbiye Cad., Uskudar, 34668 Istanbul, Turkey
Tel: +90 216 - 542 20 20 E-mail: sinanoksuz@gmail.com

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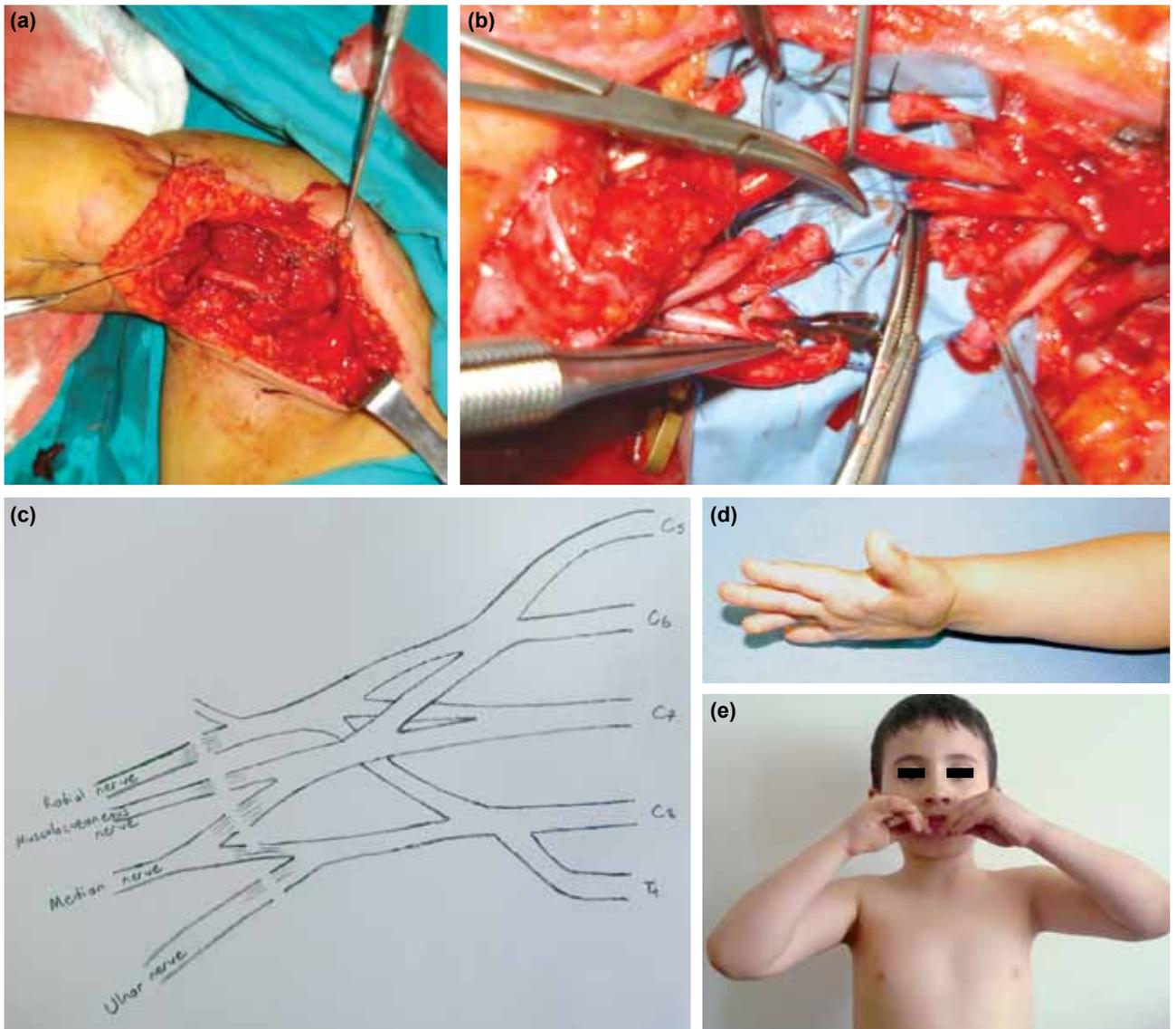


Figure 1. (a) Initial appearance at the exploration. (b) The transected brachial plexus elements. (c) An illustration demonstrating the brachial plexus laceration. (d) Postoperative 10th month view with diminished ulnar nerve deficiency. (e) Postoperative 21st month view with functional recovery.

prominent in the early postoperative period, but diminished over the prolonged follow-up (Fig. 1d). As any intervention to repair the mentioned deformity would mean the loss of some recovered functions, no secondary surgery was addressed as an option. Hand, forearm, elbow, and shoulder motor functions were almost totally restored at postoperative 21 months (Fig. 1e). Sensation was totally restored as well. The child could efficiently perform his daily activities. There was no cold intolerance or trophic change at the injured extremity.

DISCUSSION

Sharp laceration injuries of the pediatric brachial plexus and the outcomes after repair are sparse in the literature. Reports exhibit diversity depending on the level and type of the injury and the nerve affected.^[1] Traumatic causes of brachial

plexus injuries can be classified as: stretch/contusion injuries, gunshot wounds and lacerations.^[2] Clear-cut sharp lacerations of the nerves without tissue loss indicates immediate primary repair.^[3,4]

Laceration injuries generally transect just some elements of the brachial plexus, but total plexus lacerations are reported scarcely.^[2] Outcomes of sharp laceration injury repair for median and radial nerves at various levels are reported to be equally good and better than for the ulnar nerve. Muscles innervated by median and radial nerves are not responsible for delicate movements; however, the ulnar nerve supplies the distal fine intrinsic hand muscles. This physiologic feature may be responsible for the prominent functional loss after the repair of the ulnar nerve.^[1] Moderate claw hand posture was noticed in this presented case as well. Motor functional

outcomes were better for the median, radial and musculocutaneous nerves.

Even though the relationship between nerve regeneration and patient age is controversial,^[5,6] the motor functional recovery observed within six months can be attributed to the age of the patient in this case.

Clear-cut lacerations are expected to yield better results than avulsion and crush injuries.^[7] The reports about injuries to the upper extremity nerves indicate that as the injury level shifts to proximal, the functional outcome deteriorates.^[1] Even though the nature of the injury was favorable, the level of the laceration in this case was challenging. However, despite the high level of injury, the functional outcome did not deteriorate.

Arterial circulation failure of an extremity can remain obscure among pediatric patients. Instant surgical exploration is indicated to eliminate both vascular and neural injury in case of a sharp laceration.

In the pediatric population, primary repair of a brachial plexus laceration can be expected to produce successful results regarding functional motor and sensory recovery.

Conflict of interest: None declared.

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OLGU SUNUMU - ÖZET

Pediyatrik brakial pleksus kesisinin uzun dönem takip sonuçları

Dr. Sinan Öksüz, Dr. Hüseyin Karagöz, Dr. Yalçın Külahçı, Dr. Ersin Ülkür, Dr. Asım Uslu

Gülhane Askeri Tıp Akademisi Haydarpaşa Eğitim Hastanesi, Plastik ve Rekonstrüktif Cerrahi Servisi ve Yanık Ünitesi, İstanbul

Bu yazıda nadir bir pediyatrik brakial pleksus kesisi olgusu sunuldu. Sağ aksiller bölgeyi etkileyen kesici cisim yaralanmasına maruz kalan beş yaşındaki erkek çocuk acil olarak ameliyata alındı. Aksiller arter, brakial pleksusun radial, ulnar ve muskulokutan sinir dalları ile median sinirin lateral kökü tam olarak kesilmişti. Median sinirin medial kökü ise parsiyel kesilmişti. Brakial pleksusun kesilen tüm elemanları ve aksiller arter acil olarak onarıldı. Onarımdan altı ay sonra bile belirgin bir fonksiyonel iyileşme saptandı. Ameliyat sonrası 21. ayda, etkilenen ekstremitenin motor ve duyu fonksiyonları, ulnar sinir motor fonksiyonları dışında, tama yakın düzeldi. Yaralanan ekstremitede soğuk intoleransı veya atrofik değişiklikler gözlenmedi. Pediyatrik yaş grubunda brakial pleksus kesici yaralanmalarının primer onarımı, onarımdan sonra görece kısa sürede bile, başarılı fonksiyonel iyileşme sonuçları verebilir.

Anahtar sözcükler: Brakial pleksus kesisi, izole, pediyatrik.

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