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Ultrasound Guided Distal Adductor Canal Block for Pediatric Lower Limb Surgery

Ahmet Murat Yayık
Ali Ahıskalıoğlu
Erkan Cem Çelik

Pediyatrik Alt Ekstremite Cerrahisi için Ultrason Eşliğinde Distal Adduktor Kanal Bloğu

ABSTRACT

Objective: *Surgery applied for musculoskeletal system deformities is a major surgery that causes severe postoperative pain. This situation is related to physiological and psychological side effects, especially in pediatric patients. Distal adductor canal block was applied in adults, and sensory block of sciatic and femoral nerves has been demonstrated. This block may provide adequate analgesia after pediatric lower extremity surgery.*
Method: *We performed distal adductor canal block in a five-year-old pediatric patient who underwent Ilizarov external fixation with fibular and tibial osteotomy. During postoperative 24-hour, pain scores and additional analgesic requirement were recorded.*
Results: *Postoperative 24-hour pain scores were between 0-2 points, patient slept well, and did not require additional analgesics for 16 hours after the procedure.*
Conclusion: *Distal adductor canal block may provide effective postoperative analgesia for lower limb surgery in pediatric cases with blockage of two nerves with a single injection.*

Keywords: *Distal adductor canal block, pediatric lower limb surgery, postoperative analgesia*

ÖZ

Amaç: *İskelet kas sistemi deformitesi cerrahisi, postoperatif ciddi ağrıya neden olan major ameliyatlardır. Bu durum, özellikle pediyatrik hastalarda fizyolojik ve psikolojik yan etkilerle ilişkilidir. Distal addüktör kanal bloğu yetişkin hastalarda uygulanmış, femoral ve siyatik sinirde duyusal blokaj sağladığı gösterilmiştir. Bu blok, pediyatrik alt ekstremite cerrahisinde de yeterli analjezi sağlayabilir.*
Yöntem: *Fibular ve tibial osteotomi ile Ilizarov eksternal fiksatörü uygulanan beş yaşındaki pediyatrik hastaya postoperatif distal adductor kanal bloğu uygulandı. Postoperatif 24 saatlik ağrı skorları ve ek analjezik gereksinimi değerlendirildi.*
Bulgular: *Postoperatif 24 saatlik ağrı skorları 0-2 arasındaydı, hasta iyi uyudu ve işlemden sonra 16 saat boyunca ek analjezik gereksinimi olmadı.*
Sonuç: *Distal addüktör kanal bloğu, pediyatrik alt ekstremite cerrahisi için tek 1 enjeksiyon ile 2 siniri bloke ederek etkili postoperatif analjezi sağlayabilir.*

Anahtar kelimeler: *Distal adduktor kanal bloğu, pediyatrik alt ekstremite cerrahisi, postoperatif analjezi*

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Ahmet Murat Yayık
Bölge Eğitim Araştırma Hastanesi,
Anestezi Kliniği,
Erzurum - Türkiye
m_yayik@hotmail.com
ORCİD: 0000-0002-2783-7041

A. Ahıskalıoğlu 0000-0002-8467-8171
Atatürk Üniversitesi Tıp Fakültesi
Anesteziyoloji ve Reanimasyon ABD
Erzurum, Türkiye

E. C. Çelik 0000-0002-7773-9562
Bölge Eğitim Araştırma Hastanesi,
Anestezi Kliniği,
Erzurum, Türkiye

INTRODUCTION

Children with musculoskeletal system deformities often undergo major surgical interventions to achieve functional recovery and improve these deformities. Such extensive surgeries cause significant tissue damage and severe pain in the postoperative period [(1)].

If postoperative pain is not adequately treated in pediatric patients, hospital stay will be remembered as a traumatic experience, furthermore effective postoperative analgesia reduces the body's response to surgery; minimizes endocrine, metabolic and inflammatory reactions, decreases the risk of postoperative complications and increases the success of surgery [(2)].

In children, lower extremity nerve blocks offer an alternative to neuraxial techniques used for analge-

sia following lower extremity surgeries with the increased use of ultrasound. In contrast to the upper extremities, it requires at least two peripheral nerve blocks to achieve complete analgesia in the lower extremities. The sciatic and femoral nerves are the main nerves of the lower extremities. Distal adductor canal block (DACB) is applied in adults to demonstrate sensory block of these nerves [3].

Here we first report the successful management of postoperative analgesia with DACB for pediatric lower limb surgery. Written and oral informed consent for publication of the patient's data and accompanying image were obtained from the parents of the patient.

CASE REPORT

A five-year-old boy weighing 18 kg with right varus deformity was scheduled for Ilizarov external fixation with fibular and tibial osteotomy. Anesthesia induction was performed with propofol (2 mg kg^{-1}), fentanyl (1.5 µg kg^{-1}), and rocuronium (0.6 mg kg^{-1}) and following tracheal intubation anesthesia was maintained with sevoflurane, 50% nitrous oxide and 50% oxygen. After the surgical operation ended, the right leg was placed in slight adduction and internal rotation position. The region to be intervened was determined, and ultrasound probe was sterilized. Distance between the patella and anterior superior iliac spine was measured and divided into three equal parts, the distal segment was specified for the procedure site. Xperius™ US systems by high-frequency linear ultrasound probe was used to identify the superficial femoral artery deep to the sartorius muscle in short axis (Figure 1). With the in-plane technique, an 80-mm sonovisible block needle (Stimuplex® Ultra, Braun, Germany) was passed through the Sartorius muscle and inserted into the lateral of the superficial femoral artery. After negative aspiration block was performed with 10 mL of 0.25% bupivacaine, and 30 minutes before the end of the operation 10 mg kg^{-1} IV paracetamol was injected and repeated every six hours postoperatively. Postoperative pain was assessed using Wong-Baker pain scale in the first 24 hours. Postoperative 24-hour pain scores ranged between 0-2 points, patient slept well, and did not require additional analgesics for 16 hours after the procedure. The maximum pain score estimated between 16-24 hours was 6 points and, oral ibuprofen (7.5 mg kg^{-1}) was used for rescue analgesia.

DISCUSSION

Mid to severe pain occurs after orthopedic surgeries which is related to physiological and psychological side effects, especially in pediatric patients. Therefore, postoperative pain control is of great importance in pediatric patients.

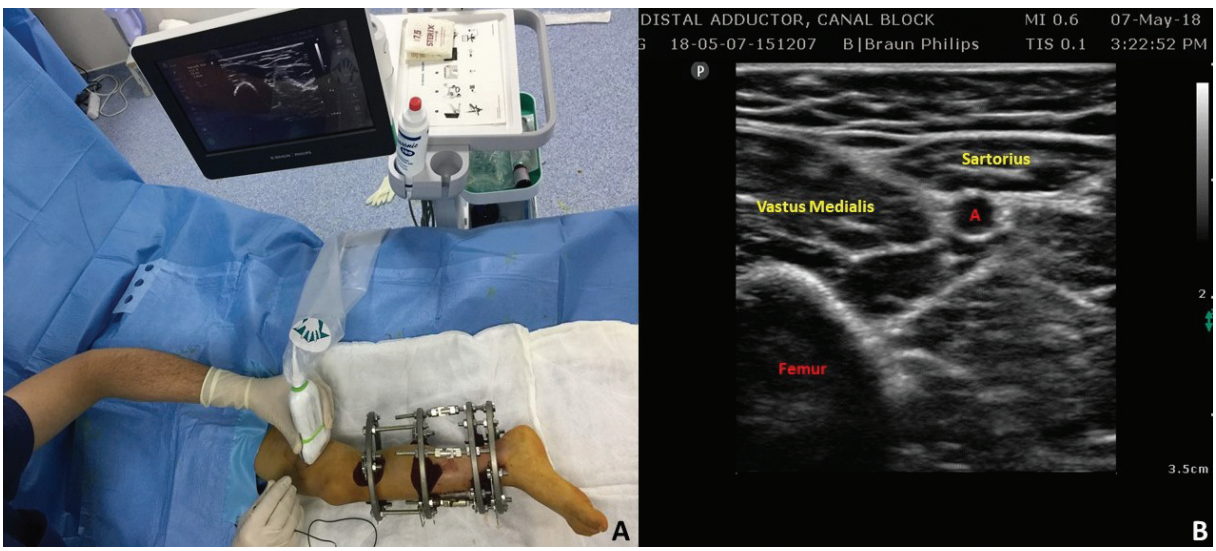

Figure 1. A. Ultrasound and Patient set up for Distal Adductor Canal Block. B- Sonographic Anatomy of Distal Adductor Canal. A, Superficial femoral artery.

Postoperative analgesia in children undergoing lower extremity surgery is usually provided with systemic opioids or neuroaxial methods such as caudal anesthesia. Both methods have their own disadvantages. Itching, nausea-vomiting, sedation and respiratory depression may occur due to the use of opioids. After caudal anesthesia, serious complications such as total spinal block due to improper placement of the caudal needle may be seen. Thanks to the usage of ultrasonography in regional anesthesia, many techniques applied with the aid of ultrasound in adult patients, and also in pediatric patients as well.

Ultrasound-guided peripheral nerve blocks reduce postoperative opioid consumption and minimizes opioid-related side effects. Adductor canal is located at the apex of the femoral triangle and it is a gate from the femoral triangle to the popliteal fossa enclosing the saphenous nerve, superficial femoral artery, and vein. Initially, the adductor canal block was applied to achieve only saphenous nerve block. However it was later shown that especially the local anesthetics injected distally into the adductor canal may spread to the popliteal fossa and provide sciatic nerve block [(4)]. So that, the sciatic nerve and saphenous nerve can be anesthetized with a single injection with the patient in supine position to achieve complete analgesia in the lower extremity [(5)].

We suggest that DACB provides effective postoperative analgesia for lower limb surgery in pediatric patients via blocking two nerves with a single injection. Randomized controlled studies are required to define the optimal volume and efficacy of DACB for pediatric patients.

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