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CASE REPORT

Analgesic efficacy of ultrasound-guided quadratus lumborum block during extracorporeal shock wave lithotripsy

Ekstrakorporeal şok dalga litotripside ultrasound eşliğinde uygulanan quadratus lumborum bloğunun analjezik etkinliği

Ahmet Murat YAYIK,[1] Ali AHISKALIOĞLU,[1] Özlem Dilara ERGÜNEY,[1] Elif ORAL AHISKALIOĞLU,[2] Haci Ahmet ALICI,[1] Şaban Oğuz DEMİRDÖĞEN,[3] Şenol ADANUR[3]

Summary

Extracorporeal shockwave lithotripsy (ESWL) is widely used for the treatment of urinary tract calculi; however, the vast majority of the patients does not tolerate the procedure without analgesia and sedation. Pain control in ESWL has been crucial for process success and patient comfort. Systemic drugs, such as non-steroid anti-inflammatory drugs, opioids, alfa-2 agonist and various local and regional anesthesia methods (transversus abdominis plane block, paravertebral block, infiltration) have been applied to control ESWL pain. Quadratus lumborum block (QLB) is performed as one of the regional anesthetic techniques for abdominal surgery. This block provides anesthesia and analgesia on the anterior and lateral wall of the abdomen. In this report, we presented the analgesic efficacy of QLB in 15 patients, which included nine renal and six ureter stones for ESWL. The mean of the VAS scores ranged from 0.20±0.41 to 2.73±1.22, and mean fentanyl consumption was 15.00±15.08 mcg during the procedure. No opioid-related side effects were observed in any of the patients. Full fragmentation was obtained in nine of the 15 patients, and partial fragmentation was obtained in five patients.

Keywords: Extracorporeal shock wave lithotripsy; pain; ultrasound; quadratus lumborum block.

Özet

Ekstrakorporeal şok dalga litotripsi (ESWL), üriner trakt taş tedavisinde yaygın olarak uygulanmaktadır; ancak hastaların büyük çoğunluğu sedasyon ve analjezi olmaksızın bu işlemi tolere edememektedir. ESWL'de ağrı kontrolü işlem başarısı ve hasta konforu açısından önemlidir. ESWL ağrı kontrolünde, non-steroid antiinflamatuar ilaçlar, opioidler, alfa-2 agonistler gibi sistemik ilaçlar; TAP blok, paravertebral blok ve lokal infiltrasyon gibi çeşitli rejyonel anestezi yöntemleri uygulanmıştır. Quadratus lumborum bloğu (QLB) abdominal cerrahide uygulanan rejyonel analjezik yöntemlerden biridir. Bu blok batın ön ve yan duvarında anestezi ve analjezi sağlar. Bu vaka serisinde, dokuzu renal taş ve altısı üreter taşı olmak üzere QLB eşliğinde ESWL yapılan 15 hasta sunulmuştur. İşlem sırasındaki VAS skorları, ortalama 0.20±0.41 ile 2.73±1.22 arasındaydı, ortalama fentanil tüketimi 15.00±15.08 mcg olup hiçbir hastada opioide bağlı yan etki görülmedi. 15 hastanın dokuzunda tam fragmantasyon, beşinde de parsiyel fragmantasyon elde edildi.

Anahtar sözcükler: Ağrı; ekstrakorporeal şok dalga litotripsi; ultrasonografi; quadratus lumborum blok.

Introduction

Extracorporeal shock wave lithotripsy (ESWL) has been widely used for the treatment of urinary tract stones and is usually administered as an outpatient procedure. Although ESWL is painful, this technique is non-invasive and is based on the power of acoustic shock waves. Pain severity in ESWL has been associated with many factors, including lithotripter type, stone size, stone location, shock wave pressure and frequency, age and gender.[1] Shock waves must be appropriate power and time for effective fragmentation. The vast majority of the patients does not tolerate this procedure without sedoanalgesia.[2] Systemic drugs, such as non-steroid anti-inflammatory drugs,

[1]Department of Anesthesiology and Reanimation, Ataturk University Faculty of Medicine, Erzurum, Turkey
[2]Department of Anesthesiology, Regional Training Hospital, Erzurum, Turkey
[3]Department of Urology, Ataturk University Faculty of Medicine, Erzurum, Turkey

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Correspondence: Dr. Ahmet Murat Yayık. Atatürk Üniversitesi Tıp Fakültesi, Anesteziyoloji ve Reanimasyon Anabilim Dalı, 25100 Erzurum, Turkey.
Phone: +90 - 442 - 344 70 55 **e-mail:** m_yayik@hotmail.com

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Table 1. Demographic data

Age (year)	34.80±11.38
Weight (kg)	75.20±11.26
Height (cm)	171.40±8.71
Gender (male/female)	9/6
ASA (I/II)	11/4
Dj stent (yes/no)	3/12
Stone size (mm)	10.53±3.07
Stone location (renal/ureter)	9/6

Values are presented as number or mean±standard deviation.

opioids, alfa-2 agonist and various local and regional anesthesia methods (transversus abdominis plane block, paravertebral block, infiltration) have been applied to control ESWL pain.[3–5] Use of opioids to control pain may cause serious side effects, such as respiratory depression, sedation, nausea vomiting, constipation, and increased hospitalization.

The quadratus lumborum block (QLB) was first described by Blanco.[6] This technique involves a local anesthetic drug, which is applied to the thoracolumbar fascia. The anesthesia and analgesia of the T7-L1 dermatome are provided in this ultrasound-guided block. The QLB has provided effective analgesia in various surgeries, such as abdominal hernia repair, colostomy closure, radical nephrectomy and pyeloplasty.[7–10]

In this report, we presented the analgesic efficacy of QLB in 15 patients, which included nine renal and six ureter stones for ESWL.

Case Report

The patients that were planning on ESWL for renal or ureter stone therapy were informed about the procedure before the operation. Fifteen patients accepted the QLB application, provide written consent, and were taken to the room for the block (Table 1).

Standard ECG, peripheral oxygen saturation (SpO_2) and noninvasive blood pressure monitoring were performed on all patients, and 50 mg of intravenous dexketoprofen was applied 30 min before the application. A lateral decubitus position was assigned, and the side to be treated was designated on top (Fig. 1A). The area to be treated and the convex USG probe were sterilized. The anterior wall of the abdomen, external oblique, internal oblique and transversus abdominis muscles were respectively visualized using USG. Transverse process, quadratus lumborum muscle and psoas muscle were visualized after the lateralization of the USG probe (Fig. 1B). The intervention was performed using an in-plane technique with a 10-cm block needle. The quadratus lumborum muscle was passed as transmuscular. Entering among the fascia of the psoas and the quadratus lumborum muscles, the position of the needle was confirmed with 2 ml of saline. Afterwards, the block was applied with 10 ml of 0.5% bupivacaine and 10 ml of 2% lidocaine (Fig. 1C). The sensory examination was performed 20 minutes after the block was made, and the block was considered successful once T7-L1 dermatomal anesthesia was achieved.

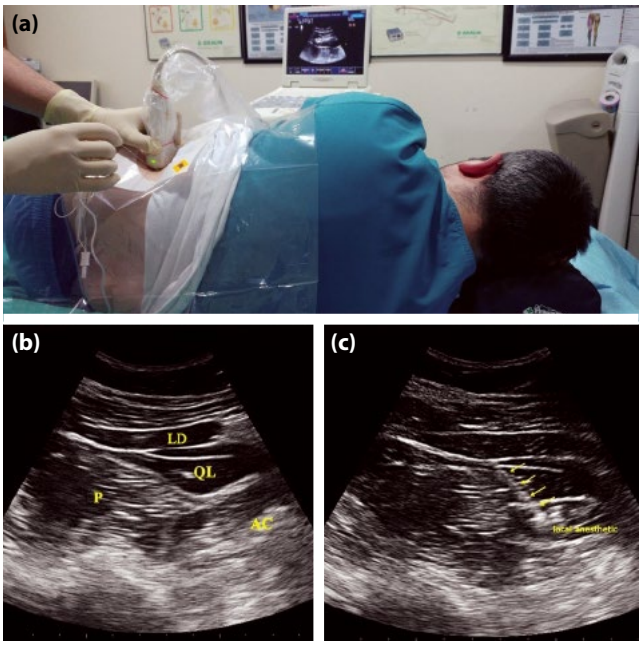

Figure 1. (a) Probe and ultrasound set up for QL block. **(b)** Sonographic anatomy of block **(c)** After local anesthetics administration. LD: Latissimus Dorsi Muscle QL: Quadratus Lumborum Muscle, P: Psoas Muscle, AC: Abdominal Cavity, yellow arrows: needle.

VAS pain scoring was described to all patients before premedication. At the ESWL, 1 mg midazolam was administered and during the procedure, 5 min, 10 min, 15 min, 20 min, and 25 min VAS scores were recorded. Twenty-five mcg fentanyl was applied and recorded if the VAS score was 4 and over. In addition, the perioperative side effects and patient satisfaction were recorded after the procedure.

The maximum and mean energy of shock, the total power of shocks (j), frequency, number of shockwaves, stone properties and the success of ESWL were recorded (Table 2).

Table 2. ESWL data

	Mean±SD
Mean power of shocks (j)	2.58±0.25
Maximum power of shocks (j)	3.43±0.32
Total power of shocks (j)	77.97±14.78
Frequency (min)	102.00±15.07
Number of shock waves	2191.10±283.31

SD: Standard deviation; ESWL: Extracorporeal shockwave lithotripsy.

Table 3. Perioperative datas of study patients

	Mean±SD
VAS pain	
5 min.	0.20±0.41
10 min.	1.27±1.58
15 min.	2.73±1.22
20 min.	2.47±1.36
Fentanyl consumption (mcg)	15.00±15.08
Patient satisfaction (excellent/good/moderate/bad)	11/3/1/0
Fragmentation (total/partial/no)	9/5/1

SD: Standard deviation; VAS: Visual Analoque Scale.

Discussion

The QLB was first described by Blanco in 2007, where local anesthetic injection into the anterolateral junction of the quadratus lumborum muscle was performed.[6] Later, QLB was modified with the transmuscular approach by administering between the quadratus lumborum and the psoas muscles.[9] The QLB has been applied in many studies as a part of the multimodal analgesia in patients undergoing abdominal surgery.[7–9, 11] The local anesthetic was administered between the quadratus lumborum, and the psoas muscle affects T7-L1 dermatomes. Unlike the TAP block, which is another trunk block applied to the abdominal anterior wall, local anesthetic spread also occurs in the posterior abdominal wall and paravertebral area. Thus, it is not only prevents analgesia in the anterior wall but also reduces visceral pain.[12]

ESWL is a painful, non-invasive technique based on the power of acoustic shock waves. The mechanism of the pain during ESWL has not been explained, but it is thought to be multifactorial. It has been considered that pain receptors, which are induced by the effects of acoustic shock waves, are responsible for the pain.[13] These shock waves act by spreading through the skin, subcutaneous tissue, muscle tissue, peritoneum, pleura, and periosteum. During ESWL, the frequency, power and duration of the shock waves are adjusted according to the location and characteristics of the stone. While starting with low energy levels, the goal is to try to obtain fragmentation by increasing applied energy.[14]

Pain control in ESWL has been crucial for process success and patient comfort. Opioids are often needed to control this pain. Morphine, tramadol, fentanyl and remifentanil were used for this purpose.[2, 5] In a multimodal analgesia approach, regional anesthetic methods decrease opioid consumption and reduce side effects, such as respiratory depression, sedation, nausea vomiting, and constipation due to opioids. In the literature, paravertebral block and TAP block have been applied in multimodal analgesia regimens for ESWL as regional anesthetic methods and it has been demonstrated that they significantly reduce consumption of the opioid.[3, 4]

In our study, we applied the QL block with USG in 15 patients. On the 20th minute sensory examination, all patients provided at T7-L1 dermatomes anesthesia. Mean fentanyl consumption was 15.00±15.08 mcg during the procedure, and no opioid-related side effects were observed in any patient. The mean of the VAS scores for each 5-minute interval ranged from 0.20±0.41 to 2.73±1.22 (Table 3).

One of the factors that affected the success in ESWL was the optimal focus of the shock waves. This focusing was done with the guide of fluoroscopy or USG. Movement of patients due to pain during ESWL can prevent the focus of shock waves and reduce procedural success. Therefore, providing effective and appropriate analgesia is very important for the success of the procedure. Another factor affecting success is the level and duration of the applied energy.[14] Patients cannot tolerate the energy levels and processing times, which are required to achieve fragmentation in situations where effective analgesia cannot be provided. In our study, full fragmentation was obtained in nine of the 15 patients and partial fragmentation was obtained in five patients.

As a result, QLB allows higher energy levels and adequate time for ESWL by providing effective analgesia. QLB may also increase the success rate of the procedure by reducing the pain-related movement of the patient. This study is a preliminary study, and there is a need for a large sample size of randomized controlled studies to support the findings we obtained in this study.

Informed Consent: Written informed consent was obtained from the patient for the publication of the case report and the accompanying images.

Conflict-of-interest issues regarding the authorship or article: No conflicts of interest.

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