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# Relief of refractory renal colic in emergency department: A novel indication for ultrasound guided erector spinae plane block

Muhammed Enes Aydin <sup>a</sup>, Ali Ahiskalioglu <sup>a,\*</sup>, Erdal Tekin <sup>b</sup>, Fatih Ozkaya <sup>c</sup>,  
Elif Oral Ahiskalioglu <sup>a</sup>, Atif Bayramoglu <sup>b</sup>

<sup>a</sup> Department of Anesthesiology and Reanimation, Ataturk University School of Medicine, Erzurum, Turkey

<sup>b</sup> Department of Emergency Medicine, Ataturk University School of Medicine, Erzurum, Turkey

<sup>c</sup> Department of Urology, Ataturk University School of Medicine, Erzurum, Turkey

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## ABSTRACT

Plane blocks have become very popular in recent years with the introduction of ultrasonography into the regional anesthesia and algology practice. Erector spinae plane (ESP) block involves injection of local anesthetics between erector spinae muscles and transverse process of vertebrae and can block the dorsal and ventral rami of thoracolumbar spinal nerves. The primary factor in the great popularity of this block is easy sonographic identification of landmarks and lower complication rate compared to paravertebral or central neuroaxial blocks. These characteristics mean that it will in all probability be widely used in the future, not just for anesthetists, but also for emergency physicians. Here we first report a novel indication for ESP block in emergency department; renal colic.

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## 1. Introduction

Most of the applications to the emergency department cause acute pain and the duration of analgesia is an important clinical indicator in determining the quality of care of emergency department patients [1,2]. Acute renal colic is a serious cause of flank pain and is one of the most common urological emergency cases. Urolithiasis is the first cause in the differential diagnosis of flank pain and is characterized by the presence of stones in the kidney and urinary tract. The reported prevalence of renal colic varies between 5% and 15% according to the geographic distribution of the disease [3]. The risk of recurrence is high and reaches 40% in 5 years and up to 50% in 10 years. The cost associated with urolithiasis reaches \$ 6 million per year in United States (US), resulting in more than one million emergency services per year [3]. The severity of pain varies depending on the individual pain threshold and the hydrostatic pressure above the obstruction. Nausea and vomiting accompany the pain in half of the cases. In emergency services, nonsteroidal anti-inflammatory drugs (NSAIDs), opioid analgesics (fentanyl, meperidine), hydration, calcium channel blockers, alpha blockers and phosphodiesterase inhibitors can be used in the treatment of renal colic pain. In spite of the patients who had taken analgesic medication before coming to the emergency department for serious pain, parenteral opioids were used in 72% of patients who presented to the emergency department with renal colic [4].

\* Corresponding author at: Ataturk University School of Medicine, Yakutiye Research Hospital Department of Anesthesiology and Reanimation, Palandöken, 25070 Erzurum, Turkey.

E-mail address: [ali.ahiskalioglu@atauni.edu.tr](mailto:ali.ahiskalioglu@atauni.edu.tr) (A. Ahiskalioglu).

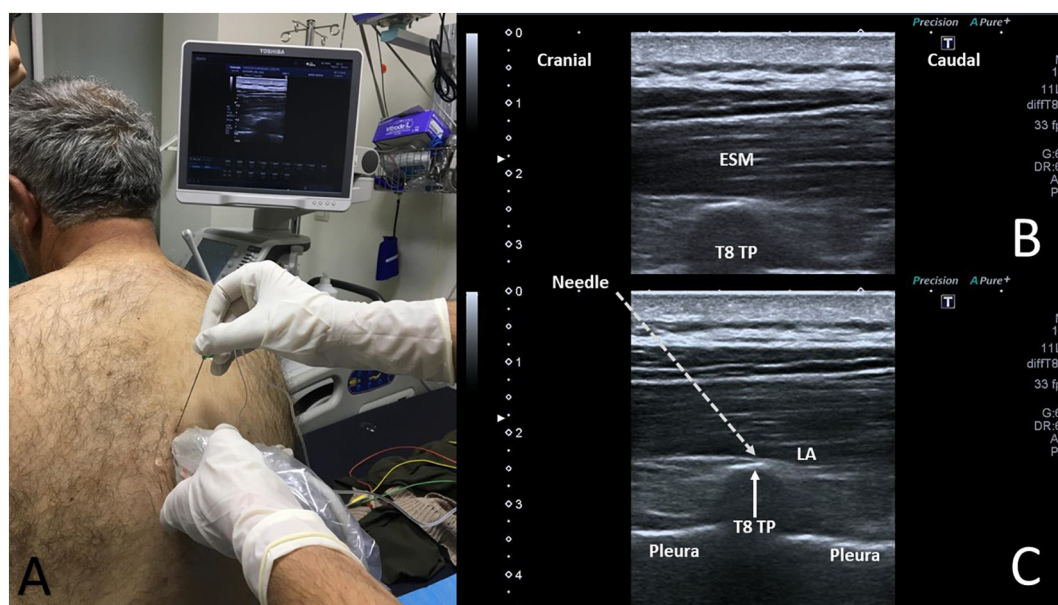
ESP block for the first time described by Forero et al. [5] for thoracic and abdominal region has found widespread use from acute pain to postherpetic neuralgia [6] such as rib fracture [7], transverse process fracture [8] and in emergency department. Although there are publications on the use of subcutaneous paravertebral block [9], twelfth intercostal nerve block [10] and trigger point injection [11,12] for renal colic, regional anesthetic techniques are quite limited.

In this case, we report a new indication for the ESP block in the emergency department and also in the literature; renal colic.

## 2. Cases

### 2.1. Case 1

Patient was a 56-year-old male (178 cm, 95 kg) who was admitted to emergency department with left renal colic. A pelvic and abdominal CT scan was performed then ureteral stone was diagnosed in the left mid-lower ureter. The patient had severe flank pain with a visual analogue scale (VAS) score of 10/10 in the last 2 h. Initially he was treated with 100 µg fentanyl, 50 mg dexamethasone, tramadol and 1 g paracetamol after hydration. Then 50 µg fentanyl was administered 1 h after initial medication. Despite administration of NSAID and opioids, patient had persistent flank pain. Therefore, we decided to advance an ultrasound-guided ESP block at T8 level for intractable acute pain treatment of renal colic. The patient was placed in the seated position then the transverse process and the erector spina muscle were visualized in the sagittal plane with multifrequency linear probe placed longitudinal parasagittal orientation at 3 cm lateral of the midline at T8 vertebra level



**Fig. 1.** A. Ultrasound and patient set-up for erector spinae plane block. B. Sonographic image of erector spinae plane block. ESM: erector spinae muscle, TP: transverse process. C. After local anesthetic infiltration. LA: local anesthetic.

(Fig. 1A). While the needle was advanced by in-plane technique, plane was clarified by performed hydro-dissection with 3 ml saline. ESP block was administered by injection of 30 ml mixture of 0.25% bupivacaine and 2% lidocaine into the fascial plane between the transverse process and erector spinae muscle (Fig. 1B–C). The patient reported a rapid and effective relief in his VAS pain score to 0/10 at 3 min after block procedure. Thirty minutes after the block, analgesia distribution was observed from T2 to L2 with the hot-cold test. The block was uneventful and no additional analgesics were required for 10 h. Patient was followed up for 2 days in urology clinic. After ultrasound control, ureteroscopy (URS) was performed because of dilatation. Double J (DJ) ureteral stent was inserted and removed on the third post-operative day under sedoanalgesia.

### 2.2. Case 2

Case 2 was a 50 year-old-female and was presented to emergency department with right renal colic, after insufficient conservative pain management patient was scheduled for ESP block. The patient had severe pain with a VAS score of 8/10. ESP block was performed as described in Case 1. The first analgesic requirement time is 11 h, and VAS score was 2/10 after block procedure.

### 2.3. Case 3

Case 3 was a 52 year-old-female and was presented to emergency department with right renal colic, after conservative pain management patient was scheduled for ESP block. The patient had severe pain with a VAS score of 10/10. ESP block was performed as described in Case 1.

Different from other cases 20 ml mixture of 0.25% bupivacaine and 2% lidocaine was injected into the fascial plane between the transverse process and erector spinae muscle. The first analgesic requirement time is 8 h, and VAS score was 2/10 after block procedure. Patient's characteristic was summarized in Table 1.

## 3. Discussion

Flank pain is one of the most common causes of admission to the emergency department and is usually characterized by renal colic due to obstruction of the ureter. Acute renal colic can be treated with hydration and conservative pain management. Patients without pain and acute surgery can be discharged from the emergency department, but uncontrolled pain, fever, and limited oral intake require hospitalization. In the emergency department, NSAIDs, opioid analgesics and antispasmodic drugs are used to relieve renal colic pain. Acupuncture, local active warming, subcutaneous paravertebral block, transcutaneous electrical nerve stimulation (TENS) and twelfth intercostal nerve block whose efficacy cannot be proven are the other alternative methods for pain relief [9,13–15].

Regional anesthetic techniques are increasingly gaining popularity among emergency physicians. Particularly with the application of ultrasound in regional anesthesia, both the success of the procedure and the complication rates decreased. Peripheral nerve blocks are frequently used in emergency services as well as upper and lower extremities. In recent years, the plane blocks, which stand out with their reliability in anesthesiology practice, have been applied in emergency services for different indications. Especially in patients with burns, rib

**Table 1**  
Patients' characteristic.

	Age	Sex	Weight	Height	Stone localization	Needle entry point	Volume of LA	Dermatomal level	VAS Before procedure	VAS After procedure	First analgesic requirement time <sup>a</sup>
Case 1	56	M	95	178	Mid-lower ureter	T8	30 ml	T2–L1	10	0	10
Case 2	50	F	72	160	Lower ureter	T9	30 ml	T4–L1	8	2	11
Case 3	52	F	86	165	Upper ureter	T8	20 ml	T6–T12	10	2	8

M: male, F: female, LA: local anesthetics, VAS: visual analogue scale (0–10).

<sup>a</sup> Time between ESP Block to VAS  $\geq 4$  (hour).

fractures and transverse process fractures, the erector spinae plane block has an important role with its successful analgesic activity.

The sympathetic preganglionic nerves that make the renal innervation originate from the spinal segments T8 and L1. The ureter has a rich source of autonomic nerves originating from celiac, aortorenal and mesenteric ganglion in addition to superior and inferior hypogastric (pelvic) plexus. The sympathetic response to the ureter arises from the preganglionic fibers of the lumbar segments T11, T12 and L1. Distention of the renal capsule and the collecting system causes stimulation of renal pain fibers that carry signals through the sympathetic nerves, thus resulting in visceral-type referred pain in the flank, groin, or scrotal (labial) regions [16].

We considered the ESP block at the T8 level, especially considering the renal and ureter innervation. We aimed to provide a full analgesia by applying a high volume and reducing the peritoneal irritation. After ESP block, the patient was taken under observation and the patient was hospitalized for urologic follow-up in order to avoid a possible hydronephrosis after relief of pain.

In conclusion, ESP block may be an alternative safe way to relieve uncontrolled acute pain in patients with reno-ureteral colic. It reduces the need for parenteral opioids and decreases the side effects associated with opioid. Randomized controlled trials are needed for this new indication.

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