

External oblique intercostal block in open nephrectomy patients - A zenith in analgesia for anterolateral upper abdominal surgeries: A case series



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Submission: 20-10-2023

Revision: 06-12-2023

Publication: 01-02-2024

ABSTRACT

Open nephrectomy is a common surgery usually performed for malignant and non-malignant renal pathologies. The external oblique intercostal block (EOIB) blocks the anterior and lateral cutaneous nerves from T6 to T10 and provides somatic analgesia. We present a case series of the use of EOIB in patients undergoing open nephrectomy by subcostal incision. Ten patients were given EOIB, which included patients undergoing simple nephrectomy for non-functioning kidneys and radical nephrectomy for renal mass. The patients had satisfactory numerical rating scale scores, mostly <4 for 24 h. Post-operative opioid consumption was minimal. The external oblique fascial plane block is a novel thoracic block that provides reliable upper thoracoabdominal somatic analgesia. It can certainly be considered a suitable option in surgeries such as nephrectomies that involve an upper lateral abdominal wall incision.

Key words: External oblique intercostal plane block; Nephrectomy; Subcostal

Access this article online

Website:

<http://nepjol.info/index.php/AJMS>

DOI: 10.3126/ajms.v15i2.59407

E-ISSN: 2091-0576

P-ISSN: 2467-9100

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INTRODUCTION

Open nephrectomy is a common surgery usually performed for malignant and non-malignant renal pathologies. Classically, open nephrectomy can be performed by midline, subcostal, and flank incisions. Most commonly, a subcostal incision is preferred due to the ease of accessibility to vessels and smaller incisions. Post-operative pain results in restricted use of respiratory muscles, leading to post-operative pulmonary complications and increased hospital costs. Available regional analgesia options are local infiltration, epidural analgesia, quadratus lumborum block, erector spinae block, paravertebral block, and subcostal transversus abdominal plane (TAP) block. In 2021, Elsharkawy et al.,

came up with a novel fascial plane block technique, external oblique intercostal block (EOIB) which blocks anterior and lateral cutaneous nerves from T6 to T10. They injected the drug at the level of the 6th rib on the anterior axillary line deep to the external oblique muscle (EOM) above the protective barrier of the rib or between the EOM and the external intercostal muscle.¹ EOIB, because of the extensive attachments of the EOM and by virtue of being a fascial plane block, the drug spread covers an extensive anatomical area.² Although EOM is predominately an abdominal muscle, a large part of it lies over the thoracic cage. It originates from the external surface of the lower eight ribs T5-T12 and inserts into the linea alba, iliac crest, and pubic tubercle. The posterior fascial sheath of the EOM is continuous with

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the fascial sheath of the serratus anterior and latissimus dorsi, thus mimicking the local anesthetic diffusion in the serratus anterior muscle plane block, thereby covering lateral cutaneous branches (Figures 1-3).³ Anteriorly, the

fascial sheath of the EOM continues with the anterior and posterior sheath of the rectus abdominis muscle, which explains the coverage of the anterior cutaneous branches of the intercostal nerves. Here, we present a case series of the use of EOIB in patients undergoing open nephrectomy by subcostal incision.

METHODOLOGY

After obtaining written informed consent and ethical approval from the institutional ethics committee, EOIB was performed postoperatively in 10 patients who were posted for open nephrectomy by subcostal incision (Table 1). At the time of surgical closure, injection paracetamol 1 g IV and injection tramadol 50 mg IV were given to all patients. After completion of surgery, before extubation with the patient in the supine position, EOIB was performed using the Sonosite M Turbo, linear transducer. The transducer was kept in the parasagittal plane between the midclavicular line and anterior axillary line with a pointer. The cephalad and ribs were counted from down upward, starting from the 10th rib, and the 6th rib was identified (Figure 4). After this, the cranial end of the transducer was rotated medially, and a paramedian sagittal oblique view with the rib at the short axis was obtained 1–2 cm medial to the anterior axillary line. At this point, the EOM and intercostal muscles are identified, and the needle is inserted from the cephalad to the caudal direction (Figures 5 and 6). The needle tip is aimed to be between the EO and intercostal muscles, and 20 cc of 0.25% bupivacaine was injected in the fascial plane (Figure 7).

Postoperatively, injection paracetamol 1 g IV Q.I.D. was given to all patients as part of multimodal analgesia. Injection tramadol 50 mg IV was given whenever the numerical rating scale (NRS) was ≥ 3 . If, after half an hour of tramadol administration, NRS is >3 , 50 mg of tramadol was repeated. The pain was assessed using NRS at 1, 3, 6, 12, 18, and 24 h. (Tables 2 and 3) Dermatomal coverage of the block was checked at half an hour postoperatively using a cold swab at the anterior axillary line and midline.

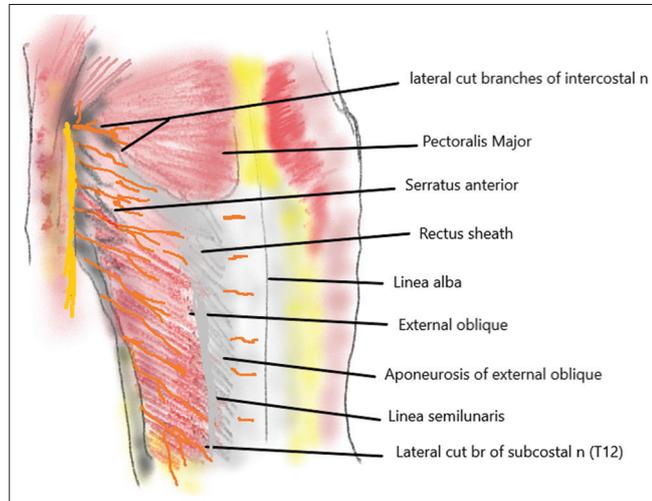


Figure 1: Cutaneous nerve supply upper lateral thoracoabdominal wall

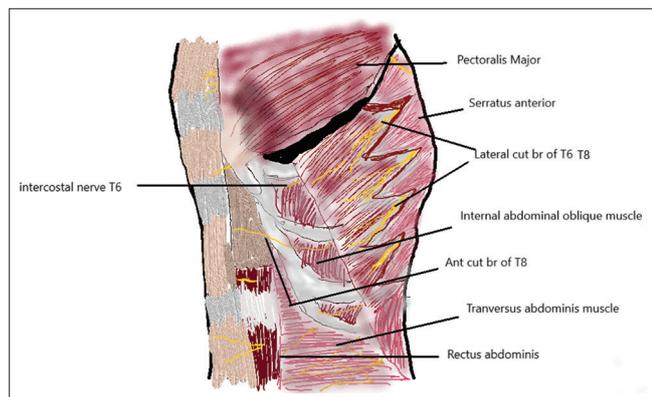


Figure 2: Origin of lateral cutaneous branches of anterior intercostal nerves at angle of ribs in between the slips of serratus anterior muscle between external oblique muscle and rib

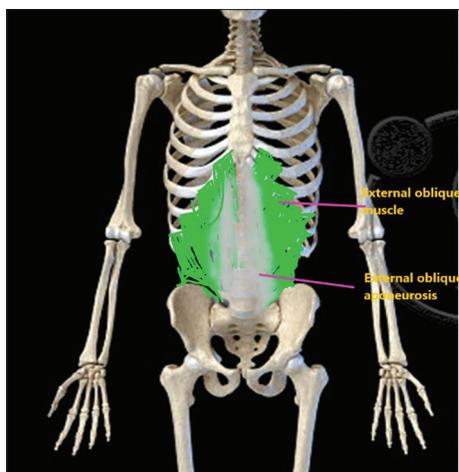


Figure 3: Origin of insertion of external oblique intercostal muscle

Table 1: Demographic profile

Serial no of patients	Age	ASA	BMI	Comorbidities
1	48	II	23	Diabetes
2	70	III	20	HTN, CAD
3	35	II	30.8	Obesity
4	55	II	18	Asthma
5	42	II	23.6	Diabetes
6	30	II	20	Smoker
7	48	III	25.5	CAD
8	66	II	26	HTN
9	49	II	22.5	-
10	38	II	24	Diabetes

CAD: Coronary artery disease, HTN: Hypertension, BMI: Body mass index

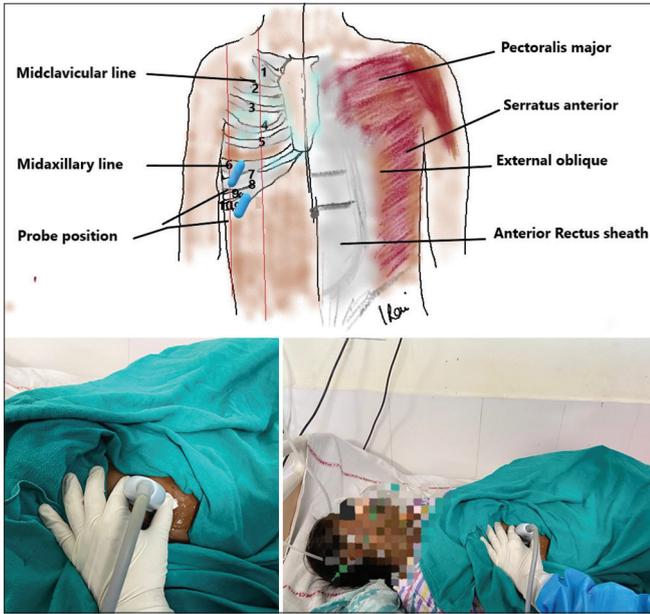


Figure 4: Probe position for external oblique intercostal block

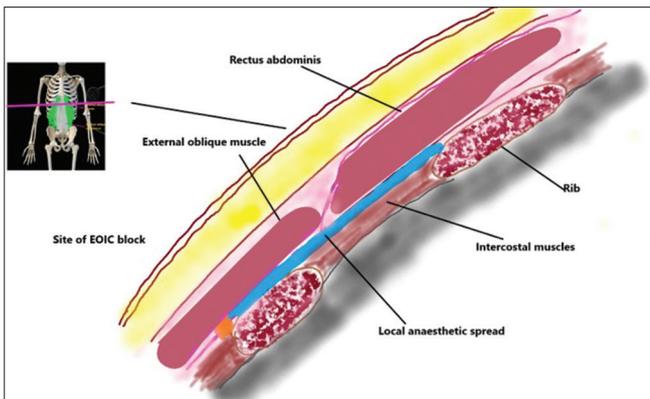


Figure 5: Cross-section at T6 level showing drug spread for external oblique intercostal block

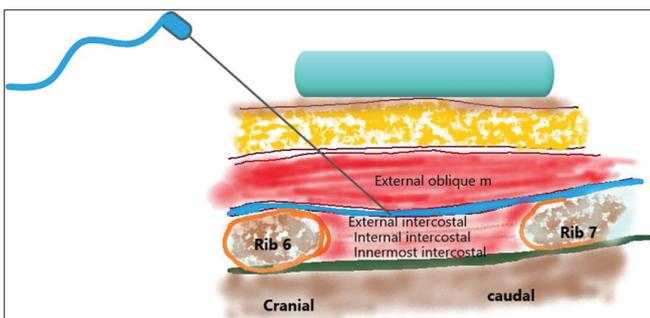


Figure 6: Diagrammatic representation of ultrasound image for external oblique intercostal block

CASE PRESENTATION

Case 1

A 48-year-old-male diabetic patient (ASA grade II) presented with a right non-functioning kidney due to a ureteric stone

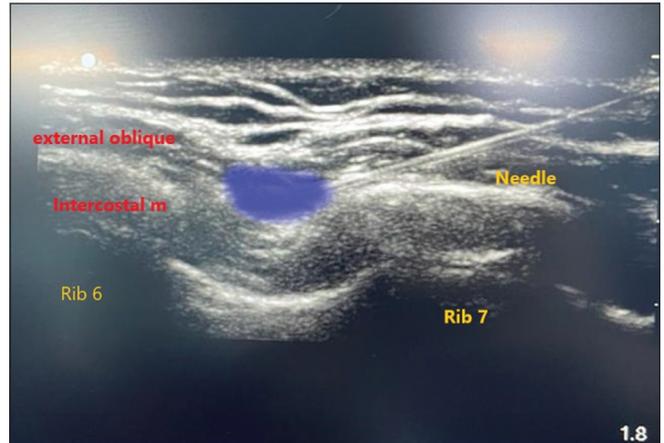


Figure 7: Ultrasound for external oblique intercostal block

Table 2: NRS score

Serial no of patients	On arrival in PACU	1 h	3 h	6 h	12 h	18 h	24 h
1	2	1	1	2	2	2	4
2	2	1	1	4	2	2	5
3	2	0	1	3	3	3	2
4	1	1	3	1	4	3	2
5	3	2	1	4	2	3	1
6	2	0	0	1	1	2	2
7	4	2	2	4	2	3	1
8	3	1	1	1	3	2	1
9	4	1	4	2	4	2	2
10	3	2	4	2	2	3	4

NRS: Numerical rating scale, PACU: Post anesthesia care unit

and was posted for a right simple nephrectomy. EOIB was performed as per our protocol, after the completion of surgery and before extubation. Postoperatively, the patient had satisfactory pain relief with NRS <2 for 18 h and at NRS \geq 4 at 24 h when injection tramadol 50 mg I/V was given to him.

Case 2

A 70-year-old male was posted for a left radical nephrectomy for a left renal mass. The patient was a known case of hypertension and coronary artery disease with ASA grade III. EOIB was given to him as per our protocol. He had NRS 4 at 6 h postoperatively and required additional analgesics.

Analogous to the above, eight more cases were done, which included patients undergoing simple nephrectomy for non-functioning kidneys and radical nephrectomy for renal mass.

RESULTS

The detailed results are as shown in Tables 1-3.

Table 3: Block characteristics

Serial no of patients	Dermatomal Cover anterior axillary line	Dermatomal cover midline	Time of 1 st pain complaint NRS \geq 3	Total number of time request in 24 h NRS \geq 3	Adverse effects nausea, omitting, hypotension
1	T6-T10	T6-T9	24	1	-
2	T7-T10	T6-T10	6	2	-
3	T6-T10	T6-T10	6	3	-
4	T6-T10	T6-T9	3	3	-
5	T6-T10	T6-T9	On arrival in PACU	3	-
6	T6-T10	T7-T10	-	-	-
7	T6-T10	T6-T9	On arrival in PACU	3	-
8	T6-T10	T6-T9	On arrival in PACU	2	-
9	T6-T10	T6-T9	On arrival in PACU	3	-
10	T6-T10	T6-T9	On arrival in PACU	5	-

NRS: Numerical rating scale, PACU: Post anesthesia care unit

DISCUSSION

In this study, it was observed that the NRS score was ≤ 4 most of the time, except in one patient who had NRS 5 at 24 h when injection tramadol 50 mg IV was given as rescue analgesia. Post-operative analgesic consumption is significantly reduced with better patient satisfaction and recovery. The lateral and anterior cutaneous nerves from T6/7 to T10/11 are covered satisfactorily, thus providing excellent anterolateral abdominal wall somatic analgesia without any side effects.

Open nephrectomy incisions are intensely painful, leading to significant post-operative pulmonary complications, a delay in ambulation with a risk of thromboembolism, a delay in discharge, and chronic pain. In subcostal incision, for open nephrectomy, somatic pain is from the T6 to T9 dermatomes, and visceral pain is mediated by sympathetic fibers.

The contemporary gold standard for post-operative analgesia in thoracoabdominal surgeries is epidural block, but it has disadvantages such as anticoagulation concern, hypotension, motor block, technical difficulty, and complete spinal.⁴ Paravertebral block has the disadvantage of closeness to neuraxis, pleura, and other critical structures. Moreover, it is an advanced block; there are chances of arterial puncture, and subsequent bleeding will be difficult to control by pressure. Hematoma at such a critical location can prove fatal. Regional analgesia has witnessed a renaissance and ultrasonography has made it possible to deposit the drug into the vicinity of the nerve or the plexus, and hence, the reliability and success of our blocks have increased overall. The complications have been reduced but have not been eliminated as yet. On the contrary, some studies claim that the rate of complications with or without the use of ultrasound (USG) is almost similar even today, despite flooding in the field of USG-guided peripheral nerve blocks.

Quadratus lumborum block covers both somatic and visceral components of pain, but it is an advanced block and has its disadvantages, such as technical and positional

difficulty, risk of motor block due to vicinity to the lumbar plexus, retroperitoneal hematoma, and inconsistent blocking of lower thoracic segments. Abd Ellatif and Abdelnaby et al., 2021 compared the erector spinae plane (ESP) block with the quadratus lumborum block for post-operative analgesia in open nephrectomy.⁵ They concluded that ESP is better than quadratus lumborum block, as the latter is technically challenging and time consuming. ESP provides somatic as well as visceral analgesia but is faced with challenges such as positioning difficulty, chances of sympathetic block, and proximity to neuraxis.

The lateral TAP block fails to cover dermatomes at the incision site and the anterior cutaneous branches of intercostal nerves. In subcostal TAP, the lateral cutaneous branches are spared. Besides, the analgesic effect of these blocks is highly limited and variable.⁶ In 2018, Hamilton and Manickam proposed that upper abdominal wall analgesia can never be achieved with any TAP block done inferior to the subcostal margin but is possible with a thoracic fascial plane block, either superficial or deep to the EOM.⁷ In 2019, they concluded that injection deep into the EOM was superior in a cadaveric dye study.^{8,9}

In 2021, Elsharkawy et al., introduced a new block external oblique intercostal plane block (EOIB) as the rhomboid intercostal and rhomboid intercostal sub-serratus blocks failed to cover anterior cutaneous branches.¹ EOIB has many advantages such as easy sonoanatomy, superficial location at a compressible site, easily performed in obese patients, needle insertion site is away from the surgical site, can be performed in the supine position, no anticoagulation concern, technical simplicity, and ease of catheter placement.^{10,11} The rib acts as a protective barrier against inadvertent pneumothorax. By cadaveric dye study, they found that the lateral and anterior cutaneous nerves from T6/7 to T10/11 are covered and can be used for upper abdominal wall analgesia (Figures 1-3) It lacks visceral or sympathetic blockade, making multimodal analgesia necessary. Only somatic nerve fibers are targeted in EOIC. One more drawback is difficulty in block placement in

females with huge lumpy breasts. This block has substantial potential for use in upper lateral thoracic abdominal surgeries such as open cholecystectomy with Kocher incision, nephrectomy, hepatobiliary surgery with Chevron incision, abdominal wall tumors, and laparoscopic surgeries (bilateral EOIC is preferred).

In 2022, White and Ji used EOIC in obese patients for upper abdominal surgery. Patients had significant pain relief, and the block was performed without much ardue.¹²

In 2023, Petiz et al., used EOIC in open-donor nephrectomy patients and concluded that EOIC is effective and opioid sparing. The NRS score in their study was 3 at rest immediately after surgery and 2, 2, 0, 0 at 6, 12, 24, and 48 h, respectively.¹³ In our study, the NRS score was ≤ 4 most of the time, except for one patient. One patient had NRS 5 at 24 h when injection tramadol 50 mg IV was given as rescue analgesia.

In a nutshell, EOIC is a safe, reliable block with attractive dermatomal coverage that is not being provided by any of the facial plane blocks in the regional anesthesia armamentarium at present.

CONCLUSION

The external oblique fascial plain block is a novel thoracic block that provides reliable upper thoracoabdominal somatic analgesia. It can certainly be considered a suitable option in surgeries such as nephrectomies that involve an upper lateral abdominal wall incision. Randomized controlled trials with a larger number of patients are required to validate the results further.

ACKNOWLEDGMENT

None.

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Source of Support: Nil, **Conflicts of Interest:** None declared.