Case Report

Bilateral high thoracic continuous erector spinae plane blocks for postoperative analgesia in a posterior cervical fusion

ABSTRACT

Posterior decompression and instrumentation of the cervical spine are associated with severe postoperative pain due to extensive soft tissue and muscle dissection during the surgery. In this case series, we describe bilateral continuous cervical erector spinae plane block (CESPB) placed at T1-2 through the thoracic erector spinae plane. A series of 4 patients underwent posterior cervical decompression and stabilization for various surgical indications. The CESPB block provides intense analgesia with low requirements of anesthetic drugs in the perioperative period and opioid-free analgesia in the postoperative period. The spread of local anesthetic was studied by performing CT contrast studies after obtaining informed consent.

Key words: Acute pain; cervical spine fusion; erector spinae plane block; regional anesthesia; ultrasound

Posterior decompression and instrumentation of the cervical spine is associated with severe postoperative neck pain, which is a result of the extensive soft tissue and muscle dissection during the surgery.[1] Inadequate pain control can delay recovery during the postoperative period and prolong hospital stay.[2] The erector spinae plane block (ESPB) was first described in 2016 for managing chronic thoracic neuropathic pain in a cancer patient.[3] It continued to evolve as a block for the management of postoperative pain in various thoracic, abdominal, and lower limb surgeries among adults and pediatric patients as it is easy to perform and provided good quality analgesia.[4] The ESPB has been used in lumbar and thoracic spine surgeries to provide effective perioperative analgesia.[5] Through its action on the dorsal rami, the ESPB provides extensive analgesia in the postoperative period. In this case series, we describe the use of cervical ESPB (CESPB) in four patients undergoing posterior cervical spine decompression and fusion to provide postoperative analgesia. Written informed consent was obtained from all patients in this case series.

Case description

The basic demographic details and the level of operation are summarized [Table 1]. The four patients described in this case series underwent posterior cervical decompression with posterior laminectomy, pedicle instrument fixation, and interbody fusion. After induction of general anesthesia,

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the patient was positioned prone and the patient received bilateral ESP blocks at T1 (cases 1 and 2) or T3 (cases 3 and 4) with 20 mL of 0.2% ropivacaine with a mixture of 25 mcg of dexmedetomidine. After skin disinfection under the guidance of high-frequency linear probe (M-Turbo, Sonosite, Bothel, USA) bilateral ESP catheters were placed at the same level and inserted until the tip of the catheters were positioned 2 levels below the lowest level of decompression. The catheter was subcutaneously tunneled laterally away from the surgical incision site [Figure 1a]. The same procedure was repeated on the opposite side. A continuous infusion of 0.1% ropivacaine at an infusion rate of 5 mL/h was commenced in the post-anesthesia care unit (PACU) through the ESP catheters for the next 48 h. No additional opioid was given during the operation after the initial dose of intravenous 1.5 μg/kg fentanyl at the start of anesthesia in every patient. All patients were hemodynamically stable throughout the operation. Neurologic examination in the immediate postoperative period was normal in all patients, with full motor strength and intact sensation in the four extremities. Every patient received a standard regimen of 1 g of intravenous paracetamol every 8 h and 75 mg of diclofenac every 12 h for the next 48 h. Intravenous fentanyl was prescribed as needed for the management of additional breakthrough pain during the postoperative period.

The Numeric Rating Scale (NRS) pain score of the patients from the immediate postoperative time (0 h) to 48 h after the operation are summarized in Table 2. Initial pain scores reported at the arrival to PACU ranged from 2–3/10. The follow-up pain scores ranged from 2–3/10 (2 h), 2/10 (4 h), 1–2/10 (8 h), 1/10 (12 h), and 1/10 (24 h), respectively. Only one patient (Case 1) received one rescue dose of 50 mg of tramadol at 2 h after operation and 50 μg of fentanyl at 4 h after the operation. The other three patients did not receive any additional doses of fentanyl during the postoperative period. The CESPB catheters were removed at 48 h postoperatively and the patients were discharged without complications.

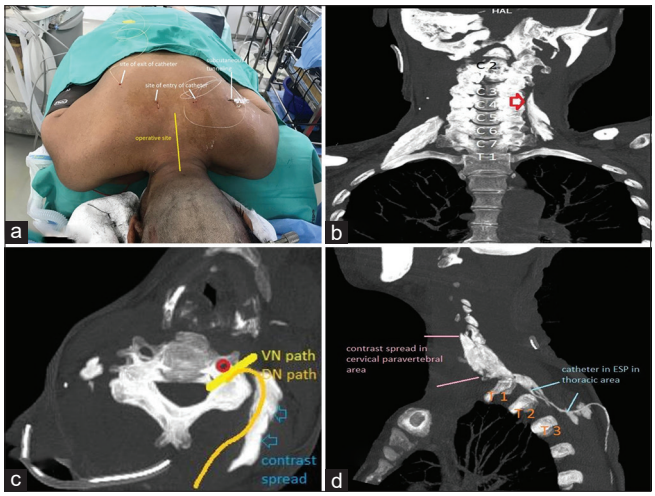

Figure 1: (a) Bilateral subcutaneously tunneled ESP catheters. (b) Coronal image depicting a bilateral spread of contrast in the paravertebral area (red arrow). (c) Axial plane depicting the bilateral spread of the contrast in the cervical erector spinae plane which also includes the dorsal rami (blue arrow). (d) Sagittal image depicting the catheter insertion at T2-3 and contrast spread below erector spinae muscle and in the paravertebral space

Computed tomographic (CT) contrast imaging studies

After receiving informed consent from all the patients, CT contrast imaging studies were performed 24 h after the surgery to investigate the spread of injectate after CESPB axial, sagittal, and coronal planes. A solution containing 3 mL of omnipaque (300 mg iodine/mL) with 17 mL of 0.9% saline was injected into each CESPB catheter. The resulting CT images [Figure 1b-d] were interpreted by a consultant radiologist. The results of contrast dye spread injected through the bilateral CESP catheters are described in Table 3. Every patient demonstrated paravertebral spread and to the dorsal ramus in the coronal plane with no spread to the ventral ramus.

Discussion

ESPB in cadavers has established that it provides an effective blockade of dorsal rami of spinal nerves.[6] The multifidus cervical plane block is a related technique that has been described for perioperative analgesia in cervical spine surgery.[7] However, two theoretical complications can exist with the abovementioned approach; the needle can transgress the intrathecal space or it may perforate the artery accompanying the dorsal rami.[8] Extensive posterior cervical exploration and instrumentation is a cause for severe pain in the postoperative period. The postoperative pain relief must be aimed at multimodal analgesia (MMA) with opioid-sparing strategies.

To our knowledge, the continuous cervical erector spinae for cervical spine surgery is not described. The catheters and infusions were placed in sterile conditions. Rapid recovery, tolerance of endotracheal tube for the first 24 h, and no intravenous fentanyl requirements in the postoperative period were the chief highlights in our case series. Contrast studies revealed no encroachment of LA in the surgical field. An infusion of 0.1% ropivacaine at 5 mL/h provided good pain relief with IV paracetamol 1 g 8 hourly.

In contrast to the single injection multifidus cervicis plane block and the cervical interfascial plane block reported for cervical spine surgery, bilateral continuous catheters introduced at T1 provided uninterrupted delivery of LA for postoperative pain

Table 1: Demographic characteristics of the patients

	Case 1	Case 2	Case 3	Case 4
Age	24		45	28
Sex	M	M	F	M
B M I	25	25.3	21.7	25.6
A S A	I	II	I	I
Duration of Surgery	154min	187min	138min	143min
Duration of Anesthesia	169min	198min	159min	153min
Surgical level	C2-7	C3-7	CI-TI	C2-TI
CESPB level	TI	T I	T3	T3

Table 2: Numeric Rating Scale (NRS) pain scores at the postoperative period of 48 hours

Time (hr)	VAS for case 1	VAS for case 2	VAS for case 3	VAS for case 4
0	3		2	3
2	3	2	2	2
4	2	2	2	2
8	2	1	1	2
12	1	1	1	1
24	1	1	I	I
30	1	1	1	1
36	2	1	1	1
48	2	2	1	I

Table 3: Computed tomography contrast image patterns

	Spread seen in Axial plane	Spread seen in Sagittal plane	Spread seen in Coronal plane
Case 1	Between the groove of splenius and levator scapulae. Close to the dorsal rami of right C3 and left C6.	From lateral to medial close to the paravertebral space at right C3 and left C6	Catheter entry at T1-2. Paravertebral spread at right C3and left C 6
Case 2	Between the groove of splenius and levator scapulae. Close to the dorsal rami of right C6 and left C2	From lateral to medial close to the paravertebral space at right C6 and left C2	Catheter entry at T2-3. Paravertebral spread at right C6 and left C2
Case 3	Between the groove of splenius and levator scapulae. Close to the dorsal rami of right C4 and left C2	From lateral to medial close to the paravertebral space at right C4 and left C2	Catheter entry at T 1-2. Paravertebral spread at right C4 and left C2
Case 4	Between the groove of splenius and levator scapulae. Close to the dorsal rami of right C3 and left C3	From lateral to media l close to the paravertebral space at right and left C3	Catheter entry at T2-3. Paravertebral spread at right C3 and left C3

relief. Bilateral single injections of long-acting local anesthetic agents in the thoracocervical ESP for dorsal spine surgery would provide intraoperative analgesia extending for a few hours in the postoperative period.

This novel approach warrants further prospective study and comparison with single-injection techniques to establish the role of CESPB for dorsal spine surgery.

Conclusion

To conclude, bilateral continuous CESPB is an easy modality of managing perioperative pain by providing opioid-free or opioid-sparing analgesia thus promoting early recovery. We recommend incorporating CESPB in the MMA regimen for all patients undergoing cervical to dorsal spine surgery.

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Conflicts of interest

There are no conflicts of interest.

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