Ultrasound-Guided Transversus Thoracis Muscle Plane Block Provides Effective Postoperative Analgesia for Pediatric Open Pectus Carinatum Surgery: First Report

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Dear Editor,

Pectus carinatum (PC) is one of the common anterior chest wall protrusion deformities. Surgical treatments include suprasternal compression bar placement or resection of deformed cartilage with sternal osteotomy. Open PC surgery is characterized by mild to severe postoperative pain that is around the sternum. Inadequate treatment of this pain leads to several pulmonary complications such as restricted postoperative breathing, increased pulmonary secretions, and atelectasis [1]. Inadequate pain management during the acute postoperative period may be related to chronic pain. In recent years, ultrasound-guided plane blocks such as erector spinae plane (ESP), serratus anterior plane (SAP), pectoral nerves (PECs), and rhomboid intercostal plane blocks have been frequently applied for chest surgeries [2–4]. However, the effectiveness of these blocks in the parasternal region could be limited [5].

Transversus thoracis muscle plane (TTMP) block is a newer regional anesthesia technique that provides analgesia to the anterior branch of the second to sixth intercostal nerves (Figure 1). In the literature, the TTMP block was used for sternal fracture, medial rib fracture, sternotomy, chronic pain, and medial coverage for breast surgery [6, 7]. Although there are a few studies in the pediatric population with these indications, the TTMP block may be an alternative regional analgesic method for pediatric open heart surgery [5]. It can provide early extubating by reducing postoperative opioid consumption. Here, we first describe the successful usage of the TTMP block for postoperative pain management in a patient undergoing an open PC surgery procedure.

Written consent was obtained from the patient for the procedure and future publishing.

A 15-year-old, 55-kg, 160-cm male patient was taken to the operating room for open PC surgery. The operation decision was made for cosmetic appearance; the patient did not have significant physical or cardiopulmonary symptoms. The patient was premedicated with 2 mg of midazolam. After general anesthesia, TTMP block application was planned for postoperative analgesia before the surgical procedure as a part of multimodal analgesia.

The patient was placed in the supine position, and the parasternal region and linear ultrasound probe were sterilized. The ultrasound probe was placed 2 cm lateral to the sternum at the fourth and fifth ribs, level with longitudinal parasagittal orientation. Then, the ultrasound probe was rotated and placed between the fourth and fifth ribs in the transverse plane. The pleura, transversus thoracic muscle, intercostal muscles, and pectoral major muscle were visualized (Figure 1A). A 100-mm sonovisible needle was inserted from a medial to lateral direction with the in-plane technique, and it was advanced between the intercostal and transversus thoracic muscle planes. The location of the needle was confirmed by a 2-mL saline solution, and then the block was performed with 20 mL of 0.25% bupivacaine bilaterally (Figure 1B). A 10-cm vertical incision was performed on the sternum. The skin was retracted laterally, and the pectoralis muscle was mobilized to reach the deformed cartilages. Cartilage from the third, fourth, and fifth parasternal deformed ribs was resected from each side without damaging the perichondrium. The pectoral muscles were refixed at the midline, and a drain was
placed over the sternum. The patient was given 10 mg/kg of paracetamol every six hours and 50 mg of dextropropofen twice a day.

Postoperative pain control was assessed using the numerical pain rating scale (NRPS; 0 = no pain to 10 = the worst possible) during rest and active movement. The NRPS at rest in the first 24 hours was 0, with a maximum of 4 during active movement. No additional opioid requirement occurred during the first 24 hours, and no postoperative complications were recorded.

The second to sixth intercostal nerves are confined to the walls of the thorax and named thoracic intercostal nerves. Near the sternum, they cross in front of the internal thoracic artery and transversus thoracic muscle. They are blocked between the internal intercostal muscles and the transversus thoracic muscle by a TTMP block procedure. In these surgeries, other plane blocks such as ESP and SAP blocks could be used for postoperative analgesia. However, considering the surgical region and course of the intercostal nerves, we think that the TTMP block is more target-oriented than the others. The nerves that play a key role in the innervation (medial branches of the thoracic intercostal nerves) of the parasternal region may not be fully blocked with other plane blocks (ESP, SAP, PECs, etc.). Potential complications of the block are infection, hematoma, internal mammary artery puncture, pleural puncture, pneumothorax, and intravascular injection.

In this report, which is limited to the parasternal region, causing severe pain postoperatively, the TTMP block may be a part of the multimodal analgesia concept by reducing pain scores and opioid consumption. Comparative studies assessing other regional anesthetic techniques are needed to further our understanding of the effectiveness of TTMP block.

Authors’ Contributions
The manuscript has been read and approved by all co-authors.

References
Dear Editor,

Chronic low back pain (CLBP) following lumbar discectomy is a well-recognized disorder. Current therapeutic strategies for this condition include conservative treatment or surgery. However, none of these methods address the underlying problem. De Palma et al. [1] hypothesized that symptomatic annular fissures in discs previously treated by discectomy might be effectively treated with intradiscal injection of biologic agents, but to date no study has tested biologic therapies for this subgroup of patients. Indeed, patients with previous surgery have specifically been excluded from studies of intradiscal injection therapies.

A 33-year-old male presented to our clinic with low back pain without referred pain or radicular symptoms. This pain commenced a few months after an L5-S1 discectomy performed 15 years ago and had worsened over the last two years. Magnetic resonance imaging revealed a Pfirrmann grade IV degeneration of the L5-S1 intervertebral disc with a focal, posterolateral protrusion. We postulated that this disc was the source of pain but did not undertake discography as a diagnostic test because some consider discography to be contraindicated in previously operated discs [2]. Treatment options discussed included fusion, artificial disc implantation, and intradiscal injection of platelet-rich plasma (PRP). The patient consented to the latter.

After intravenous injection of antibiotics, the procedure was performed under aseptic conditions in an angiography room with single-plane digital fluoroscopy and the patient under conscious sedation. A 1.5-mL aliquot of previously prepared autologous PRP was injected into the L5-S1 disc. The clinical outcome was evaluated using Visual Analog Scale and Oswestry Disability Index scores.

Before treatment, these scores were 8 and 74, respectively. At two months after treatment, these scores decreased remarkably to 3 and 34, and they decreased further to 1 and 22 at 12 months, after which they remained stable until last follow-up at 36 months.

To the best of our knowledge, this is the first reported case of CLBP successfully treated with a single intradiscal injection of autologous PRP into a degenerated disc previously subjected to discectomy. We acknowledge that a single case does not constitute evidence of effectiveness, let alone efficacy, but we are encouraged—and perhaps others might also be encouraged—to explore this treatment for patients with recurrent pain after discectomy: a