Ultrasound-guided intertransverse process block

- Distribution pattern of different volumes of ropivacaine in ultrasound-guided intertransverse process block: a randomized, blinded, computed tomography imaging study
- Intertransverse Process Block With Catheter Placement for Postoperative Pain Management in a Patient With Alcoholic Liver Disease and Portal Hypertension: A Case Report
- Intertransverse process block versus subcostal transversus abdominis plane block in patients undergoing laparoscopic radical gastrectomy: a prospective randomized controlled trial
- Intertransverse process block (ITPB) at the retro-superior costotransverse ligament (retro-SCTL) space: Evaluation of local anesthetic spread using MRI and sensory blockade in healthy volunteers
- Comparison between ultrasound-guided intertransverse process and erector spinae plane blocks for breast cancer surgery: A randomised controlled trial
- Ultrasound-guided quadratus lumborum block in sheep: A cadaveric study
- Anatomical assessments of injectate spread stratified by the volume of the intertransverse process block at the T2 level
- Comparison of injectate spread and nerve coverage between single-injection intertransverse process block and paravertebral block at the T2 level: a cadaveric study

An **ultrasound-guided intertransverse process block (ITPB)** is a **regional anesthesia technique** that targets the **dorsal rami and potentially the ventral rami of spinal nerves** by injecting local anesthetic between adjacent **transverse processes** of the vertebrae. It's especially useful for **thoracic and lumbar analgesia**, and is sometimes used as an alternative or adjunct to other regional techniques like **erector spinae plane blocks (ESPB)** or **paravertebral blocks (PVB)**.

🧠 Anatomical Basis

- The **intertransverse space** contains **connective tissue**, **muscles** (intertransversarii), and potentially communicates with the **paravertebral space**.

- Local anesthetic in this plane may spread to:

1. **Dorsal rami**
2. **Ventral rami**
3. Possibly **sympathetic chain**, if spread is deep enough

🔧 Technique Overview

1. **Patient Position** - Lateral decubitus or prone position, depending on level and operator preference

2. **Ultrasound Probe** - **High-frequency linear probe** for superficial targets (upper thoracic) - **Low-frequency curvilinear probe** for deeper targets (lower thoracic/lumbar)

3. **Target Level** - Usually **T5-T8** (for thoracic procedures), but lumbar levels can also be accessed

4. **Probe Orientation** - **Parasagittal** view over transverse processes

5. **Needle Insertion** - **In-plane** technique from **cranial to caudal** - Advance needle into the **intertransverse connective tissue space**

6. **Injection** - Inject **5–20 mL** of local anesthetic (e.g., ropivacaine 0.25%–0.5%) - Watch for **hydrodissection** of the space and spread of the injectate between transverse processes

🎯 Indications

- Thoracic surgery (e.g., VATS) - Rib fractures - Lumbar spine surgery - Postoperative analgesia

⚠️ Advantages

- **Less risk of pleural puncture** compared to paravertebral block - Easier visualization in some patients than ESPB - Potentially better spread to both **anterior and posterior rami**

🚫 Complications

- Vascular puncture - Local anesthetic systemic toxicity (LAST) - Inadvertent intrathecal or epidural injection (rare) - Inadequate analgesia if spread is limited

Randomized Controlled Trials

A study investigates the spread of ropivacaine in the context of an ultrasound-guided intertransverse process block (ITP block), using computed tomography (CT) to visualize distribution patterns across various anatomical compartments. The researchers enrolled 45 adult patients who were randomized to receive three different volumes of 0.375% ropivacaine mixed with a contrast agent [1].

Strengths

- **Innovative imaging-based design:** This is one of the few RCTs evaluating real-time distribution of local anesthetic in living humans using CT. This gives it high translational value compared to cadaveric or theoretical models.

- **Clear focus on anatomy:** The study thoroughly explores multiple compartments: paravertebral space, visceral compartment, erector spinae plane block, [[intercostal space, sympathetic ganglion, and more.

- **Blinded and randomized:** Although only single-blinded, the use of randomization and blinding in data analysis increases internal validity.

- **Quantitative modeling:** The use of multivariate analysis (e.g., F models, R^2) to evaluate the influence of position, volume, and BMI adds depth to the interpretation.

Weaknesses

- **Small sample size:** With only 15 participants per group, the study may be underpowered to detect small but clinically relevant differences in secondary outcomes like VAS score or dermatomal spread.

- **Lack of sensory correlation:** Although dermatomal sensory loss was assessed, the article does not link specific patterns of anesthetic spread to functional or clinical anesthesia levels.

- **Limited clinical utility of imaging findings:** While the CT images clarify distribution patterns, it's uncertain how much these patterns correlate with real-world analgesic effectiveness, which is the ultimate goal of the block.

- **Minimal variation in outcomes across volumes:** The primary hypothesis regarding volume-related spread was not supported, suggesting either a true plateau in distribution or insensitivity of the imaging protocol to subtle differences.

- **No comparison to other block techniques:** The study could have strengthened its implications by comparing ITP with standard paravertebral_block or erector_spinae_plane_block.

Key Findings

- The spread of local_anesthetic was most frequent in the paravertebral, visceral, erector spinae plane, and intercostal compartments, irrespective of the volume administered. - The most influential variable for spread was **patient positioning**, not anesthetic volume or BMI. - A prone position was associated with greater anterior (prevascular) spread ($B = 2.45$, $P = 0.002$). - **No significant differences** were found in secondary outcomes like pain scores or block-related complications.

Clinical Implications

This study adds evidence that ITP blocks consistently reach multiple relevant anatomical targets, supporting their use as a versatile technique for thoracic analgesia. However, clinicians should not assume greater anesthetic volumes lead to broader analgesia. Instead, **patient positioning** appears to be a more critical factor and should be optimized when performing these blocks.

Conclusion

This is a methodologically sound and anatomically insightful trial that advances understanding of ITP block mechanics in vivo. However, the lack of correlation between spread and analgesic effect, along with the modest sample size, limits its immediate clinical applicability. Future studies should expand sample sizes, include functional outcomes, and compare ITP with other interfascial plane blocks.

Sixty-one patients who underwent ALIF surgery were enrolled. For thirty-one of them, a continuous local anesthetics infiltration system was used at the abdominal site. They collected data regarding the patients' sleep quality; satisfaction with pain control after surgery; abilities to perform physical tasks and the additional application of opioids in the postoperative 48 hours.

The On-Q system group showed reduced visual analog scale scores for pain at the surgical site during rest and movement at 0, 12, 24, and 48 hours; and more were satisfied with pain control management at the first postoperative day (7.0 ± 1.2 vs. 6.0 ± 1.4; P = 0.003) and week (8.1 ± 1.6 vs. 7.0 ± 1.8; P = 0.010) than the control group. The number of additional patient-controlled analgesia (PCA) bolus and pethidine injections was lower in the On-Q group (PCA: 3.67 ± 1.35 vs. 4.60 ± 1.88; P = 0.049 and pethidine: 2.09 ± 1.07 vs. 2.73 ± 1.38; P = 0.032). Patients who used the On-Q system performed more diverse activity and achieved earlier ambulation than those in the control group.

Continuous wound infiltration with ropivacaine using an On-Q system may be effective for controlling postoperative pain after ALIF surgery [2].

1)
Wang CW, Zou P, Zhang ZX, Si MY, Yi QG, Zhan LF. Distribution pattern of different volumes of ropivacaine in ultrasound-guided intertransverse process block: a randomized, blinded, computed tomography imaging study. BMC Anesthesiol. 2025 Apr 5;25(1):155. doi: 10.1186/s12871-025-03017-x. PMID: 40188337.
2)
Lee SM, Yun DJ, Lee SH, Lee HC, Joeng KH. Continuous wound infiltration of ropivacaine for reducing of postoperative pain after anterior lumbar fusion surgery: a clinical retrospective comparative study. Korean J Pain. 2021 Apr 1;34(2):193-200. doi: 10.3344/kjp.2021.34.2.193. PMID: 33785671.