

Percutaneous Intercostal Cryoneurolysis: The Future of Perioperative Analgesia for Thoracic Surgery?

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INTRODUCTION

Cryoneurolysis is a technique based on application of cold temperatures to freeze a targeted tissue site, resulting in **2nd degree reversible nerve injury, known as Wallerian degeneration**. This injury results in a disruption in nerve signaling, but **preserves the ability for nerve regeneration over weeks to months**. Thus, it can provide a potential modality for reducing pain signaling.

- Cryoneurolysis has been used in chronic pain management
- Studies on mastectomy and rib fracture patients have demonstrated profound analgesic benefit and reduced incidence of chronic pain.
- Thoracic surgery has high incidence of chronic post-thoracotomy pain

METHODS

Right flank pain and abdominal pain:

- **Anterior quadratus lumborum (QL) block**
- **External oblique intercostal (EOI) fascial plane block**

Right thoracic wall pain

- **T5-T7 paravertebral block** - immediate pain relief and to tolerate cryoneurolysis
- ***T5-T9 intercostal cryoneurolysis**



Figure 1: Post-thoracotomy incision as target site for ultrasound guided percutaneous intercostal cryoneurolysis.

CASE REPORT

57 year-old female with renal clear cell carcinoma complicated by tumor thrombus in the right renal vein/IVC junction underwent right open radical nephrectomy and level 1 thrombectomy. Additional history of chronic flank pain treated with MS Contin 15 mg BID and Hydromorphone 2mg.

Following additional imaging, a right lower lobe lung nodule was identified as primary adenocarcinoma. Approximately 2 months after initial open nephrectomy, the patient underwent robotic assisted segmentectomy of the RLL.

- Initially discharged, but readmitted on POD 10 with several days of persistent abdominal, chest wall, and back pain
- Unrelieved by high-dose opioids
- Acute pain team was consulted: Combination of regional anesthesia (blocks and cryoneurolysis) performed successfully - **See methods for details**

After the procedures, patient reported no pain and her symptoms had improved dramatically. She was cleared for discharge < 36 hours after presenting with intractable pain.

Follow-up (s/p intercostal cryoneurolysis)

- 6 weeks: minimal postsurgical pain (2/10), gabapentin + hydromorphone PRN (1-2 mg PRN, at most 2x/day)
- 2 months: limited to no pain (1/10), no opioids, only gabapentin
- 3 months: minimal to no pain (1/10), no analgesic medications

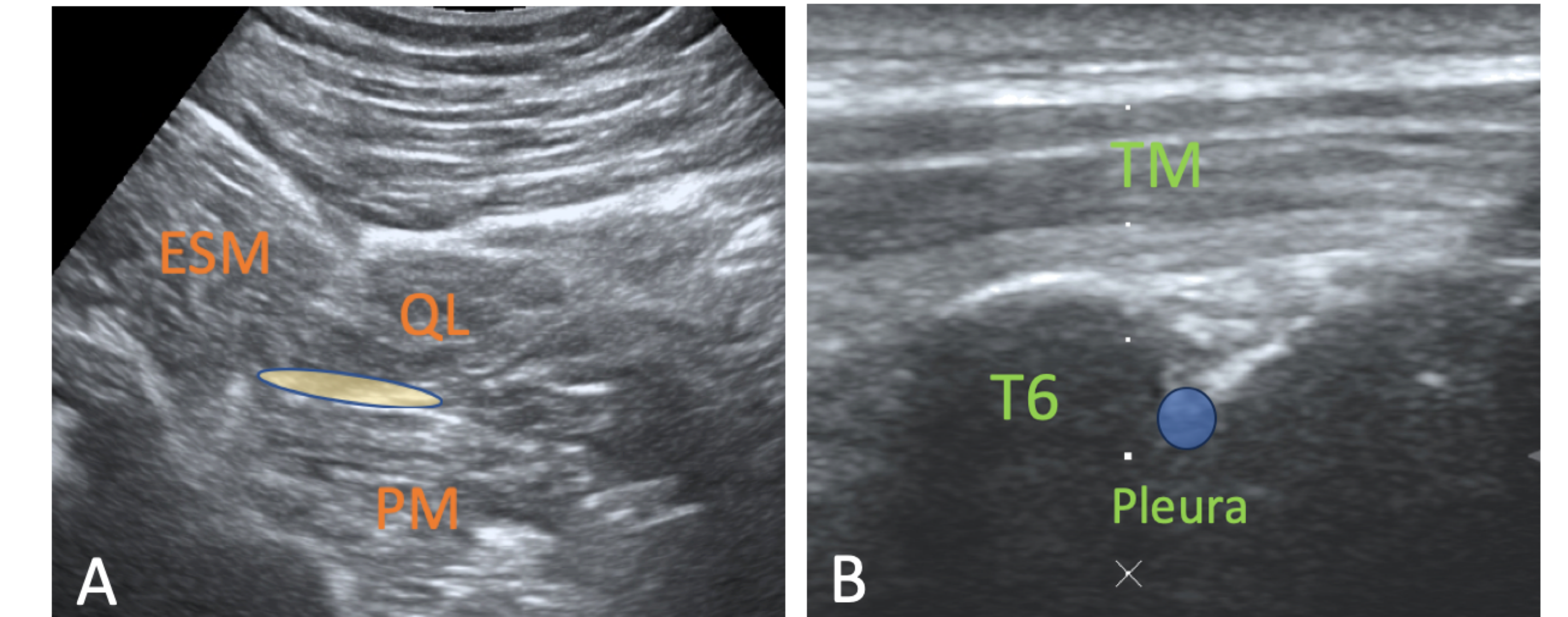


Figure 2: Ultrasound of anterior QL block (A) and intercostal cryoneurolysis (B). Needle tip and site of cryoneurolysis indicated by blue circle. ESP: Erector Spinae Muscle, QL: Quadratus Lumborum Muscle, PM: Psoas Major Muscle, TM: Trapezius Muscle, T6: 6th Thoracic Rib

DISCUSSION

- Cryoneurolysis has shown promise as an alternative to traditional techniques for managing postop pain
- ***Opioid-sparing benefit and potential reduction in chronic postsurgical pain***
- Relevant s/p mastectomy, thoracotomy, orthopedic surgery, and traumatic injuries (rib fractures)
- ***Our case demonstrates a combination of regional anesthetic interventions, providing effective and extended relief for unrelenting post-surgical pain***
- 50% of post-thoracotomy patients report pain that interferes with their day-to-day life
- Percutaneous cryoneurolysis could provide benefit to patients following extensive surgical interventions with high risk of prolonged postoperative pain

Abstract &
References

