

# Sternal Blocks Beyond the OR

## successful use of transversus thoracic plane blocks for CPR-related sternal pain to facilitate buprenorphine induction

Reade E. Tillman MD<sup>1,2</sup>, Kelly Kaneshiro DO<sup>1</sup> and Vineesh Mathur, MD<sup>1</sup>

<sup>1</sup> Regional Anesthesiology and Acute Pain Medicine, Johns Hopkins University School of Medicine, Baltimore, MD, USA; <sup>2</sup> Critical Care Medicine, Johns Hopkins School of Medicine, Baltimore, MD, USA

### BACKGROUND

Parasternal blocks (PSB) including superficial and deep intercostal plane blocks and transversus thoracic plane block (TTP), are frequently utilized in management of post-sternotomy pain.<sup>1-4</sup> Less is published regarding the use of PSB for non-sternotomy indications, including traumatic sternal fractures<sup>5,6</sup> or acute sternal pain after chest compressions during CPR.

Patients with opioid use disorder (OUD) often experience severe acute pain that can be difficult to manage.<sup>7</sup> Pharmacotherapy with buprenorphine or methadone is well-established for OUD treatment and initiation of either medication during acute pain episodes is critical for stabilizing baseline opioid tolerance. Until this occurs, opioid-based analgesia often offers limited relief. However, starting buprenorphine while treating acute pain with full opioid agonists risks precipitated withdrawal as the partial agonist/high affinity buprenorphine displaces the full agonist, resulting in abrupt decline of opioid receptor activation.<sup>8</sup> In this context, microdosing buprenorphine can facilitate successful induction and leveraging non-opioid and interventional pain strategies can improve tolerability of this process.

**We present the case of a complex patient with OUD and severe sternal pain after CPR who underwent TTP block to facilitate buprenorphine induction.**

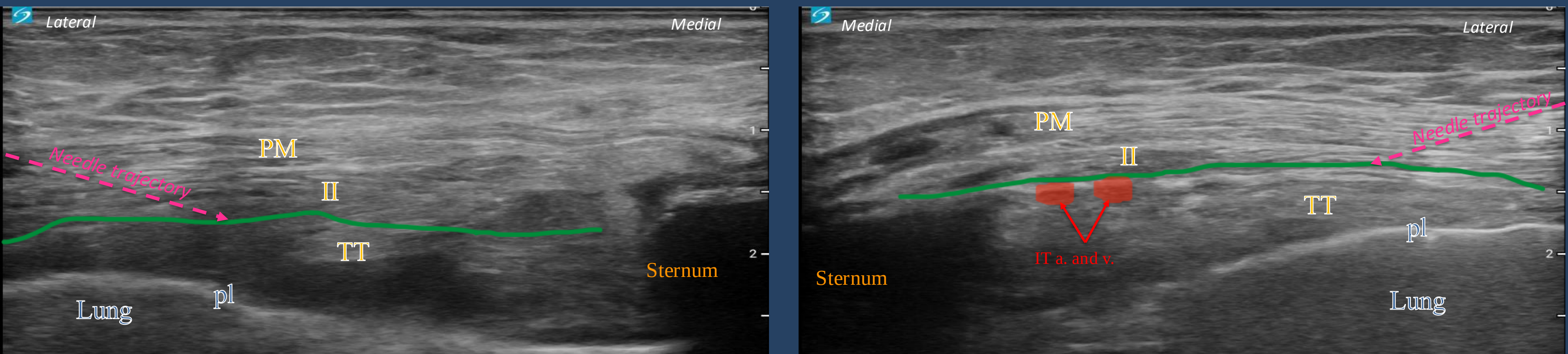
### CLINICAL CASE

- 62F with history of COPD, HTN, DM, prior left CEA, CAD s/p DES (2017), CKD3 and OUD on methadone 140mg daily with persistent withdrawal symptoms suffered a witnessed cardiac arrest in the ED.
- Received chest compressions and synchronized cardioversion for ventricular tachycardia with a QTc documented at >700ms with subsequent ROSC.
- CPR-related injuries included non-displaced rib fractures (L ant ribs 2-4) as well as a non-displaced ant sternal fracture, resulting in severe centralized chest pain. She reported difficulty with deep breathing and coughing, and her incentive spirometry performance was limited by pain (~250mL).
- Given her persistently prolonged QTc, switching from methadone to buprenorphine for OUD was recommended prior to CABG. However, worsening of her acute pain was a significant barrier to her willingness to start buprenorphine.
- Abrupt methadone discontinuation left a significant opioid deficit such that her acute pain was refractory to multimodal analgesia, including IV hydromorphone, which only offered opioid withdrawal relief. Ketamine was avoided due to arrhythmias.

NOTE: Informed consent from the patient was obtained to share their de-identified clinical case presentation and is exempt from Institutional Review Board (IRB) review, in accordance with the Johns Hopkins IRB policy.

### INTERVENTION AND OUTCOMES

Using sterile technique, a **transversus thoracic plane** block was performed at the T4 level bilaterally using 25mL ropivacaine 0.2% on each side.



PM - pectoralis major muscle; II - internal intercostal muscle; TT - transversus thoracis muscle; PL – pleura; IT a. and v. - internal thoracic artery and vein

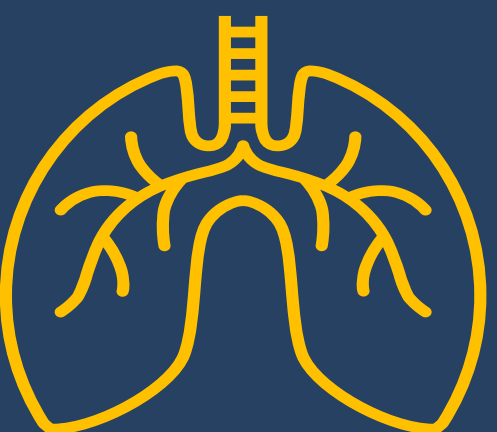
>50%  
pain relief



Lasted ~4h



Incentive Spirometry  
~2500mL



Successful bup  
induction and CABG



DC POD8 on  
8mg SL BID



#### After Discharge

She stopped buprenorphine after discharge due to undesirable side effects. One month later she was found unconscious at home with aspiration pneumonia, sternal osteomyelitis with inferior dehiscence, superficial infection at her vein harvest site and SUD relapse. After self-discharging twice from care, she eventually underwent antibiotic treatment and sternal debridement approx. 2 months postop. She was able to successfully restart buprenorphine and was discharged on IV antibiotics.

### DISCUSSION

1. TTP block is best studied in patients undergoing surgical sternotomy; here it was successfully used to provide acute analgesia after CPR-related sternal fracture.

– The **pain relief was significant** by subjective and objective measures

– It was **unfortunately short-lived**

– If mediastinitis after sternotomy was not a concern, placing a catheter in this space may have provided more durable analgesia

2. This case demonstrates the **powerful utility of regional anesthesia to facilitate buprenorphine induction in patients with acute pain**, providing analgesia during the tenuous transition from full opioid agonists to buprenorphine which has a stronger affinity but only partial agonism at the mu opioid receptor

3. In a particularly **marginalized patient population with complex comorbidities, considering interventional strategies** is a high-yield area of further study

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