

Unclear Risk of Intrapleural Tissue Plasminogen Activator in the Setting of Thoracic Epidural Analgesia for Rib Fractures

Gavin Brion, MD; Casey Kukielski, MD; Brett Elmore, MD; Andrew Mendelson, MD; Lynn Kohan, MD; Priyanka Singla, MD

Department of Anesthesiology, University of Virginia, Charlottesville, Virginia

Introduction

- Traumatic rib fractures → significant morbidity/mortality
- Regional anesthesia → treat hypoventilation secondary to pain
- In the same patient population, intrapleural tissue plasminogen activator (tPA) → treatment of retained hemothorax

Patient Presentation

- A 73-year-old male was transferred to the ICU at our hospital after a ground level fall with loss of consciousness three days prior
- Workup revealed acute right 3-9 displaced lateral rib fractures with large hemothorax resulting in right-sided atelectasis and mild leftward mediastinal shift

Case Report

Initial interventions:

- Right pigtail catheter, scheduled acetaminophen and methocarbamol, lidocaine patch and infusion, and PRN IV hydromorphone

Hospital Day 2:

- Continued severe pain and worsening respiratory insufficiency requiring 10 liter nasal cannula. Repeat CXR showed worsening atelectasis and persistent hemothorax

Acute Pain Service Consult:

- Right serratus plane catheter due to the lateral location of the fractures. Difficult visualization of catheter on ultrasound 2/2 edema and thoracostomy tube

No Improvement:

- Continued severe pain inhibiting deep inspiration (750ml via incentive spirometer), inability to clear secretions, and persistently elevated supplemental oxygen requirement

Next Steps:

- Thoracic epidural placement. T7-T8 epidural placed via paramedian approach. Shortly after epidural placement, the patient had significant pain relief, improved inspiration volumes, and decreased O2 requirement

“Can We Use tPA?”

- Subsequently contacted by the critical care team regarding the safety of intrapleural thrombolytics in the setting of neuraxial analgesia
- Lack of clear guidelines pertaining to administration of intrapleural tPA in the setting of an indwelling neuraxial catheter, we recommended withholding intrapleural tPA until catheter was removed and deferring administration for preferably 10 days.
- At minimal 48 hours and documentation of normal coagulation following epidural removal

Discussion

- Rib Fractures → Hypoventilation due to pain, increases the risk of atelectasis, retained secretions and pneumonia
- Epidural analgesia → improve pulmonary function in multilevel or bilateral rib fractures, standard of care when oral and parenteral analgesics are inadequate¹
- Intrapleural thrombolytics may be indicated as an alternative to surgical intervention for retained hemothorax in patient’s with a traumatic rib fracture
- Systemic anticoagulant, antiplatelet, or thrombolytic administration increases risk of epidural hematoma
- ASRA guidelines stem from case reports of patients who develop epidural hematomas after unanticipated intravenous thrombolysis for myocardial ischemia²

ASRA Recommendations:

1. Avoid neuraxial techniques in patients who have received fibrinolytic or thrombolytic drugs, with a suggested 48-hour time interval and documentation of normalization of clotting studies (including fibrinogen),
2. Avoid fibrinolytic or thrombolytic medications in patients with indwelling neuraxial catheters
3. Avoidance of these drugs for 10 days following puncture of noncompressible vessels³

- The degree of systemic absorption of intrapleural tPA is unknown; some authors propose that intrapleural tPA is highly unlikely to pose a significant risk of systemic hemorrhage⁴
- Low volume thoracic epidural hematomas may cause significant spinal cord compression and recurrent thrombolytic dosing raises cause for concern
- Further research on the systemic absorption of intrapleural tPA may help determine the safety of it’s use in the setting of neuraxial analgesia

References

1. May L, Hillermann C, Patil S. Rib fracture management. BJA Education. 2016 Jan;16(1):26-32.
2. Baron EM, Burke JA, Akhtar N, Young WF. Spinal epidural hematoma associated with tissue plasminogen activator treatment of acute myocardial infarction. Catheter Cardiovasc Interv. 1999 Dec;48(4):390-6.
3. Horlocker TT, Vandermeulen E, Kopp SL, Gogarten W, Leffert LR, Benzon HT. Regional Anesthesia in the Patient Receiving Antithrombotic or Thrombolytic Therapy: American Society of Regional Anesthesia and Pain Medicine Evidence-Based Guidelines (Fourth Edition). Reg Anesth Pain Med. 2018 Apr;43(3):263-309.
4. Townsend A, Raju H, Serpa KA, Pruett R, Razi SS, Tarrazzi FA, Tami CM, Block MI. Tissue plasminogen activator with prolonged dwell time effectively evacuates pleural effusions. BMC Pulm Med. 2022 Dec 5;22(1):464