

STRAIGHT TO THE HEART: IATROGENIC LEFT VENTRICULAR INJURY FROM PREHOSPITAL NEEDLE THORACOSTOMY - A CASE REPORT

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Introduction

- Tension pneumothorax (TPX) is a time-critical emergency requiring immediate decompression.
- Needle thoracostomy (NT) is lifesaving but remains a blind, high-risk procedure, especially without ultrasound or advanced training.
- Though rare, iatrogenic cardiac injury is one of the most catastrophic complications.
- This case describes left ventricular (LV) penetration following NT in the field, highlighting important preventive considerations.

Case Presentation

- Patient:** 24-year-old male involved in ATV rollover, sustained multisystem trauma.
- Prehospital findings:** Unresponsive (GCS 8), hypotensive (BP 80/40), hypoxic (SpO_2 85%).
- Field interventions:**
 - Rapid sequence intubation
 - Bilateral NT at 2nd intercostal space, midclavicular line (ICS-MCL) for suspected TPX
 - Complication: Left-sided NT produced pulsatile bleeding; catheter capped and transport continued
- Imaging at trauma center:**
 - Catheter penetrated left ventricular (LV) wall
 - Traversed near the LAD artery and diagonal branch
- Surgical management:**
 - Median sternotomy with direct LV repair (pledgeted sutures)
 - Simultaneous right decompressive craniectomy for intracranial hemorrhage
- Outcome:**
 - Post-op echocardiography: Preserved LV function
 - Patient recovered without cardiac complications

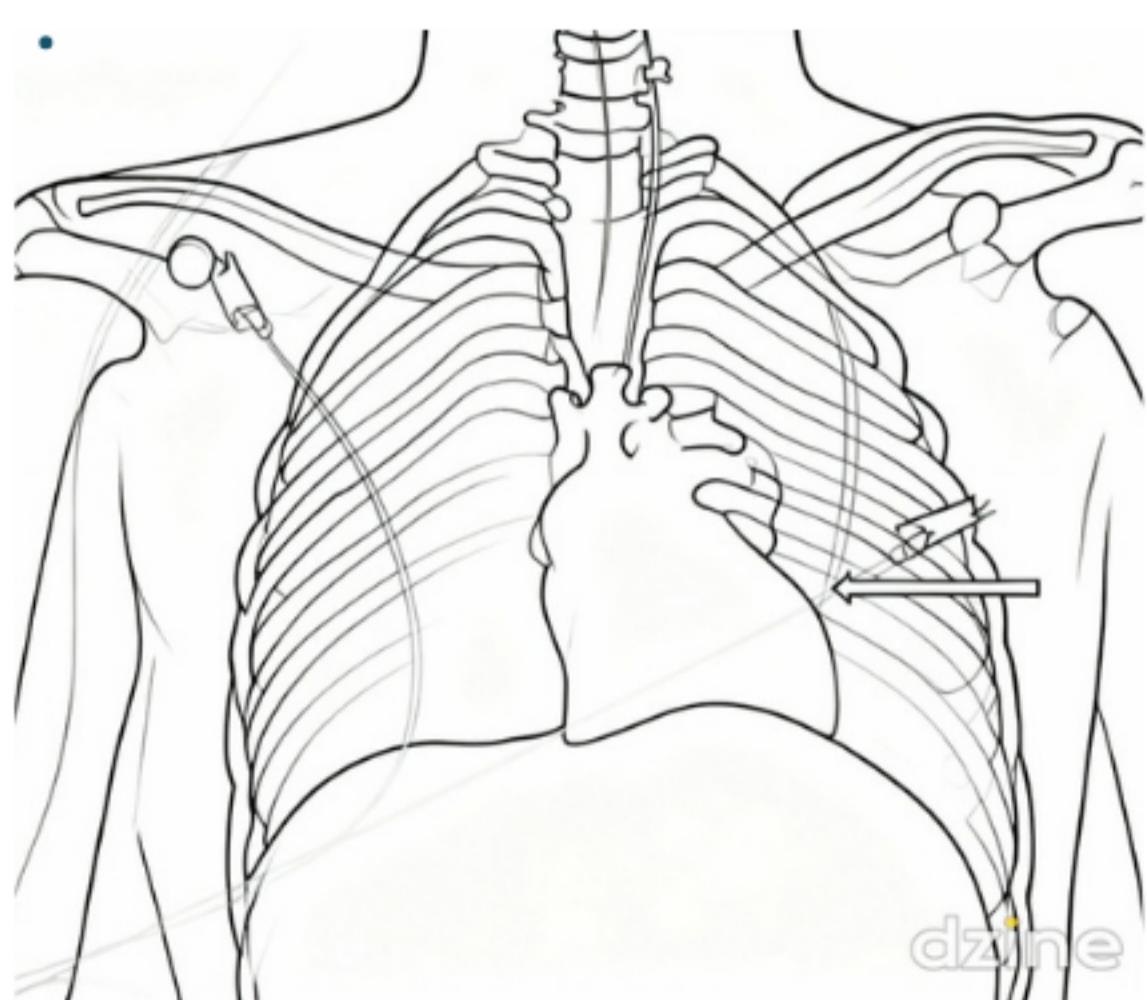


Figure 1: Chest X-ray (Sketch) showing a left-sided NT catheter with its tip over the left ventricle (white arrow). Note the midline shift to the left, without obvious cardiac enlargement.

Figure 2: (Sketch) Cardiac-gated CT (arterial phase) showing a left 2nd intercostal NT catheter (pink arrowhead) embedded in the anterior LV wall. The tip lies between the LAD (red arrow) and its first diagonal branch (blue arrow). Axial views confirm the catheter's position between these coronary vessels.

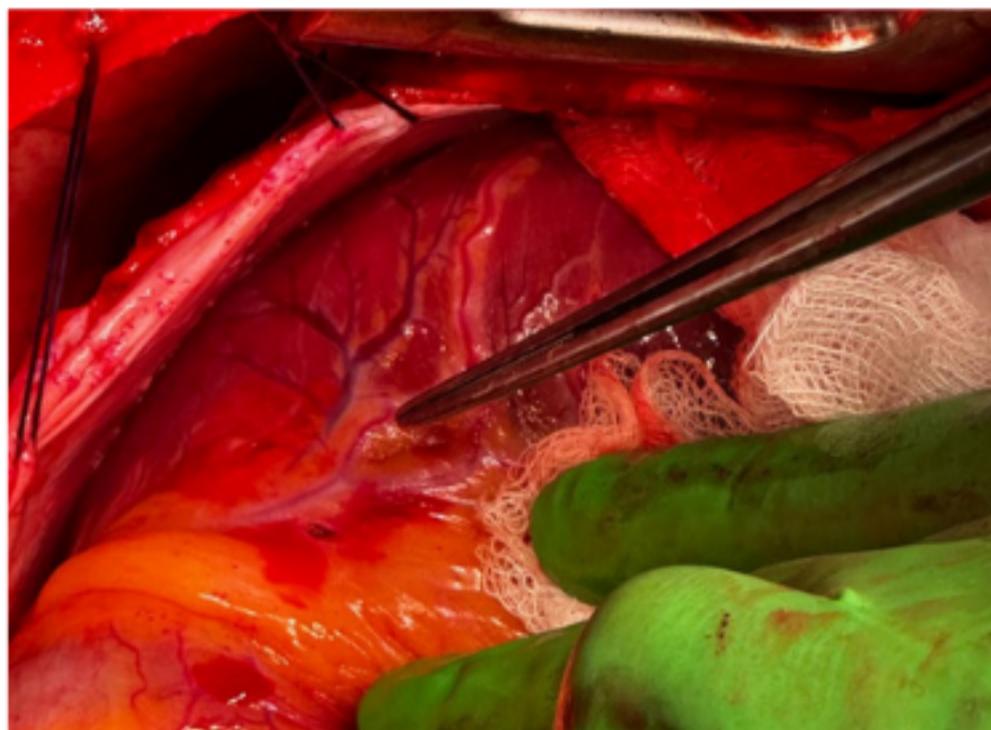
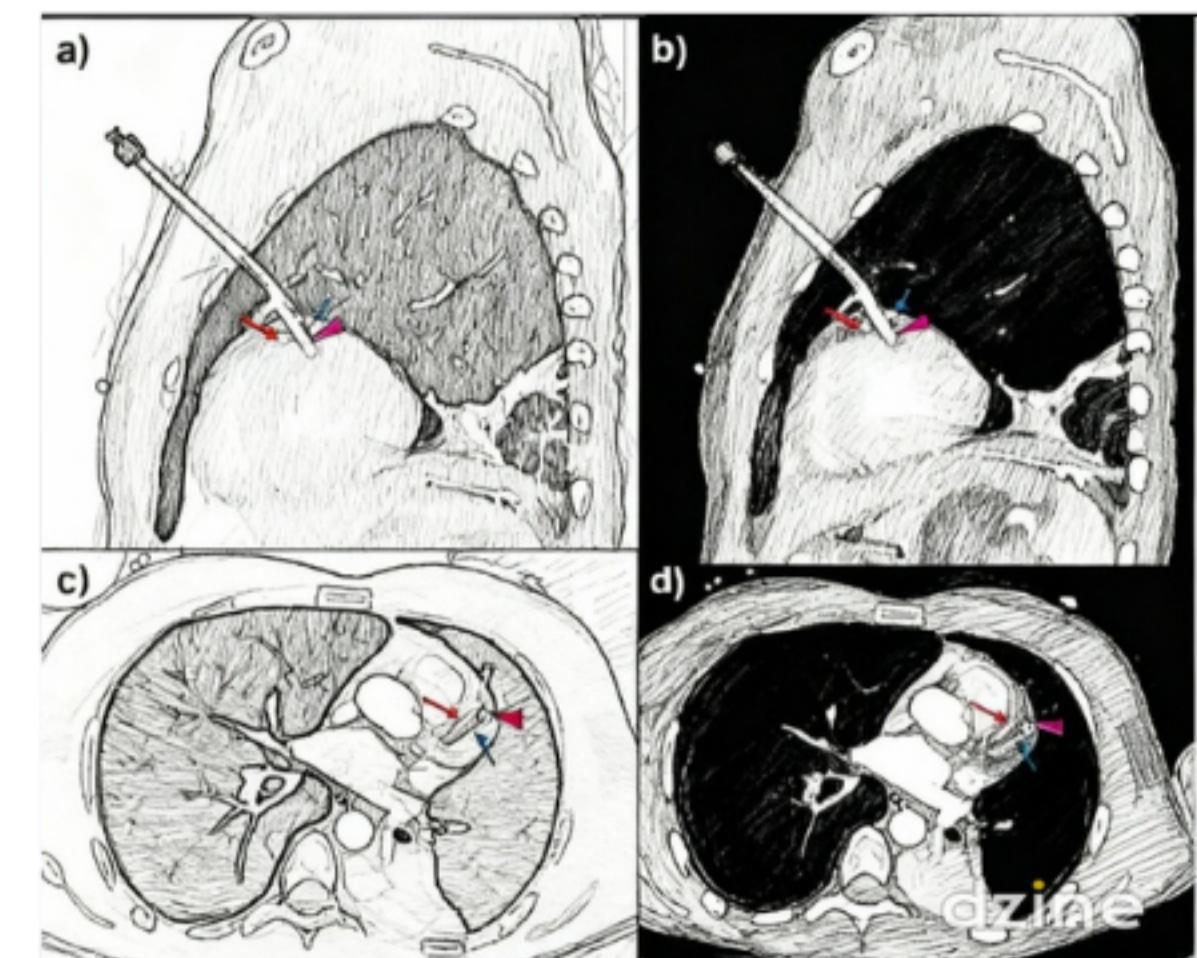


Figure 3: Intraoperative figure showing cardiac injuries beside left anterior descending artery.

Discussion

- This case contributes to the limited but growing evidence that cardiac penetration is a real risk associated with NT.
- High-risk factors:**
 - Insertion at 2nd ICS-MCL
 - Use of short catheters
 - Thin anterior chest walls
- Safer alternatives:**
 - 4th/5th ICS at anterior or midaxillary line (ICS-AAL / ICS-MAL)
 - Use of longer catheters (≥ 8 cm)
- Prevention strategies:**
 - Point-of-care ultrasound to guide placement
 - Simulation-based EMS training for anatomical targeting and real-time feedback



Conclusion

- Needle thoracostomy remains a critical intervention in trauma care; however, the success of the decompression comes at a price of a higher risk of iatrogenic injuries. As this case shows, it can result in life-threatening complications when anatomical landmarks and technique are not optimized. Cardiac injury is **preventable**. Adopting **safer insertion sites**, using **appropriate catheter lengths**, and incorporating **ultrasound guidance** and **simulation training** are crucial to minimizing risk and improving outcomes in the prehospital setting. Moreover, collaborative work can save lives in complex combined injuries.

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