

The Management of Large Penetrating Chest Wounds with Immediate Chest Wall Reconstruction

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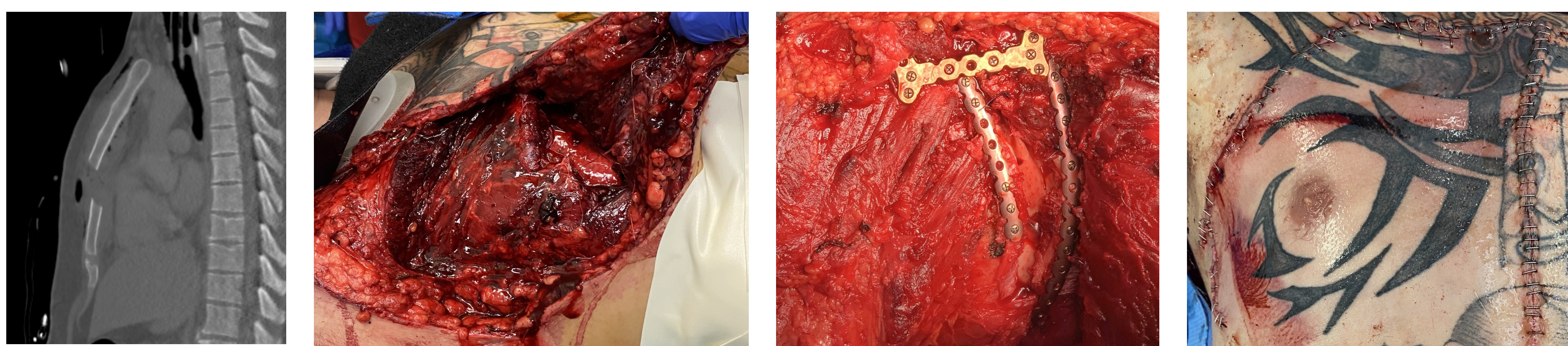
INTRODUCTION

- Large penetrating wounds to and through the chest wall can be difficult to manage as further surrounding tissue loss, underlying rib fractures and loss of the parietal pleura with exposed lung parenchyma give rise to a unique operable challenge. There is limited literature describing definitive surgical management of these specific wounds. Techniques have been described using negative pressure wound therapy (NPWT) and delayed closure using regional muscle flaps that may take weeks for definite closure. The use of synthetic material in the traumatic setting has been discouraged given the contaminated nature of the wounds and the associated risk of infection.
- We present our experience of four patients with large penetrating injuries to the thorax - one from blunt trauma and three from high-velocity projectiles managed with prompt reconstruction and closure using biologic mesh, titanium plates and rotation tissue flaps.

CASE PRESENTATION

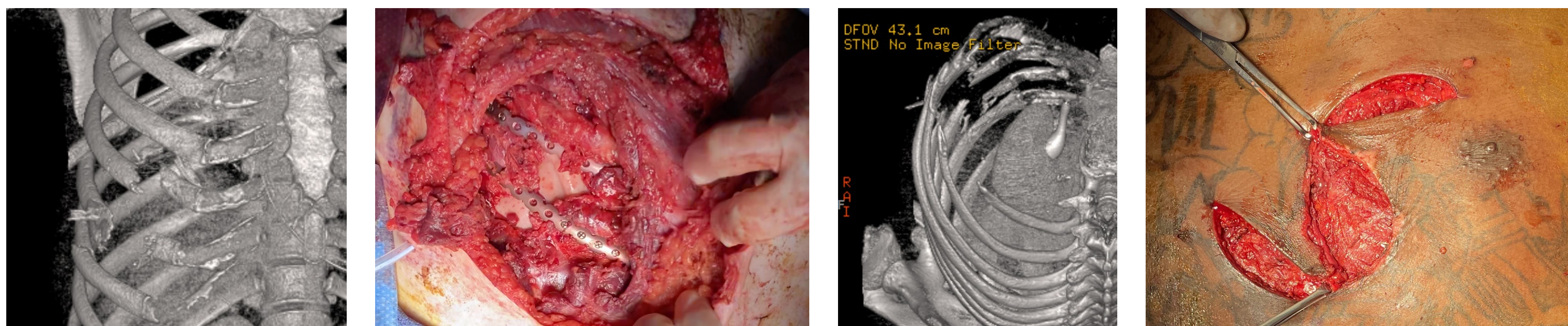
Patient 1: 34-year-old male blunt polytrauma multiple rib fractures and a large destructive wound through the right thoracic wall with a 3cm displaced sternal fracture, right 4th/5th 3cm displaced rib fractures with exposed and herniated lung.

- Post injury day (PID) 0- Immediate OR for chest wall exploration plating of sternum, ribs 4, 5.



CASE PRESENTATION

- Patient 2, 3 and 4 had large "blast like" injuries to the thorax, from gunshot wounds (GSWs).
- On arrival PID 0 - All three were intubated and managed with thoracostomy tube placement.
- Followed by immediate wound management, and NPWT during initial resuscitation and stabilization requiring ICU.



Patient 2

Patient 2

Patient 2

Patient 3

Patient 2: 30-year-old male with GSWs to zone 1 of the neck, right chest and costal margin.

- PID 0 – Exploratory Laparotomy, VATS
- PID 7 – Definite surgical repair of right anterior chest wall defect with plating of ribs 5 and 6 and Z-plasty reconstruction (6x4cm)

Patient 3: 27-year-old male GSW to the chest, right upper and left lower extremity.

- PID 6 - Definite surgical repair of right anterior chest wall defect (6x6cm) and plating of 5th rib and closure with Z-plasty
- Discharged on post-op day 3.

Patient 4: 19-year-old male with a GSW to the left chest with initial PH of 6.56.

- PID 0 – Emergent Thoracotomy
- PID 2 - Definite surgical repair of left chest wall defect, plating of ribs 5, 6 and 7 and thoracotomy closure.

OPERATIVE TECHNIQUE

1. Incision incorporating wound, debridement and creation myofascial flaps exposing underlying fractures
2. If present, reduction of the herniated lung.
3. Using biologic mesh (Strattice®) the parietal pleura was recreated.
4. Fractures reduced and fixated with titanium plates, using pre-contour plates for floating segments and to sternum if needed spanning across the cartilaginous junction.
5. A 19F round drain was then placed as our thoracostomy tube.
6. Closure using myofascial rotational flaps and skin flaps (Z-plasty).

RESULTS

- One patient was managed with immediate repair.
- Three were managed promptly utilizing NPWT during initial resuscitation and stabilization followed by definitive surgical repair within 7 days
- All four patients did well post-operatively without complications or wound infections.

CONCLUSION

Historically, these wounds may take weeks for definite closure and skin coverage. With the appropriate management, we suspect there may be an advantage in performing immediate chest wall reconstruction and closure in open thoracic injuries utilizing mesh and titanium rib spanning plates with a lower risk of infection than previously believed