



CWIS Chest Wall Injury Summit 2023

Oral Presentation Abstract Submission

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Title of Presentation Extracorporeal membrane oxygenation during surgical stabilization of rib fractures in successful management of severe blunt chest trauma: a case report.

Background

Blunt chest trauma is a leading cause of traumatic deaths. Severe rib fractures can alter pulmonary mechanics leading to respiratory compromise especially when combined with pulmonary contusions and lacerations. Early surgical stabilization of rib fractures (SSRF) improves outcomes in patients with flail physiology and severely displaced fractures. However, ensuring adequate ventilation and oxygenation during SSRF can be challenging in critically ill trauma patients.

Methods

We present a case of a 40-year-old male who sustained a severe crush injury to the chest requiring veno-venous extracorporeal membrane oxygenation (VV-ECMO). Chest wall stability was restored with SSRF successfully improving pulmonary mechanics and allowing for transition off ECMO. To our knowledge, this is the first reported case of SSRF on ECMO in the literature.

Results

A 40-year-old male presented to our level 1 trauma center following a crush injury from a forklift. He presented with severe chest wall trauma and sustained cardiac arrest in the trauma bay. Return of spontaneous circulation was achieved though he remained critically unstable prompting bedside VV-

ECMO. Given massive hemothorax and multi-trauma, the ECMO was run heparin-free. He was found to have extensive left-sided rib fractures (Ribs 1-10), multiple sternal fractures, flail chest, lung lacerations, massive hemopneumothorax, and bilateral pulmonary contusions. His chest wall injury severely limited his pulmonary mechanics prohibiting transition off VV-ECMO. Therefore, we performed SSRF on hospital day 3 while on VV-ECMO support. Fractures were selectively plated to stabilize the chest wall and minimize operative time. The flail segment of left ribs 4 through 6 was stabilized along the anterior and posterior fracture lines. Stabilizing his chest wall allowed for improved ventilation and successful decannulation from VV-ECMO on post-operative day 4 and VV-ECMO day 8. Ultimately, he was discharged to a rehabilitation facility and subsequently home with an impressive functional recovery.

Conclusion

VV-ECMO is an important rescue for patients with severe thoracic injury. This case demonstrates a unique damage control strategy in which SSRF is performed while on VV-ECMO. Improving chest stability and pulmonary mechanics with SSRF allowed for safe transition off VV-ECMO and achieved a favorable long-term outcome.