Use of Surgical Fixation for Chest Wall Stabilization in Severe Traumatic Rib Fractures

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Background and Significance

- Significant morbidity associated with both flail chest and severe rib fracture
- Use of operative rib fixation is understudied in the trauma population
- Surgical fixation of chest wall injuries is a historically underutilized procedure
  - Only 22% of physicians aware of topic
  - The majority of previous studies are small
  - Include only flail segments
  - Do not include severe/debilitating rib fracture patterns
- No absolute indications for surgical treatment of rib fractures

Background and Significance

- Flail chest is defined as 3 adjacent ribs that are fractured in at least 2 places resulting in paradoxical motion of the free segment of the chest wall
- "Severe rib fractures" usually refers to >3 fractured ribs
  - Ribs angulated into the chest
  - Severely displaced fractures
  - Associated with a large hemothorax
  - Persistent pneumothorax
  - Prolonged ventilation
  - Severe pain from non-union or mal-union
Specific Aim

- Determine the absolute indications for surgical stabilization of rib fractures
- Determine if surgical stabilization of rib fractures improves patient outcomes compared to medical management alone

Inclusion Criteria

Trauma patients with any of the following (Fix within 5 days of injury):
- Surgical treatment of thoracic injury in the setting of multiple rib fractures
- Flail chest
- Greater than or equal to 3 rib fractures with displacement AND
  - Greater than or equal to 30% hemithorax volume loss OR
  - Severe pain OR
  - Respiratory failure OR
  - Persistent air leak

Trauma patients with the following (Fix within 1 month):
- Nonunion or mal-union AND severe pain OR respiratory failure diagnosed after 5 days from time of injury

Exclusion Criteria

- Age less than 15
- Severe Head Injury mandating Intracranial Monitoring Devices
- Hemodynamic instability due to concomitant injuries
- Patients that expire within 24 hours of injury
Therapeutic Interventions

Standard care for patients with rib fractures including:

- Analgesia
  - PO/IV pain medication
  - PCA
- Pulmonary toilet
  - Suctioning
  - Incentive spirometry
  - Chest physiotherapy
- Operative technique protocols will be included

Benefits

- Decreased respiratory failure (need for mechanical ventilation)
- Decreased rates of pneumonia
- Decreased need for tracheostomy
- Decreased duration of chest tube
- Decreased total ventilator days
- Decreased Intensive Care Unit and hospital length of stay
- Decreased mortality rate
- Decreased narcotic requirements
- Decreased oxygen requirements
- Increased daily maximum incentive spirometer volume

Risk

The risks to the patient are minimal and are the risks associated with standard open fixation of the ribs, including, but not limited to:

- Bleeding
- Infection
- Injury to surrounding organs and death
Progress/Needs

- Approved by Research-Scholarship Committee
- IRB Submission Pending Acceptance
- Recruitment of other centers
- Creation of standardized online survey tools

Goals/Timeline

Feb – March 2016 - IRB submission at participating sites
March – April 2016 – development of online surveys
May 2016 - May 2018 – Ongoing data collection
June 2018- Data analysis
July 2018 – EAST abstract submission
Thank you!

Questions?

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References


