Care of Patients with Rib Fractures

Purpose

Rib fractures occur in approximately 10% of patients with traumatic injury. They are associated with greater injury burden especially when coupled with head, extremity, abdominal and blunt cardiac injury. Mortality rates increase with the number of fractured ribs (5.8% for a single rib to 34.4% mortality with 8 or more rib fractures). Flail chest and pulmonary contusion also increase mortality. Rib fractures are associated with multiple pulmonary complications including pneumonia, adult respiratory distress syndrome (ARDS) and pneumothorax. Rib fractures are also associated with an increased ICU length of stay (LOS), hospital LOS, and ventilator days. The purpose of this guideline is to standardize our approach to the management of traumatic rib fractures.

Admission Criteria:

Admit to unit based on age, injury burden, degree of pulmonary compromise, comorbidities, and trauma attending discretion.

1. Consider admission to ICU if:
    - mechanical ventilation
    - age > 60 yrs
    - 4 or more rib fractures
    - lung parenchymal abnormality or contusion
    - flail segment
    - volume expansion protocol needed more frequently than every 2 hours
    - incentive spirometry <1000 cc.
    - COPD, home O2 use, current tobacco user, current antiplatelet use
2. Consider admission to STEP DOWN Unit if:
    - <3 rib fractures
    - age >45 yrs with rib fractures and flail segment or sternal fracture
    - O2 requirement greater than or equal to 5L nasal canula
    - volume expansion protocol needed every 2-3 hrs
    - incentive spirometry 1000-1500 cc
3. Consider admission to FLOOR if:
    - pain control is adequate
    - incentive spirometry >1500 cc

Initial Management:

1. Consult to respiratory therapy for "Lung Volume Expansion" (if no pneumothorax)
2. Continous pulse oximetry
3. Incentive spirometry for 10 times/hr while awake
4. Supplemental oxygen as needed to maintain SpO2>90% (or >88% in patients with known history of COPD).
5. Chest X-ray (portable) every morning x 3 days (+/1 days based on clinical judgement)
6. Physical therapy consult for early mobilization. When cleared, patient should ambulate 3x daily at minimum.
7. Judicious use of intravenous fluids. Avoid boluses if possible and, if boluses are indicated, utilize small boluses. If unresponsive to 2 boluses, notify trauma attending.
8. Multimodality pain management:
    - PCA or hourly PRN IV pain medication
    - Consult APS for epidural or paravertebral block if not contraindicated.
        - contraindications for an epidural include: platelets <80K, infection at site of insertion, epidural or spinal cord hematoma, INR >1.2, prophylactic LMWH within 12 hrs or therapeutic dose within 24 hrs, hemodynamic instability.
        - contraindications to a paravertebral block include: platelets <80k, infection at site of insertion, INR <1.5, transverse process fractures in proximity to level of insertion.
    - Lidocaine patch over rib fractures
    - Tylenol 1000 mg PO every 6 hrs scheduled + Flexeril 10 mg PO every 8 hrs scheduled + Oxycodone immediate release 5-15mg PO every 4 hrs as needed (PRN).
    - Add ibuprofen 800 mg PO every 8 hrs scheduled if not contraindicated due to age, renal function, or bleeding risk; strongly consider a COX-2 inhibitor if ibuprofen is contraindicated.

Non-invasive mechanical ventilation (BiPAP or CPAP):

Should only be used if the patient is normally on this treatment prior to injury.

1. BiPAP/CPAP is rarely appropriate for patients with chest injuries and progressive respiratory distress. Early intubation in these patients is more appropriate.
2. BiPAP should be used for reversible ventilation issues such as hypercarbia, COPD exacerbation, and/or pulmonary edema.
3. BiPAP is a bridge to all time for interventions (e.g. Lasix administration for volume overload) to be performed that may prevent intubation.
4. BiPAP should only be used as a short term option, ideally no more than 6 hours.
5. Monitor the patient closely while on BiPAP for further respiratory decline.
6. If respiratory status does not improve within 6 hours or less, consider intubation.

Surgical Stabilization of Rib Fractures (Rib Plating):

Consider rib plating in the following clinical situations: (see Trauma Policy PRO06 Surgical Stabilization of Rib Fractures):

1. Non-intubated patients with respiratory insufficiency due to pain despite continuous epidural/paravertebral anesthesia and use of multi-modality pain regimen.
2. Intubated patients with flail chest who fail to wean from ventilator.
3. Patients with extensive anterolateral flail chest and progressive displacement of fractured ribs.
4. Patients who require thoracotomy due to associated intra-thoracic injury.
5. Painful nonunion
6. Patient complaints of painful movement of ribs (popping, clicking).

References

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