Care of Patients with Rib Fractures

Purpose:

Rib fractures occur in approximately 10% of patients with traumatic injury.They are associated with a 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 fracture to 34.4% mortality with 8 or more rib fractures. Flail chest and pulmonarycontusion also increase mortality. Rib fractures are associated with multiple pulmonary complications including pneumonia, adult respiratory distress syndrome, and pneumothorax. Rib fractures are also associated with an increased ICU length of stay, hospital length of stays, and ventilator days. The purpose of this guideline is 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 at trauma attending’s discretion.

1. Consider admission to ICU if:
    - Mechanical Ventilation
    - Age >60
    - 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 Oxygen Use, Current Tobacco User, Antiplatelet Use2.
2. Consider admission to Step-Down Critical Care Unit if:
    - <3 rib fractures
    - Age >45 with rib fractures and flail segment or sternal fracture
    - Oxygen requirement ≥ 5L/min nasal cannula
    - Volume expansion protocol needed every 2-3 hours
    - Incentive spirometry 1000-1500 cc
3. Consider Floor admission if:
    - Pain control is adequate

- Incentive spirometry >1500 cc

Initial Management:

1. Consult to Respiratory Therapy for Lung Volume Expansion (if no pneumothorax).
2. Continuous pulse oximetry.
3. Incentive spirometry for 10 times per hour while awake.
4. Supplemental oxygen as needed to maintain SpO2 >90% (or >88% in patients with known history of COPD).
5. CXR PA portable every morning for 3 days (+/- days based on clinical judgment).
6. Physical therapy consult for early mobilization. When cleared, patient should ambulate three times a day at minimum.
7. Judicious use of intravenous fluids. Avoid boluses. If boluses are indicated utilize small boluses. If unresponsive to 2 boluses, notify trauma attending.
8. Multimodal Pain Management:
   - PCA or hourly prn IV pain medication.
   - Consult to 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 hours or therapeutic dose within 24 hours, hemodynamic instability.
     - ***Contraindications for a paravertebral block include***: platelets <80K, infection at site of insertion, INR >1.5, transverse process fracture in proximity to level of insertion.
   - Lidocaine patch over rib fractures
   - Tylenol 1000 mg PO every 6 hours scheduled + Flexeril 10 mg PO every 8 hours scheduled + Oxycodone Immediate Release 5-15 mg PO every 4 hours as needed PRN
   - Add ibuprofen 800 mg PO every 8 hours scheduled if not contraindicated due to age, renal function or bleeding risk; strongly consider a COX-2 inhibitor is ibuprofen 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 allow time for interventions (e.g. Lasix administration) 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 monitored 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.
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.

References:

1. Carver, T., Milia, D, Somberg, C., Brasel, K., & Paul, J. (2015). Vital capacity helps predict pulmonary complications after rib fractures. Journal of Trauma Acute Care Surgery, 79(3), 413-416. doi: 10.1097/TA.0000000000000744
2. Chen, J., Jeremitsky, E., Philp, R. Fry, W., & Smith R. (2014). A chest trauma scoring system to predict outcomes. Journal of Surgery, 156(4), 988-994. doi: 10.1016/j.surg.2014.06.045
3. Gonzalez, K., Ghneim, M., Kang, F., Jupiter, D., Davis, M., Regner, J. (2015). A pilot single-institution predictive model to guide rib fracture management in elderly patients. Journal of Trauma Acute Care Surgery, 78(5), 970-975. doi: 10.1097/TA.0000000000000619
4. Leininger, S. (2017). Rib fracture protocol advancing the care of the elderly patient. Critical Care Nursing, 40(1).
5. Mastroianni, S. Implementing a rib fracture management pathway and PIC scoring tool to reduce ICU readmissions. San Francisco, CA: University of San Francisco Scholarship Repository; May 22, 2015, Spring.
6. Sahr, S., Webb, M., Hacket Renner, C, Sokol, R., & Swegle, J. (2013). Implementation of a rib fracture triage protocol in elderly trauma patients. Journal of Trauma Nursing, 20(4), 172-175. doi: 10.1097/JTN.0000000000000008
7. Simon, B., Ebert, J., Bokhari, F., Capella, J., Emohoff, T., Hayward, T., Rodriguez, A., & Smith, L. (2012). Management of pulmonary contusion and flail chest: An Eastern Association for the Surgery of Trauma practice management guidelines. Journal of Trauma Acute Care Surgery, 73(5), S351-S361. doi: 10.1097/TA.0b013e31827019fd
8. Witt, C., & Bulger, E. (2017). Comprehensive approach to the management of the patient with multiple rib fractures: a review and introduction of a bundled rib fracture management protocol. Trauma Surgery & Acute Care Open, 2(1), 1-7. doi: 10.1136/tsaco-2016-000064

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