

CLINICAL PRACTICE GUIDELINE: Surgical Stabilization of Rib Fractures

DATE OF ORIGIN: 10/30/2024

REVIEWED/UPDATED: Trauma Committee 2/20/2025

PURPOSE: The purpose of this guideline is to facilitate timely and appropriate surgical management of patients with multiple rib fractures.

PROCEDURE: use this guideline to optimize care of patients with indication for surgical stabilization of rib fractures.

PHYSICIAN CLINICAL JUDGEMENT SUPERSEDES THIS GUIDELINE

GUIDELINE:

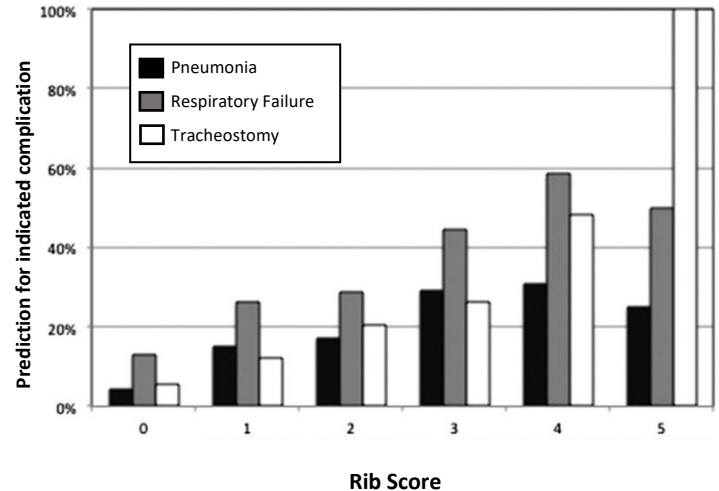
- I. Initial assessment for patients with multiple rib fractures
 - a. Primary assessment by trauma team
 - b. Calculate Denver Rib Score (see **Appendix A**)
 - c. Admit patient to the appropriate floor based on acuity
 - i. See Billings Clinic *Rib Fracture Admission and Management Guidelines*
- II. Surgical stabilization NOT indicated
 - a. Follow Billings Clinic *Rib Fracture Admission and Management Guidelines*
- III. Surgical stabilization of rib fractures **is** indicated (see **Appendix A,B,C**)
 - a. Plan for operative fixation within 72 hours
 - i. Consider concomitant intrathoracic issues
 - Hemothorax, pneumothorax, diaphragm injury
 - ii. Complete 3-D reconstructions of the chest CT to aid in operative planning
 - b. Thoracic pain control
 - i. Consult Anesthesia for consideration of:
 - Epidural catheter placement
 - Erector Spinae Plane block
 - Intercostal nerve block
 - Paravertebral block
 - ii. Institute gabapentin, methocarbamol, lidocaine patch and NSAIDs (unless contraindicated)
 - c. Preoperative patient optimization
 - i. Management of concomitant injuries/comorbidities
 - ii. Institution of aggressive pulmonary toilet:
 - Respiratory Therapy consultation
 - Order albuterol, Duoneb and MetaNeb PRN (unless contraindicated)
 - Consider awake bronchoscopy
 - d. Surgical management

- i. Postop admission to SICU preferred
- e. Postoperative patient optimization
 - i. Ongoing management of concomitant injuries/comorbidities
 - ii. Continue aggressive pulmonary toilet:
 - Respiratory Therapy evaluation/recommendations
 - Order albuterol, Duoneb and MetaNeb PRN (unless contra-indicated)
 - Consider bronchoscopy
 - iii. Recovery complete in SICU
 - Post-SICU step down preferences:
 - a. Intermediate Care Unit if applicable
 - b. Medical/surgical floor
 - iv. Chest x-ray prior to discharge from hospital

APPENDIX

A. Denver Rib Score – 1 point for each criterion

1. ≥6 rib fractures
2. Flail chest
3. Bilateral fractures
4. ≥3 severely displaced rib fractures (bicortical displacement)
5. ≥ 1 anterior, lateral, and posterior fracture (must have at least one fx in EACH listed location)
6. First rib fracture



B. Surgical Stabilization of Rib Fractures: Indications

- a. Denver Rib Score of 6
- b. Denver Rib Score of 5 and ≥3 ribs with bicortical displacement
- c. Mechanical Instability (paradoxical respiration)
- d. ≥30% volume loss in hemithorax
- e. Progressive thoracic volume loss on imaging (collapse of flail segment)
- f. Concomitant intrathoracic pathology (retained hemothorax associated with fractures, suspected diaphragm injury, etc.)

C. Surgical Stabilization of Rib Fractures: Relative Indications

- a. Denver Rib Score <5 with:
 - i. Inadequate pulmonary toilet
 - ii. Inadequate pain control to allow IS (persistent IS <500 on maximal medical therapy)
 - iii. ≥3 ribs with significant displacement (>1 cm bicortical displacement or separation)

Fixation should be attempted within 72 hours of patient meeting indications

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REFERENCES

1. American College of Surgeons. Surgical Stabilization of Rib Fractures Alleviates Debilitating Axial Skeleton Injuries. Case Reviews In Surgery. February 24, 2021. Retrieved from: <https://www.facs.org/for-medical-professionals/news-publications/journals/case-reviews/issues/v1n4/muellens-surgical/>
2. Chapman, Brandon C. MD; Herbert, Benoit MD; Rodil, Maria; Salotto, Jennifer MD; Stovall, Robert T. MD; Biffel, Walter MD; Johnson, Jeffrey MD; Burlew, Clay Cothren MD; Barnett, Carlton MD; Fox, Charles MD; Moore, Ernest E. MD; Jurkovich, Gregory J. MD; Pieracci, Fredric M. MD, MPH. RibScore: A novel radiographic score based on fracture pattern that predicts pneumonia, respiratory failure, and tracheostomy. Journal of Trauma and Acute Care Surgery 80(1):p 95-101, January 2016. | DOI: 10.1097/TA.0000000000000867.
3. Fokin AA, Hus N, Wycech J, Rodriguez E, Puente I. Surgical Stabilization of Rib Fractures: Indications, Techniques, and Pitfalls. JBJS Essent Surg Tech. 2020 May 7;10(2):e0032. doi: 10.2106/JBJS.ST.19.00032. PMID: 32944413; PMCID: PMC7478329.