

Chest Wall Injury Society guidelines for surgical stabilization of rib fractures: Indications, contraindications, and timing

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Introduction

Surgical stabilization of rib fractures was introduced as a successful and safe surgical option for rib fractures in the 1950s, specifically as a treatment for patients with flail chest. The quantity and quality of research and literature supporting the benefits of this operation continue to increase exponentially. Despite this data, there remains hesitancy among surgeons caring for these patients to perform SSRF. This is often said to be related to a lack of guidelines and indications for SSRF. This project aims to provide evidence-based indications for SSRF in the form of a guideline to serve as a foundation for surgeons caring for their chest wall-injured patients.

Method

An extensive literature search was conducted using keywords. Search results were grouped based on similar characteristics including SSRF indications, contraindications, pain management, chest wall injury imaging, and SSRF timing. The guidelines were created based on the summary of information from this literature search and expert opinion from the surgeon authors of this article. Next the guidelines were brought before a larger group of experts, the membership of the Chest Wall Injury Society (CWIS). At this point, the guidelines were edited and adjusted per recommendations made from the membership. Once this was completed the surgeon authors of this article then voted on each recommendation as to whether or not they supported that recommendation (Table 1). This was then sent to the CWIS Executive Committee and Board of Directors for vetting who unanimously agreed upon the guidelines. Lastly, the guidelines/algorithm was voted on by the CWIS membership as a whole for adoption as the official SSRF guidelines of the organization.

Chest Wall Injury Society Guidelines for Surgical Stabilization of Rib Fractures: Indications, Contraindications, and Timing

Surgical stabilization of rib fractures (SSRF) has gained significant popularity over recent years for patients with chest wall injury.

There remains a lack of standard of indications for which patients might benefit from SSRF.

These guidelines, created from extensive literature review and the Chest Wall Injury Society, help lay a foundation for which patients may benefit from SSRF.



INDICATIONS

Ventilated patients

1. Chest wall instability
 - a. Three or more bi-cortical rib fractures with greater than 50% displacement on imaging
 - b. Paradoxical chest wall motion
 - c. Significant chest wall deformity (volume loss $\geq 20\%$)
 - d. Clicking or popping reported by the patient or palpated by the healthcare provider
2. Failure to wean from mechanical ventilation due to chest wall instability

Non-ventilated patients

1. Chest wall instability
 - a. Three or more bi-cortical rib fractures with greater than 50% displacement on imaging
 - b. Paradoxical chest wall motion
 - c. Significant chest wall deformity (volume loss $\geq 20\%$)
 - d. Clicking or popping reported by the patient or palpated by the healthcare provider
2. Progressive respiratory failure/failure to improve despite multimodal analgesia
3. Three or more displaced rib fractures with two or more pulmonary physiologic derangements
 - a. Respiratory rate ≥ 20
 - b. Incentive spirometry value $< 50\%$ of predicted (or a value that is moving in a negative direction)
 - c. Numeric pain score (NPS) consistently greater than 5 out of 10
 - d. Poor cough
4. Abnormal/worsening stratification score (e.g., SCARF, STUMBL, RibScore)

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Conclusion

The SSRF continues to demonstrate viability as a treatment option for patients with rib fractures. These guidelines represent the current opinions of chest wall injury expert surgeons, their practice patterns, and the best available research evidence. These guidelines must be adjusted based on the surgeon's judgment and available clinical resources but can serve as a solid foundation for driving decision making around surgical intervention.