


# Comparison of postoperative pain in surgical stabilization of rib fracture technique: intrathoracic plates versus extrathoracic plates

Babak Sarani 

**To cite:** Sarani B. Comparison of postoperative pain in surgical stabilization of rib fracture technique: intrathoracic plates versus extrathoracic plates. *Trauma Surg Acute Care Open* 2024;**9**:e001321. doi:10.1136/tsaco-2023-001321

Surgical stabilization of rib fractures (SSRF) is now a well-established and evidence-based approach for management of patients with respiratory impairment due to flail chest.<sup>1,2</sup> In addition to management of flail chest, some studies suggest a beneficial role of SSRF in patients with severe, but non-flail, rib fractures,<sup>3</sup> although this remains controversial.<sup>4</sup>

Regardless of the indication for SSRF, there are no studies to guide the operative technique to be used based on fracture pattern. Currently, five commercially available systems constitute the overwhelming majority of implants that are used. Of these five, only one uses an intrathoracic approach. Proponents of this approach suggest that this technique allows for appropriate reduction and stabilization fractures without the need for more extensive soft tissue dissection associated with an extrathoracic operative approach and it provides for a more stable construct by directing the forces of chest wall movement against the plate (ie, pushing the plate into the bone). Moreover, the intrathoracic technique allows for reduction of posterior fractures that cannot be stabilized from an extrathoracic approach due to proximity to the spinous processes. But, these potential benefits have to be weighed against the need for video assisted thoracoscopic surgery and thus single lung ventilation. To date, there are no studies directly comparing clinical outcomes between any of the implants.

In this study, Tichenor *et al* sought to measure the impact of intrathoracic versus extrathoracic SSRF on pain control.<sup>5</sup> Patients underwent SSRF based on surgeon discretion. There was no way to control for degree of chest muscle dissection in either approach. Postoperative pain control was opioid based, no patient received regional analgesia, and the authors do not comment on non-opioid-based therapies such as acetaminophen or non-steroidal anti-inflammatory drug (NSAID) use. The authors noted a near 50% reduction in daily morphine equivalent narcotic use in the cohort that underwent intrathoracic plating. The difference remains significant after controlling for sex, injury severity score (ISS), number of broken ribs, lung injury, and Glasgow Coma Scale Score.

The authors are to be commended for carrying out this needed study. However, as they themselves point out, there are numerous limitations that preclude the results from being generalizable. Issues such as likely variability in postoperative pain control regimen, inability to analyze incision length or dissection methodology in both cohorts, and small sample size, which may have masked significant differences in baseline

demographics and injury patterns, are key issues. Nonetheless, this study informs future investigators of issues that need to be addressed and further supports the need for a prospective, appropriately powered trial to compare outcomes using these two very different operative approaches. Tichenor's results, as well as those of previous investigators, should be used to analyze the sample size needed for such a study. As with most things in medicine, it is likely that there is no "one size fits all" approach to SSRF and patient selection will likely be key in determining optimal outcomes based on operative approach.

**Contributors** I am the sole author of this article and wrote it myself.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Competing interests** BS is a consultant for Acumed, Haemonetics, Belmont, and Medtronic. He also teaches courses for Acumed.

**Patient consent for publication** Not applicable.

**Ethics approval** Not applicable.

**Provenance and peer review** Commissioned; internally peer reviewed.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

## ORCID iD

Babak Sarani <http://orcid.org/0000-0001-6247-3004>

## REFERENCES

- Choi J, Gomez GI, Kaghazchi A, Borghi JA, Spain DA, Forrester JD. Surgical stabilization of rib fracture to mitigate pulmonary complication and mortality: a systematic review and bayesian meta-analysis. *J Am Coll Surg* 2021;232:211–9.
- Kasotakis G, Hasenboehler EA, Streib EW, Patel N, Patel MB, Alarcon L, Bosarge PL, Love J, Haut ER, Como JJ. Operative fixation of rib fractures after blunt trauma: a practice management guideline from the eastern association for the surgery of trauma. *J Trauma Acute Care Surg* 2017;82:618–26.
- Pieracci FM, Leasia K, Bauman Z, Eriksson EA, Lottenberg L, Majercik S, Powell L, Sarani B, Semon G, Thomas B, *et al*. A multicenter, prospective, controlled clinical trial of surgical stabilization of rib fractures in patients with severe, nonflail fracture patterns (chest wall injury society NONFLAIL). *J Trauma Acute Care Surg* 2020;88:249–57.
- Dehghan N, Nauth A, Schemitsch E, Vicente M, Jenkinson R, Kreder H, McKee M, Canadian Orthopaedic Trauma Society and the Unstable Chest Wall RCT Study Investigators. Operative vs nonoperative treatment of acute unstable chest wall injuries: a randomized clinical trial. *JAMA Surg* 2022;157:983–90.



► <http://dx.doi.org/10.1136/tsaco-2023-001201>

© Author(s) (or their employer(s)) 2024. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

Surgery, George Washington University, Washington, District of Columbia, USA

## Correspondence to

Dr Babak Sarani; [bsarani@mfa.gwu.edu](mailto:bsarani@mfa.gwu.edu)



5 Tichenor M, Reparaz LB, Watson C, Reeves J, Prest P, Fitzgerald M, Patel N, Tan X, Hessey J. Intrathoracic plates versus Extrathoracic plates: a comparison of postoperative

pain in surgical stabilization of rib fracture technique. *Trauma Surg Acute Care Open* 2023;8:e001201.