

# Clinical Outcomes of Reconstruction of Paravertebral Rib Fractures: Case series

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## Background

Rib fractures are a leading consequence of blunt chest trauma, with mortality rates reaching 40% for cases involving six or more fractures. Surgical stabilization of rib fractures (SSRF) is considered for severe cases, including flail chest and significant displaced fractures, or when non-operative approaches fail. Paravertebral rib fractures pose a unique challenge, often advised against surgical repair due to proximity to the transverse process. Despite this, severe pain and extended hospital stays have led to surgical interventions in certain cases. The long-term effects on quality of life and pulmonary function post-surgery remain largely unexplored. This series examines the outcomes of patients after surgical stabilization of paravertebral rib fractures (SSpRF).

## Methods

- Study Design:** Observational descriptive study conducted at the University Hospital Fundación Valle del Lili, 2020-2023.
- Participants:** Patients with paravertebral rib fractures who underwent surgical stabilization.
- Assessments:** Quality of life measured by the EuroQol Group's EQ5D-3L and lung function assessed through spirometry during the last outpatient clinic follow-up.
- Ethics:** Informed consent obtained from all participants. Study approved by the institutional ethical review board (Protocol No. 2023.194).

## Conclusions

Paravertebral rib fractures had no clear surgical indication. SSpRF is technically difficult. There are cases with severe chest wall involvement and pain that is difficult to control, making it necessary to attempt costal reconstruction.

Follow-up of these patients have shown improved quality of life and mobility over time. Despite observing moderate pulmonary restriction during follow-up, lung volumes remained within adequate ranges and none of them required supplemental oxygen or experienced respiratory distress. Our results suggest that some patients with paravertebral rib fractures might benefit from surgery.

## References

1. Fligel BT, Luchette FA, Reed RL, Esposito TJ, Davis KA, Santaniello JM, et al. Half-a-dozen ribs: the breakpoint for mortality. Surgery. octubre de 2005;138(4):717-23; discussion 723-725.
2. Pieracci FM, Majercik S, Ali-Osman F, Ang D, Doben A, Edwards JG, et al. Consensus statement: Surgical stabilization of rib fractures rib fracture colloquium clinical practice guidelines. Injury. febrero de 2017;48(2):307-21.

## Results

A total of eight patients with SSpRF were included in this study. There were five males (62.5%) and aged on average 37.5 years (IQR 30.5-47.5). The median number of fractured ribs was 9 (IQR 7-11), with a median of 12 fractures (IQR 11-16). Median Injury Severity Score (ISS) was 29.5 (IQR 22.5-36.5).

### Lung Function (spirometry):

Spirometry was performed at 6 months, with a median Forced Vital Capacity (FVC) of 60% (IQR 63-73). The median Forced Expiratory Volume in the first second (FEV1) was 65% (IQR 64-70). The median FEV1/FVC ratio was 0.97 (IQR 0.96-0.98).

### Quality of life (EQ-5D-3L):

The overall health today, measured 6 months after surgery using the EQ-5D-3L Visual Analogue Scale (VAS), had a median score of 60 (IQR 50-75).

