



CWIS Chest Wall Injury Summit 2023

Oral Presentation Abstract Submission

Name Hason Khan

Credentials M.S

Preferred email address hasonkhan123@gmail.com

Name of work institution Division of Trauma, Emergency General Surgery and Critical Care Surgery, Department of Surgery, University of Nebraska Medical Center

Additional authors:

| | Full Name | Credentials | Email address | Mobile or WhatsApp number |
|--------------------|-------------------|-------------|-------------------------|---------------------------|
| Author/Presenter 2 | Zachary M. Bauman | D.O | zachary.bauman@unmc.edu | |
| Author/Presenter 3 | Lindsey Cavlovic | | | |
| Author/Presenter 4 | Sydney Todd | | | |
| Author/Presenter 5 | Samuel Cemaj | M.D | | |

Title of Presentation Better Late Than Never- A Single Center Review of Delayed Surgical Stabilization of Rib Fractures

Background

Rib fractures occur commonly in trauma patients - prevalent in up to 10% of all trauma patients and leading to significant morbidity and mortality. Surgical stabilization of rib fractures (SSRF) has been an emerging therapy for the treatment of patients with rib fractures. It has been demonstrated that SSRF can lead to reduced pain, improved breathing function, decreased ICU and hospital length of stay (LOS), and improved mortality. Although SSRF is more common in the acute traumatic setting, it can also be used weeks to years after a traumatic injury for non-healing ribs. Here we describe our institution's experience with delayed SSRF.

Methods

A retrospective study of patients presenting to our level 1 trauma center from January 2017 to September 2022. Delayed SSRF was defined as any SSRF over 2 weeks in the outpatient setting. Inclusion criteria for delayed SSRF included rib fracture displacement and/or non-union of the rib fractures based on radiographic imaging, ongoing pain/discomfort, patient perceived clicking or popping of the rib fracture(s), respiratory compromise and interference with daily activities. All data was collected from the trauma registry and EMR system. Number of days from injury were calculated

for each patient. Outcomes of interest included mean pain score (pre-operative and post-operative), ICU and hospital LOS, ventilator days, complications post-operatively, and resolution of pre-operative symptoms.

Results

We identified 34 (24 male, 10 female) patients who met inclusion criteria for the study with a total number of 129 non-healed ribs that were symptomatic and received delayed SSRF. Average age was 59.9 (+\ 10.4) for this study population. 12 (35%) patients had a history of smoking, 5 (14.7%) asthma, and 3 (8.8%) patients had COPD. All patients initially experienced a blunt injury and the average number of days from injury to SSRF was 122.5 days (+\ 172) (range 15 days-735 days). The average number of symptomatic/non-union ribs fractured per patient was 4.8 (+\ 3.0) with the average number of rib fractures per patient at 5.7 (+\ 4.0). The average number of ribs plated per patient was 3.8 (+\ 1.73), with an average of 3.8 (+\ 2.0) plates placed per patient.

Twenty-four (70.6%) patients had intraoperative cryoablation of intercostal nerves performed, and 7 (20.6%) patients had a thoracostomy performed. The average ICU LOS post-operatively was 0.1 days (range 0-2 days) and the average hospital LOS was 2.5 days (range 1-13 days).

None of the patients received an autologous bone graft. Twenty-eight patients (82.3%) received demineralized bone matrix grafting in at least one of the fracture sites. No patients required ventilation post-operatively. Two patients experienced a post-operative complication. One patient had hardware breakage at 6 weeks after the initial fixation due to a secondary trauma, requiring a second SSRF procedure. The other experienced a hardware infection at 10 weeks post-operatively requiring hardware explanation. No patients experienced an in-hospital mortality. 33/34 patients experienced pre-operative "clicking," while 32/34 patients had resolution of this symptom post-operatively. Pre-operatively, average pain score was 6.7 (+\ 2.47) and post-operatively, pain was reduced to 2.3 (+\ 1.9). 33/34 patient had reported improved/resolved symptoms at clinic follow-up with the only patient to have ongoing symptoms being the one who's hardware had to be removed. All repeat imaging post-operatively showed healing of the fractured sites.

Conclusion

Although most literature focuses on early SSRF, delayed SSRF also demonstrates resolution of more chronic symptoms that may be debilitating for patients. Patients who underwent delayed stabilization had minimal hospital LOS and resolution of their symptoms, specifically clicking/popping of the fractures, improved pain, and ability to return to their daily activities. Delayed SSRF is a safe and effective treatment modality and should be considered for symptomatic patients.