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Title of Presentation Surgical Reconstruction of Traumatic Sternal Body Nonunions

Background

Sternum fractures are relatively uncommon injuries that generally occur due to a high-energy mechanism of injury, the majority of which are treated nonoperatively. Rarely, traumatic sternum fractures may result in a nonunion which can have drastic, negative implications on quality of life. Literature on traumatic sternal fracture operative outcomes is scarce, while the literature on traumatic sternal nonunion reconstruction outcomes is limited to case reports and case series. We present the surgical principles, and report clinical outcomes for 7 patients following surgical reconstruction of a traumatic sternal body nonunion.

Methods

Consecutive adult patients with a sternum nonunion after a previous traumatic sternum fracture who underwent nonunion reconstruction at a level 1 trauma center between 2013 and 2021 were identified and studied. Demographic, injury, and surgery data was collected from the electronic medical record. Postoperative Patient-Reported Outcomes Measurement Information System (PROMIS) and Single Assessment Numeric Evaluation (SANE) scores were obtained from a research data registry and analyzed. Injuries were classified according to the AO/OTA classification system, and all fractures were mapped onto a sternum template utilizing a previously published technique. Postoperative radiographs were reviewed for union.

Results

Of the 7 patients included in the study, 5 were female and the mean age was 58 years. Mechanism of injury included motor vehicle collision in 5 patients and blunt chest trauma in 2 patients. All fractures involved the proximal half of the sternal body (figure 1). The mean time from injury to nonunion fixation was 11 months. Four of 7 (80%) patients achieved clinic follow-up at ≥ 12 months (mean= 20 months). Of the remaining 3 patients, 1 did not return to clinic after 6 months from surgery but did complete outcomes surveys 40 months after surgery, and 2 have not yet reached their 1 year follow-up date. The mean SANE score at final follow-up (>1 year) was 78. PROMIS survey results at final follow-up (>1 year)

provided a mean global physical health (GPH) value of 47 and a mean global mental health (GMH) value of 48 (Table 1). Six of 7 patients (86%) have achieved radiographic union.

Conclusion

We describe an effective and practical method of achieving stable fixation in traumatic sternal body nonunions using locking plate technology and iliac crest bone graft, evidenced by the positive clinical outcomes of a seven patient series. Despite the variation in presentation and fracture morphology of this rare injury, the surgical technique and principles outlined can serve as a useful tool for chest wall surgeons.