Percutaneous Strain Reduction Screws Are a Cost-Effective and Reproducible Method to Treat Long Bone Nonunion

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Purpose: Nonunions often arise because of high strain environments at fracture sites. Revision fixation, bone grafting, and biologic treatments to treat long bone fracture nonunion can be expensive and invasive. Percutaneous strain reduction screws (PSRSs) can be inserted as a day-case surgical procedure to supplement primary fixation at a fraction of the cost of traditional treatments. Screw insertion perpendicular to the plane of a nonunion can resist shear forces and achieve union by modifying the strain environment. A multicenter retrospective study was undertaken to confirm the results of the initial published case series, ascertain whether this technique can be adopted outside of the developing institution, and assess the financial impact of this technique.

Methods: Retrospective analysis was performed for all PSRS cases used to treat ununited long bone fractures in four Level I trauma centers from 2016 to 2020. All patients were followed until union was achieved or further management was required. Demographic data were collected on patients, as were data about their injuries, initial management, and timing of all treatments received. A comparative cost analysis was performed comparing patients treated with PSRS and with traditional nonunion surgery methods.

Results: 51 patients were treated with the PSRS technique. 45 patients (88%) achieved union at a median time of 5.2 months (range, 1.0-24.7 months). Comparable results were seen between the developing institution and independent units. No patients experienced adverse events beyond failure to achieve union. PSRS appears to offer savings of between £2957 (US$4035) to £11,231 (US$15,324) per case compared with traditional methods of nonunion surgery.

Conclusion: PSRS is a safe, cost-effective treatment for long bone nonunion. The promising results of the initial case series have now been replicated outside of the developing institution.