

Malreduction, Not Fixation Technique, Is Associated with Increased Complications and Worse Functional Outcomes in High-Energy Posterior Pelvic Ring Injuries

John Michael Yingling, DO; Nihar Samir Shah, MD; Matthew Winslow Cole, BA; Megan Pauline Forney, BA; Michael John Beltran, MD; Michael T. Archdeacon, MD; H. Claude Sagi, MD

University of Cincinnati, Cincinnati, OH, United States

Purpose: Our objective was to evaluate the effect of transsacral screw technique and quality of reduction on loss of reduction, complications, and outcomes of operatively treated high-energy pelvic ring injuries.

Methods: An institutional database was used to identify skeletally mature, nongeriatric patients with traumatic sacral fractures presenting to a Level I trauma center from 2011 to 2018. All patients were treated with percutaneous transsacral screws for the posterior pelvic ring injury. Preoperative radiographs and CT were analyzed for fracture pattern, characteristics, and associated sacroiliac joint diastasis. All patients underwent routine postoperative CT scans as part of an institutional protocol that were reviewed for quality of reduction, number of screws, screw station (S1 or S2), screw diameter, thread length, cortical perforation of screw head / washer, and number of cortices engaged. Postoperative follow-up radiographs were assessed for loss of reduction and fixation failure. Chart review was used to determine patient demographics, body mass index, ISS, removal of implants, postoperative nerve injury, and functional outcomes using Majeed, Iowa, and Short Form-12 outcome measures.

Results: 63 patients, of the 258 evaluated, with complete radiographic and clinical follow-up as well as functional outcome scores were included in this analysis. With respect to transsacral screw technique, number of screws, screw station, thread length, engaged cortices, cortical breach, and presence of washer were not associated with functional outcomes, complications, malunion, or change in implant position over time—regardless of injury pattern. However, malreduction of greater than 5 mm, as noted on postoperative CT, was associated with worse functional outcome ($P = 0.09$), an increased incidence of neurological injury ($P = 0.02$), and a higher rate of fixation failure ($P = 0.02$).

Conclusion: Measurable and quantifiable characteristics of transsacral screw technique do not seem to have a demonstrable effect on complications, loss of reduction, or functional outcomes in the treatment of high-energy pelvic ring injuries. However, malreduction leads to significantly higher rates of complications, malunion, and worse functional outcomes. With the increasing popularity and focus on percutaneous fixation techniques, more attention needs to be paid to achieving better quality reductions to improve outcomes and decrease complication rates.