

# Percutaneous Sacroiliac Screw Fixation of the Posterior Pelvic Ring



Justin A. Iorio, MD<sup>a,\*</sup>, Andre M. Jakoi, MD<sup>b</sup>,  
Saqib Rehman, MD<sup>a</sup>

## KEYWORDS

- Percutaneous fixation • Pelvic ring • Sacroiliac screws • Imaging • Complications
- Preoperative planning • Technique

## KEY POINTS

- Percutaneous sacroiliac (SI) screws are indicated for the treatment of unstable posterior pelvic ring injuries, sacral fractures, SI joint disruptions, or as adjunctive posterior pelvic fixation after anterior pelvic fixation.
- SI screws are associated with a shorter operating time, less blood loss, and less soft tissue injury compared with open surgical fixation of the posterior pelvis.
- The iliac cortical density (ICD) parallels the anterior border of the SI joint and represents the alar slope in a normal pelvis. In the case of an abnormal alar slope (dysmorphic pelvis), the ICD is located posteriorly and caudal; failure to recognize this may result in incorrect screw placement.
- The lumbosacral nerve roots, superior gluteal artery, and iliac vessels are at risk during screw insertion and should be managed with screw revision, embolization, ligation, or surgical consult.
- Malunion and malreduction are common complications. Posterior displacement of the pelvic ring greater than 1 cm is associated with a higher incidence of chronic pain and poorer functional outcomes.

## INTRODUCTION

Pelvic injuries account for 3% of all skeletal fractures<sup>1</sup> and about 40% are unstable because of posterior ring disruption.<sup>2</sup> Injury to the sacroiliac (SI) joint is associated with significant morbidity, including chronic pain, sexual dysfunction, bowel and bladder impairment, and failure to return to work.<sup>3–7</sup> Surgical fixation of unstable pelvic injuries provides improved fracture reduction, early weight bearing and mobilization, lower mortalities, shorter hospital stays, and superior functional outcomes compared with nonoperative treatment.<sup>6,8–10</sup>

The classic method of surgical fixation of the SI joint consisted of open reduction and internal fixation (ORIF) by sacral bars or posterior plating. These implants carried a substantial risk of large dissection, prominent implants, iatrogenic nerve injury, infection, and blood loss to the already traumatized patient.<sup>6,11–13</sup> The development of percutaneous fixation via SI screws has decreased operating time, soft tissue injury, and blood loss compared with an open procedure.<sup>14</sup> SI screws are versatile; they can be used to treat a variety of sacral fracture patterns or SI joint dislocation; and can be placed in the supine, prone, or lateral

---

Conflicts of interest and sources of funding: None.

<sup>a</sup> Department of Orthopaedic Surgery, Temple University Hospital, 3401 North Broad Street, Zone B, 6th Floor, Philadelphia, PA 19140, USA; <sup>b</sup> Department of Orthopaedic Surgery, Drexel University, 240 North Broad Street, Mail Stop 420, Philadelphia, PA 19102, USA

\* Corresponding author.

E-mail address: [justiniorio@gmail.com](mailto:justiniorio@gmail.com)

Orthop Clin N Am 46 (2015) 511–521

<http://dx.doi.org/10.1016/j.ocl.2015.06.005>

0030-5898/15/\$ – see front matter © 2015 Elsevier Inc. All rights reserved.

position regardless of soft tissue injury. In addition, for placement in large fragments, cannulated screws are safe<sup>15–17</sup> even in patients with sacral dysmorphism.<sup>18,19</sup>

Various imaging modalities, including fluoroscopy and computed tomography (CT), are used for aiding screw insertion. Conventional fluoroscopy is the standard for intraoperative screw placement. However, acceptable reduction of the SI joint and proper implantation of screws without perforation of the neural foramina is challenging, especially when coupled with the difficulties of fluoroscopic imaging and variations in pelvic anatomy. Incorrect placement of SI screws may result in iatrogenic neurovascular complications.<sup>20–22</sup> The rate of screw malposition has been reported to approach 25%<sup>23</sup> and the incidence of neurologic injury is as high as 18%.<sup>6,24,25</sup> However, thorough preoperative planning and an understanding of SI screw placement technique minimize complications.

## INDICATIONS/CONTRAINDICATIONS

SI screws can be used alone<sup>26</sup> or as supplemental fixation<sup>27</sup> for the treatment of pelvic fractures. SI screws were originally described for SI dislocations and fracture-dislocations.<sup>28</sup> Their applications were expanded to internal fixation of unstable posterior pelvic ring injuries, spinal-pelvic dissociation, incomplete sacral fractures (Denis zones 1–3) with or without pelvic instability, and sacral fractures with persistent gapping after anterior osteosynthesis (**Table 1**).<sup>26,27</sup> SI screws are advantageous in the setting of extensive soft tissue trauma, such as open fractures and

degloving injuries, because of the limited dissection and minimal implant prominence compared with plates.<sup>16,29</sup> Unstable anterior-posterior compression (APC) injuries with bladder injury or contaminated, anterior soft tissue injuries can be treated by external fixation of the anterior pelvis and posterior SI screws. APC type IIb (posterior SI ligament attenuation with sagittal plane instability) injuries are indicated for SI screws in conjunction with anterior, symphyseal plating.<sup>30</sup>

Contraindications to closed reduction and percutaneous SI fixation include the inability to obtain closed reduction and active infection of the surgical site. Delay to fixation of greater than 5 days is a relative contraindication because organized hematoma may prohibit accurate reduction.<sup>31</sup> Open reduction must be performed if closed reduction is not possible. Horizontal sacral fractures are not well suited for SI screws because the implant is inserted parallel to the fracture line. Historically, transitional lumbosacral variants were considered relative contraindications,<sup>16</sup> but later studies have shown that most patients with sacral anomalies can safely undergo percutaneous SI fixation.<sup>18,19</sup> However, severe sacral dysmorphism may prevent safe placement of SI screws. U-shaped sacral fractures with sacral kyphosis or narrowing of neural foramina may require a posterior, open procedure for sacral reduction and nerve root decompression<sup>17</sup> in addition to SI screws. In these cases, in-situ, percutaneous SI fixation does not improve neurologic function. Morbidly obese patients may not be suitable for percutaneous techniques because of difficulties obtaining adequate fluoroscopic imaging and placement of screws.

**Table 1**  
Indications and contraindications for percutaneous SI screw insertion

Indications	Unstable posterior pelvic ring injuries SI joint dislocation Spinopelvic dissociation Incomplete sacral fractures ± pelvic ring instability Vertical posterior pelvic fractures Sacral fractures with gapping after symphyseal plating
Contraindications	Delayed fixation Active infection Severe sacral dysmorphism Morbid obesity Horizontal sacral fractures

## SURGICAL TECHNIQUE/PROCEDURE

### *Preoperative Planning*

A comprehensive physical examination and radiographic evaluation of the patient is necessary. Soft tissue injuries about the pelvis are important for surgical planning, especially if adjunctive ORIF of fractures is required. Other injuries, such as head, chest, abdomen, spine, or extremity trauma, may require procedures before pelvic fixation, affect patient positioning, or delay treatment. All patients with trauma should receive chest, anteroposterior (AP) pelvis, and C-spine radiographs. Advanced pelvic imaging, such as a CT scan with axial slices taken perpendicular to the sacral slope,<sup>32</sup> is recommended for operative planning and for identification of sacral fractures, which are missed on 30% of plain radiographs.<sup>27</sup> CT scans also provide information regarding body habitus, bone quality, soft tissue integrity, neural

Download English Version:

<https://daneshyari.com/en/article/4082838>

Download Persian Version:

<https://daneshyari.com/article/4082838>

[Daneshyari.com](https://daneshyari.com)