Assessment of Sacral Osseous Fixation Pathways for Same-Level Dual Transilliac-Transsacral Screw Insertion

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Purpose: Certain clinical scenarios warrant insertion of multiple transiliac-transsacral (TS) screws at a single level. This study attempts to define the parameters of an osseous fixation pathway (OFP) that allows safe insertion of 2 TS screws at a single sacral level and determine the incidence of such OFPs.

Methods: Retrospective review of 50 patients with pelvic fractures treated with 2 TS screws at either S1 or S2 were compared to an uninjured control cohort. OFPs were calculated using the number of axial CT slices on nonreformatted images, where the distance between the anterior and posterior cortices of the OFP was ≥7.5 mm (Figure). Postoperative CT scans evaluated screw position.

Results: The average S1 OFP was larger in the operative group, but the average S2 OFP was similar (S1-operative: 13.7 mm vs control: 10.8, P = 0.05; S2-operative: 7.3 mm vs control: 7.1, P = 0.42). 39 patients had 2 TS screws at S1. 11 patients, all with dysmorphic osteology, had 2 screws at S2. The average pathway at the level the screws were placed was 17.2 mm in S1 versus 14.4 mm in S2 (P = 0.02). 21 patients (42%) had screws that were intraosseous and 29 (58%) had part of a screw that was juxtaforaminal. No screws were extraosseous screws. The average OFP size of intraosseous screws was 18.1 mm versus 15.5 mm for juxtaforaminal screws (P = 0.02). 14 mm was used as a guide for the lower limit of the OFP for safe dual-screw fixation. Overall, 30% of S1 or S2 pathways were ≥14 mm in the control group, with 58% of control patients having at least one of the S1 or S2 pathways ≥14 mm.

Conclusion: OFPs ≥7.5 mm in the axial plane and 14 mm in the sagittal plane are large enough for planning safe dual-screw fixation at a single sacral level.