

CASE REPORT

Open Posterior SI Joint Arthrodesis as Part of Revising Iliac Fixation

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Study Design. Case report.

Objective. The aim of this study was to describe a technique for augmenting the salvage of loosening of iliac bolt fixation with open posterior sacroiliac (SI) joint arthrodesis.

Summary of Background Data. Loosening of iliac bolt fixation in deformity surgery is not uncommon and can be caused by various reasons. This report highlights a treatment option of open posterior SI joint arthrodesis in addition to revising instrumentation and re-grafting the L5/S1 nonunion.

Methods. Retrospective chart and radiographic review of a 63-year-old female who underwent T10-S1 posterior fusion, L5/S1 transforaminal interbody fusion, multilevel decompression, and iliac bolt fixation using S2AI trajectory.

Results. The patient initially improved postoperatively and then went on to develop significant SI joint pain after several months. X-rays and computed tomography showed loosening of sacral and iliac fixation that required corrective surgery revising the L5/S1 transforaminal interbody fusion, new instrumentation, and open posterior SI joint arthrodesis. Following revision surgery her SI joint pain improved over time as she developed a solid arthrodesis.

Conclusion. Open posterior SI joint arthrodesis is a safe augment in revising iliac fixation in cases of loosening where revising the instrumentation is necessary.

Key words: iliac fixation, open posterior SI joint arthrodesis, SI joint.

Pelvic fixation using traditional iliac bolt placement or the newer S2-alar-iliac (S2AI) trajectory is common in deformity surgery for long constructs. This is done to help protect and augment the sacral fixation as L5/S1 nonunion is common and to prevent sacral fracture. Loosening and pain however, can still occur. This case report outlines failure of pelvic fixation with revision and open posterior sacroiliac (SI) joint arthrodesis.

CASE REPORT

This is a 63-year-old female who underwent T10-S1 posterior arthrodesis with multilevel decompression, L5/S1 transforaminal interbody fusion (TLIF), and pelvic fixation using S2AI trajectory for degenerative scoliosis and stenosis (Figures 1 and 2). She did well initially postoperatively and over the course of 6 months developed significant pain

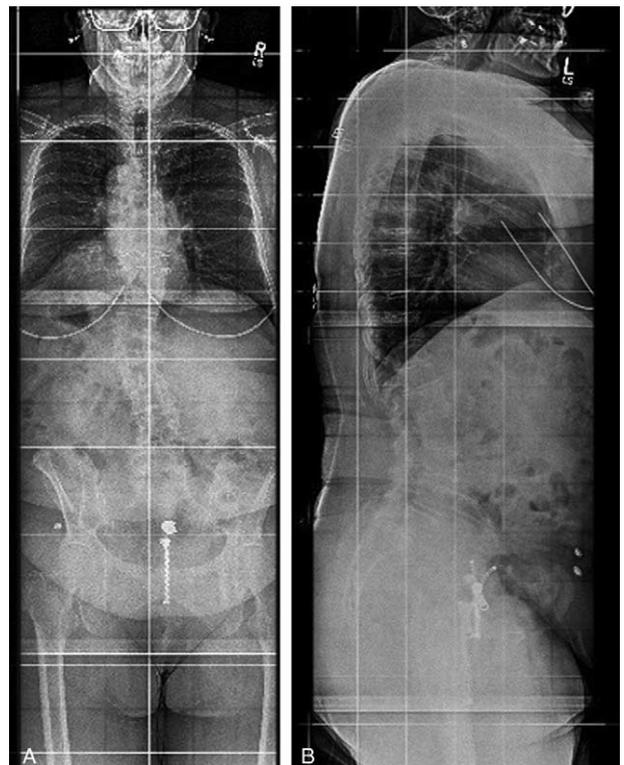


Figure 1. Initial preop. (A) PA scoliosis x-ray and (B) lateral scoliosis x-ray.

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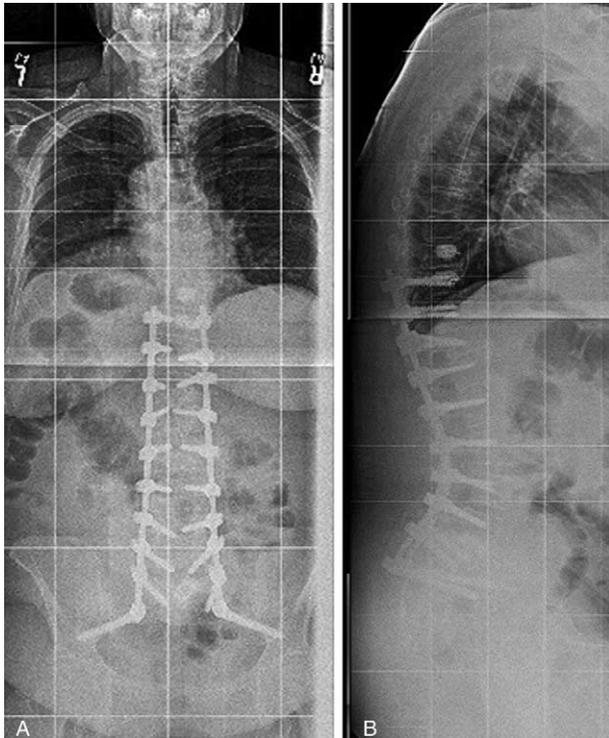


Figure 2. Two weeks postop T10-S1 fusion with iliac bolt fixation using S2AI trajectory. (A) AP scoliosis view and (B) lateral scoliosis view. S2AI indicates S2-alar-iliac.

in the SI joint region radiating into her coccyx. This pain became debilitating. Radiographs and computed tomography showed loosening of the iliac bolts (Figure 3). Recommendation was for revision of sacral and iliac fixation, TLIF

from the contralateral side, and open posterior SI joint arthrodesis (Figure 4).

Surgical Treatment

The patient was taken to the OR for revision surgery. There was gross motion at L5/S1 confirming pseudoarthrosis and the iliac bolt was loose. The decompression was taken down on the contralateral side from the prior TLIF and a TLIF was done. Larger diameter sacral screw was placed achieving good purchase. The posterior ligaments were taken down with bovie electrocautery of the SI joint and were used to define the orientation of the joint. A high-speed bur was used to decorticate the SI joint to bleeding bone and prepare the arthrodesis bed. A Camber Spine Prolix allograft was then placed into the SI joint in the same orientation as previously delineated for the joint. A new large diameter iliac bolt was placed in the same S2AI trajectory. The remainder of the joint was packed with bone graft and the rod was introduced into the tulip head (Figure 4).

Postoperative Course

The patient's symptoms improved following the revision surgery. The pain at the SI joint and coccyx is no longer debilitating and is achieving arthrodesis (Figure 5).

DISCUSSION

This report describes a nonunion at L5/S1 with loosening of iliac fixation causing debilitating SI joint pain. The patient was taken to the OR for repair of the nonunion, revision of sacral and iliac fixation, and open posterior SI joint arthrodesis. The patient's symptoms improved following revision surgery.

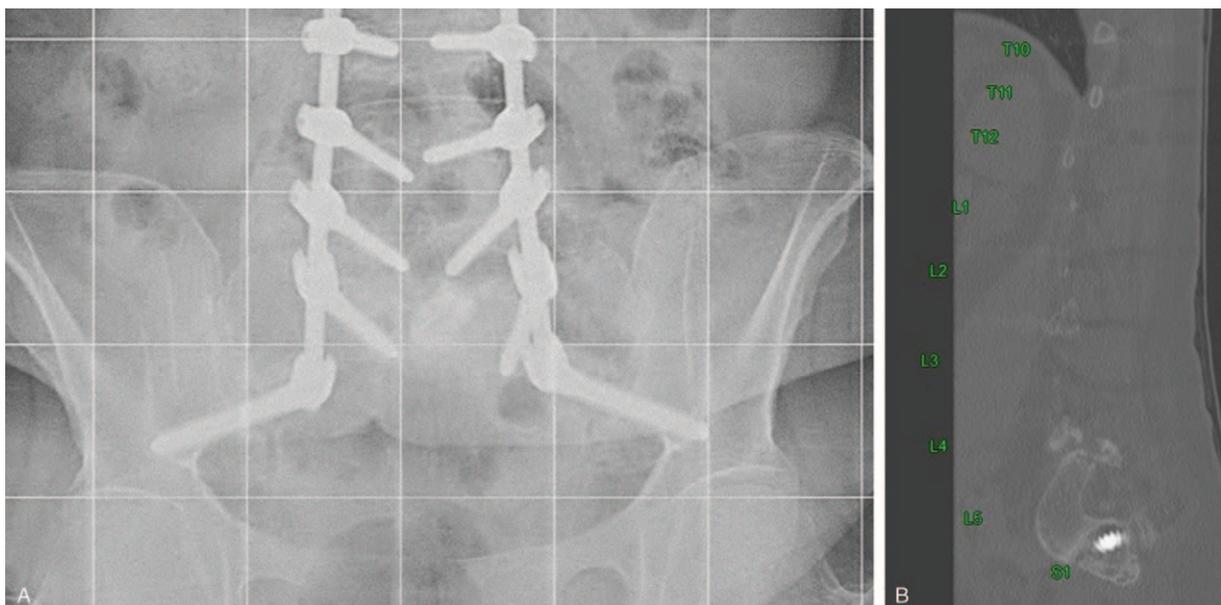


Figure 3. Ten months postoperative PA x-ray demonstrating loosening bilateral S2AI screws. (A) AP x-ray demonstrating bilateral iliac screws with loosening and (B) sagittal CT showing loosening iliac bolt. S2AI indicates S2-alar-iliac; CT, computed tomography.

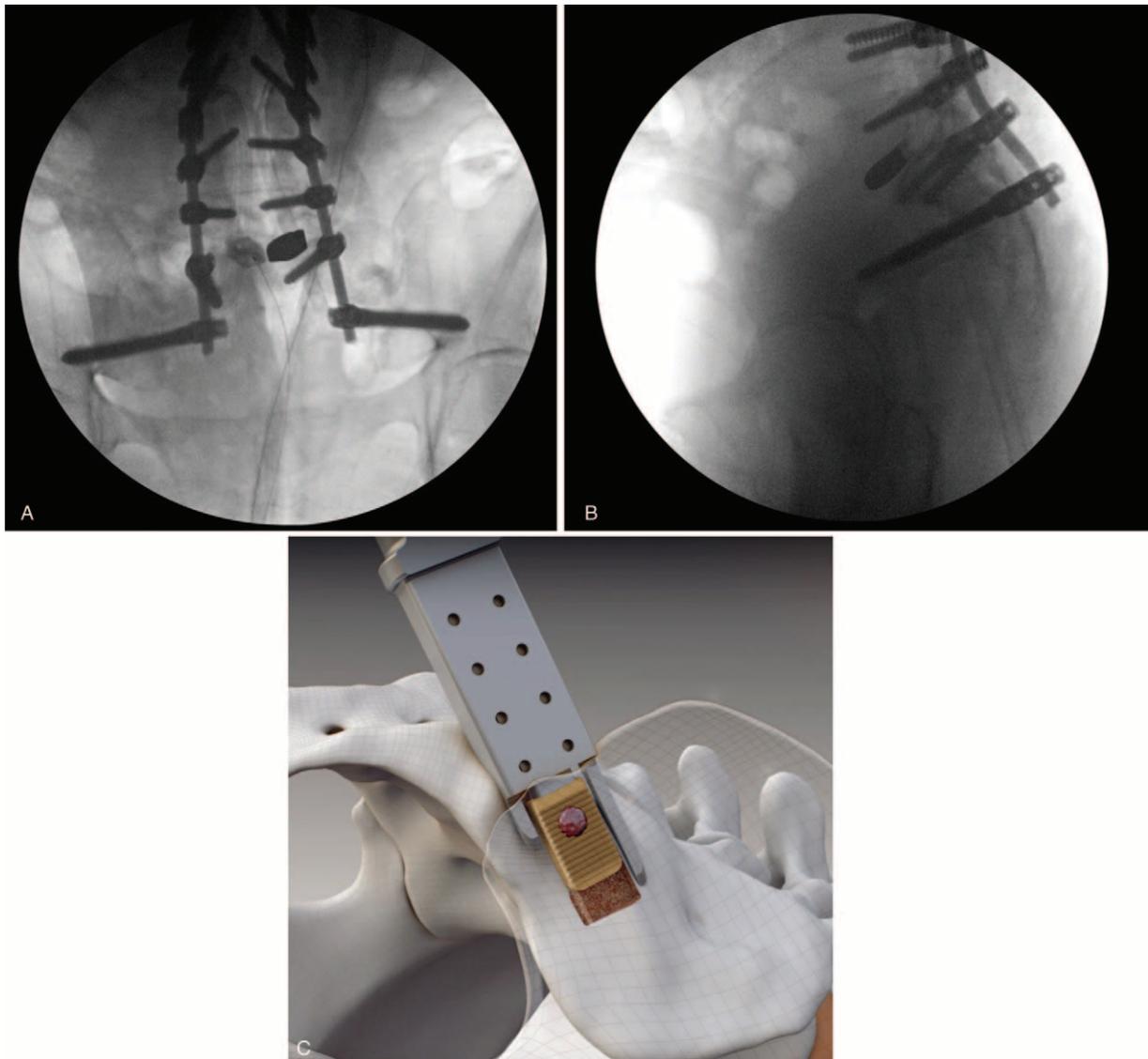


Figure 4. Revision surgery intraop AP fluoroscopy showing new TLIF, SI joint allografts, and larger diameter screws. (A) AP view, (B) lateral view, (C) schematic drawing showing insertion of graft. TLIF indicates transforaminal interbody fusion; SI, sacroiliac.

One of the pinnacles of adult spine deformity surgery rests on the importance of solid fixation at the caudal end of long constructs. Achieving a solid arthrodesis at L5/S1 has been shown to prevent iliac bolt loosening.¹ Loosening of iliac fixation is not uncommon with rates reported 7.5% to 52%.¹⁻⁴ Debates continue on the need to provide anterior column support, whether this is through anterior lumbar interbody fusion or TLIF. In this current case report, despite the fact that a TLIF was performed, unfortunately a solid arthrodesis was not achieved. This leads to loosening iliac fixation and SI joint pain.

Patient-reported outcomes are the focus of literature and discussions for reimbursement. Health-related quality of life has also been shown to be better in patients without loosening and failure of pelvic fixation.^{1,5} Risk factors for loosening and therefore worse outcome scores include pelvic incidence-lumbar lordosis mismatch, not doing interbody

fusion, and screw misplacement. In the current case, adequate lordosis was achieved and correct placement of the iliac bolts was done.

Iliac fixation utilizing the S2AI trajectory is gaining popularity. It is safer than traditional iliac bolt fixation with a lower complication profile.^{6,7} Additionally, screws with this trajectory can be placed using minimally invasive principles and techniques.⁷

In this patient, an open posterior joint arthrodesis was done in conjunction with repairing the nonunion. This was done to facilitate an arthrodesis and stable pelvic fixation to help prevent further micromotion in the SI joint that could lead to future loosening. The patient also complained of pain and had tenderness specifically at the SI joint. Future studies are needed to see if primarily fusing the SI joint at the time of initial pelvic fixation will also help prevent loosening.

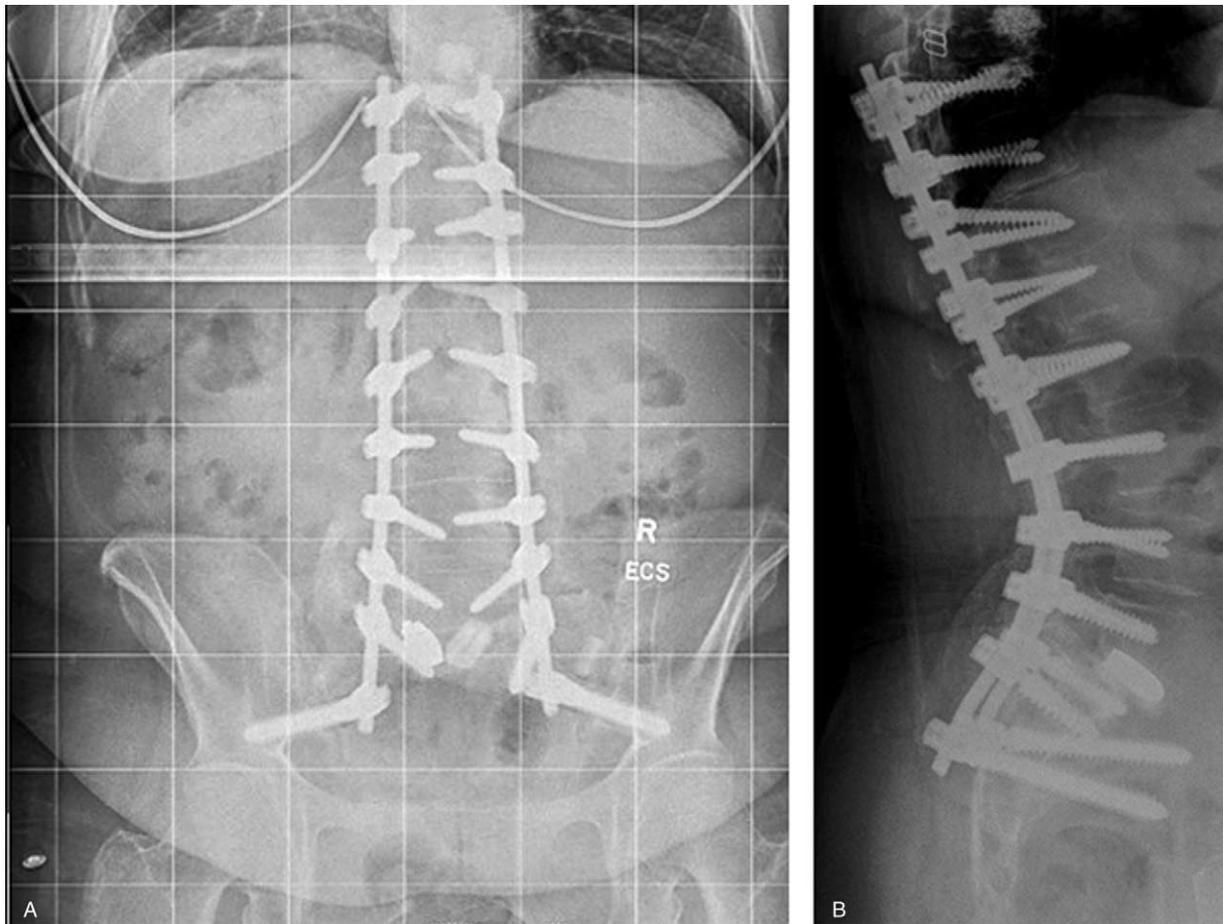


Figure 5. Six months postoperative x-ray showing maturing arthrodesis (A) PA scoliosis view. (B) Lateral scoliosis view.

CONCLUSION

Revising long constructs to the pelvis with loosening of iliac fixation is challenging. In this case, we have shown repairing the nonunion at L5/S1 but also doing an open posterior SI joint arthrodesis in conjunction to new iliac fixation using S2AI trajectory. This provided the stability needed to improve the patient's pain and lead to a better clinical outcome.

➤ Key Points

- ❑ Loosening of pelvic fixation in deformity surgery is not uncommon.
- ❑ Achieving a solid arthrodesis at L5/S1, correcting pelvic incidence-lumbar lordosis mismatch, and correct placement of iliac screws is important in preventing loosening.
- ❑ Open posterior SI joint arthrodesis is safe and helps augment iliac fixation in the revision setting.

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