A Novel Sacral Alar Iliac Fixation Technique: The S1AI Screw

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Introduction

Rigid spinopelvic fixation is necessary to anchor and maintain the stability of long fusion constructs in spinal deformity surgery, with additional applications in spinal trauma, tumor, infection, and degenerative conditions. Current techniques to enhance spinopelvic stabilization include multiple rod constructs, bicortical S1 pedicle screws, traditional iliac screws, S2 alar-iliac (S2AI) screws, anterior interbody grafts, and combinations thereof.

Methods

Two fresh-frozen human intact cadavers were surgically dissected. CT navigation was used to plan and insert unilateral S1AI and S2AI screws. A navigated gearshift was advanced from the starting point through the sacro-iliac joint. S2AI screws were similarly placed using previously described techniques. Screw position was confirmed with post-placement CT. The screws were subsequently removed, and repeat CT was obtained and scrutinized for bony breach and risks to visceral and neurovascular structures.

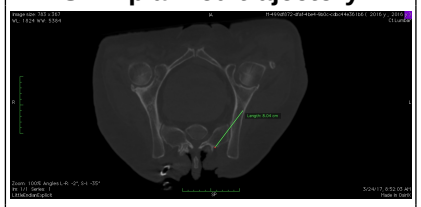
Results

S1AI and S2AI screws were successfully placed. The starting point of the S1AI screw is located at the inferior-lateral L5-S1 facet joint, identical to the S1 pedicle starting point. There were no cortical breaches. Excellent insertional torque and screw purchase was noted. 80-100 mm length and 10 mm diameter screws were placed.

Conclusions

S1AI screws can be safely placed and serve as alternate means of distal fixation. Future work elucidating their biomechanical profile and clinical application is in progress.

S1AI planned trajectory



S1AI planned trajectory

S1AI screw

Actual S1AI screw

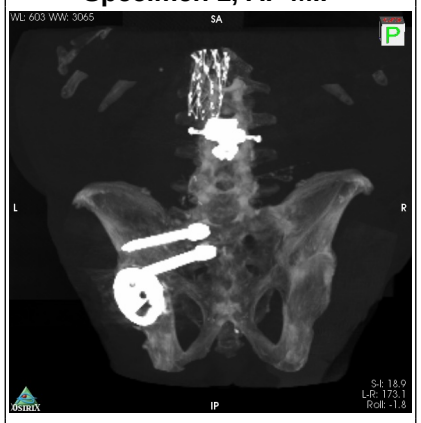
Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the indications for standard and supplemental pelvic fixation and 2) Understand the S1AI screw technique and trajectory.and

Specimen 1, Lateral MIP

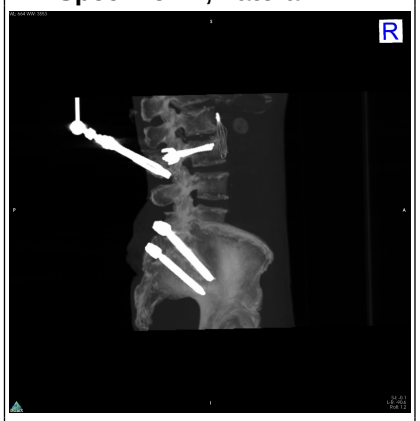
Lateral view of 3D MIP reconstruction

Specimen 1, AP MIP



AP view of 3D MIP reconstruction

Specimen 2, Lateral MIP



Lateral view of 3D MIP reconstruction

Specimen 2, AP MIP

AP view of 3D MIP reconstruction