CNS 2018 ANNUAL MEETING
HOUSTON, TEXAS
OCTOBER 6-10, 2018

Clinical and Radiographical Outcomes of S2-Alar-Iliac Screw Instrumentation Via a Freehand Technique for Lumbosacropelvic Fixation in Adult Patients: Minimum Follow-upof Two Years

Wataru Ishida MD; Benjamin D. Elder MD, PhD; Seba Ramhmdani M.D.; Alexander Perdomo-Pantoja MD; Joshua Casaos BS; Nicholas Theodore MD; Ziya L. Gokaslan MD; Jean-Paul Wolinsky MD; Ali Bydon MD; Timothy F. Witham BS MD; Daniel M. Sciubba MD; Sheng-fu Larry Lo MD, MHSc

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Introduction

With recent advancement in instrumentation devices such as larger screws for sacropelvic regions, robotic surgery, and intraoperative CT scan as well as novel techniques such as the S2-alar-iliac (S2AI) technique, instrumentation in the lumbosacropelvic spine have become safer than two decades ago. However, we preferentially perform S2AI screw instrumentation via a freehand technique based on anatomical landmarks, and thus, aim to report its safety profile.

Methods

Between October 2010, and December 2015, 232 sacropelvic fusion procedures with pelvic screw instrumentation were performed in 205 patients. The inclusion criteria were: patients who received S2AI screws with more than two-year follow-up periods, which yielded 72 patients with 150 S2AI screws. The screw starting point was about 25 mm inferior to the superior aspect of S1 and 22 mm lateral to the midline on the coronal plane. S2AI screws were routinely directed toward 40-50º lateral on the axial plane and 20-40º caudal on the sagittal plane. Rates of complications such as pelvic screw breach, neurological deficits, screw loosening, and reoperation were collected and statistically analyzed. All reported p values are 2-sided and p values $<.05$ were regarded as statistically significant.

Results

In terms of immediate postoperative complications, four S2AI screw breach (2.7%) were noted in three patients without any damage to major vessels, organs, and nerves, which caused no sequelae and thus prompted no revision surgeries. With the mean follow-up period of 33.3±8.3 months, long-term outcomes were acceptable with seven cases (9.7%) of distal device breakage, three incidences (2.0%) of major S2AI screw loosening (>2 mm radiolucency around the screws), and six patients (8.3%) with symptomatic L5-S1 pseudoarthrosis.

Conclusions

The freehand S2AI technique resulted in acceptable immediate and long-term radiographical outcomes as well as clinical outcomes. Future comparative studies are warranted to further investigate its roles in this modern era of intraoperative navigation.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the importance of freehand technique for S2AI screw instrumentaion base on anatomical landmarks and its role in the modern era of intraoperative navigation surgery.