## Comparative Analysis of Revision Rates and Long-term Outcomes in Unilateral versus Bilateral Iliac Screw Fixation versus Sacral Screw Fixation for Adult Spinal Deformity Surgery

George Abdelmalek<sup>1</sup>, Neil Patel<sup>1</sup>, Daniel Coban, Stuart Changoor, Harjot Singh Uppal, Nikhil Sahai<sup>2</sup>, Kumar Gautam Sinha<sup>2</sup>, Ki S Hwang<sup>2</sup>, Arash Emami

<sup>1</sup>St. Joseph's University Medical Center, <sup>2</sup>University Spine Center

INTRODUCTION: In the surgical correction of adult spinal deformity (ASD) requiring multilevel fusion to the sacrum, iliac screw fixation and sacroiliac screw fixation are ways of bridging the fusion construct to the pelvis. Depending on the surgeon's goals, iliac fixation can be achieved with either unilateral or bilateral constructs. Few studies compare long-term outcomes of bilateral iliac fixation, unilateral iliac fixation, and sacroiliac fixation in multilevel fusions for treating ASD. Thus, our study evaluates and compare revision rates of bilateral iliac screw fixation, unilateral iliac screw fixation, or sacral screw fixation for the treatment of ASD.

METHODS: A retrospective review was performed at two centers for patients who underwent spinal fusion from the lower thoracic spine to the pelvis for the treatment of ASD and had a minimum follow-up of five years. Patients were subdivided into three cohorts by the method of pelvic fixation: unilateral iliac screw (IL1), bilateral iliac screw (IL2), and sacral screw (SS). Return to OR (RTO) complications were noted and grouped according to the following categories: infection, neurologic, fusion status, instrumentation, and global alignment. Complications were further classified as early (< 2 years), late (2-5 years), or long-term (>5 years).

RESULTS: 162 consecutive patients (62:IL1, 48:IL2, and 52:SS patients) were included in the analysis. The mean age was 56.8 years (range: 37-74), and 86% of patients (140/162) were female. 89 of the procedures were for primary correction of ASD, and 73 cases were revision surgeries. The mean follow-up time was 6.1 years (range: 4.8-12.8 years). RTO rates at the early, late, and long-term time points for the IL1 group were 19.4%, 6.3%, and 8.1%, respectively. RTO rates at the early, late, and long-term time points for the IL2 group were 8.2%, 24.1%, and 9.3%, respectively. RTO rates for the SS group were 19.2%, 6.8%, and 6.7% at each time point. The SS cohort had a significantly lower incidence of hardware-related complications compared to the iliac screw fixation cohorts. There were no other significant differences concerning particular complications.

DISCUSSION AND CONCLUSION: In patients receiving multilevel fusion constructs from the thoracic spine to the pelvis, bilateral iliac screw fixation is associated with a significantly increased risk of reoperation rate at late (2-5 years) and long-term (>5 years) follow-up compared to unilateral iliac screw fixation and sacral screw fixation. Bilateral iliac screw fixation carried the highest incidence of reoperation for hardware-related complications.