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Current MIS Techniques Fail to Optimize Spinopelvic Parameters in Patients With High Pelvic Incidence

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Introduction

High pelvic incidence (HPI) demands a larger lumbar lordosis (LL) to achieve ideal spinopelvic harmony. Criticisms of MIS spine surgery (cMIS: MIS ant/lateral with MIS screws) include challenges in adequately matching LL to PI. This study analyzes the radiographic and clinical outcomes of patients treated with MIS with varying PIs.

Methods

Retrospective review of multicenter MIS database was queried for cMIS patients. Patients were grouped as low (LPI=43; n=14), mid (43<MPI<66; n= 46), and high (HPI=67; n=17)) pelvic incidence, by using 1 standard deviation from the mean. Theoretical LL (tLL) was calculated based on Schwab PI-LL formula with respect to PI outliers: tLL=LPI+10, =MPI, =HPI-10. The offset was calculated as the difference between tLL and pre- or post-LL. Well aligned (WA) patients were classified to Vialle et al. Nonparametric Kruskal-Wallis test was used to assess significant differences between groups.

Results

420 patients were available for review, 165 patients identified in the database and 77 met inclusion. There were no differences for demographics, levels treated, iliac fixation or use of lateral interbody. At baseline LPI and MPI had lower PT than HPI (15.7 v 23.5 v 33.6; $p<0.05$) and preop PI-LL lower for LPI than HPI (9 v 21.9;$p<0.05$) with no difference in SVA or max Cobb. Post op both LPI and MPI had improved LL, but HPI did not. The tLL, and offset however, was not different between groups at pre or postop ($p>0.05$). All groups saw improvement in ODI, VAS back and leg, with no difference in reaching MCID. Complication occurrence was similar between groups.

Conclusions

Patients with HPI remain some of the most difficult spinal deformities to treat. Current MIS techniques for treating this patient population reveal the inability to correct the PI-LL mismatch, likely due to the need for more lordosis. Consideration should be given when employing MIS techniques in patients with a high PI.

Learning Objectives

Adult spinal deformity (ASD) patients with a high pelvic incidence (PI) are a particularly difficult patient population to treat given their requirement for higher lumbar lordosis. This study demonstrates that ASD patients with high PI are not well optimized in their spinopelvic alignment when using MIS techniques. Furthermore, these patients have significantly different preop PT and it remains unchanged post op. Careful consideration should be given when using MIS techniques in patients with high PI.