Pelvic Fixation Techniques for Early Onset Scoliosis: Comparative Risks of Complications and Unplanned Return to the Operating Room

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INTRODUCTION:

Pelvic fixation is most commonly used for children with neuromuscular early onset scoliosis (EOS) who exhibit significant pelvic obliquity (>15°) or require long spinal fusions that anchor to the pelvis. While pelvic fixations help mitigate the risk of complications by improving lumbosacral stability, they often carry their own risk of morbidity. Operative techniques for pelvic fixation are heterogenous. Currently, there is a paucity of data regarding variation in outcomes of EOS patients who receive different forms pelvic fixation. We aimed to compare rates of unplanned returns to the operating room (UPROR) and complications following pelvic fixation among multiple implant types, and we hypothesized that those who received no fixation demonstrate the greatest risk of both UPROR and complications.

METHODS:

We utilized a multicenter database to identify 297 EOS patients who underwent some form of growth-friendly treatment, had at least 2 years of follow-up from graduation, and received instrumentation to the pelvis at their index growth-friendly procedure. The most common etiology was neuromuscular with 208 (70.0%) patients followed by 42 (14.1%) congenital, 31 (10.4%) syndromic, and 16 (5.4%) idiopathic cases. Demographic information, date and type of index growth-friendly procedure, and pelvic radiographs were collected, and implant types included Iliac Only Screw (I), Pelvic Hook (P), Galveston (G), Sacral Alar Iliac Screw (S), Other (O), or none (N). Chi-square tests were performed to determine if implant type was significantly associated with UPROR or complications. Kaplan Meier Survival Analysis was performed to model rates of UPROR (Figure 1) and complications (Figure 2) over time for each implant type.

RESULTS:

Chi-square tests determined that pelvic fixation type was significantly associated with UPROR and post-operative complications. In 20 unique procedures, those who underwent Galveston Technique experienced the 16 UPRORs (80%) and 33 complications (165%), the highest rates for both figures. Those with no implantation demonstrated 64 (15%) UPRORs and 187 complications (44%) in 425 procedures. Those with Iliac Only Screws had 15 UPRORs (32%) and 33 complications (70%) in 47 procedures, those with Pelvic Hooks had 192 UPRORs (51%) and 460 complications (122%) in 377 visits, and those with Sacral Alar Iliac Screws had 86 UPRORs (25%) and 219 complications (64%) in 341 procedures. Excluding those with “other” implant types, patient with Iliac Only Screws experienced the earliest UPROR and complications while those who underwent Galveston technique experienced the latest UPROR and complications.

DISCUSSION AND CONCLUSION:

The Galveston technique demonstrated the highest rates of complications and UPROR but had them at the latest time points. Those with no implantation were least frequently associated with both UPROR and complications, and Iliac Only Screw complications occurred earliest. These outcomes should be considered when managing pelvic alignment in children with neuromuscular scoliosis.

Implant Type	*Unique Visits*	*UPRORs*	*Complications*
G	20	16	33
I	47	15	33
N	425	64	187
O	4	6	11
P	377	192	460
S	341	86	219