Lumbar Disc Geometry Affects the Risk for Rod Fracture in Adult Spinal Deformity (ASD) Surgery

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Disclosures

- Consultant - DePuy Synthes Spine, Biomet, Amendia, Stryker
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Introduction

- Rod fracture (RF) has significant consequences for patients, including pain, loss of correction, and revision surgery.

- Risk factors associated with RF include previous spine surgery, insufficient sagittal vertical axis (SVA) correction, and pedicle subtraction osteotomy (PSO), among others.

- Increased lumbar disc geometry, regardless of PSO, SVA, or previous surgery, may be a risk factor affecting RF rates.
Methods

- A single center retrospective review of all patients who had adult spinal deformity (ASD) surgery was performed.

- Patients who underwent open posterior fusion constructs that spanned both the T/L junction and the pelvis with full-length scoliosis x-rays and 2-year follow-up were included.

- Patients were divided into 2 Groups:
  - Group 1 - Patients with RF
  - Group 2 - No RF

- Pre-operative lumbar disc heights, diameters, and volumes were calculated using CT and MRI by two board-certified musculoskeletal radiologists.
Results

- 39 of 52 patients met inclusion criteria.

- Group 1 - included 15/39 (38%) patients with RF all requiring revision surgery.

- Group 2 - included 24 (62%) patients without RF.

- There was no difference in age, construct length, number of non-fused lumbar discs, previous spinal surgery, pre- or post-op SVA, or PSOs between the 2 Groups.
Results

Vertical stature and male gender were significantly higher in the RF Group.

There were significant differences between the RF vs No RF Groups in

- **L1/2 disc heights** (H) (8.5 vs 6.5mm, p=0.03), L2/3 H (9.6 vs 6.7mm, p=0.015)
- **L1/2 diameters** (D) (41.4 vs 34mm, p<0.01), L2/3 D (43.2 vs. 36.2mm, p=0.01)
- **L1/2 volumes** (V) (11714 vs 7817mm$^3$, p=0.02), L2/3 V (14025 vs. 8955mm$^3$, p=0.02), respectively.
- L3/4 and L4/5 disc geometry was larger in the RF Group but did not reach statistical significance.
Conclusion

- The overall prevalence of RF was 38%
  - No differences in previous spinal surgery, SVA, or PSOs between the 2 Groups.

- Vertical stature and male gender were significantly higher in the RF Group.

- Patients with RF had significantly larger non-fused disc heights, diameters, and volumes adjacent to the PSO or apical lumbar vertebra.

- Increased disc geometrics may allow for increased micro-motion, rod stresses, and rates of RF.

- Interbody support may be considered at those “discs at risk”.
Thank you