**Presentation #83 P**

- **Are Collapsed Cervical Discs Amenable to Total Disc Arthroplasty? Analysis of Prospective Clinical Study Results with Two-Year Follow-up**

  *Cervical Disc Arthroplasty (M6 cervical disc prosthesis)*

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**Background:** There is limited clinical data on the relationship between preoperative disc height and quantity and quality of postoperative motion after cervical total disc replacement (TDR). We investigated this relationship by analyzing the radiographic and clinical results of a prospective, FDA-regulated feasibility study of a compressible cervical disc prosthesis.

**Methods:** The study included 30 patients: 12 single-level and 18 two-level implantations (C4-C5:7; C5-C6:12; C6-C7:11). All patients received a 6mm-height compressible prosthesis (M6-C, Spinal Kinetics). An independent core facility performed measurements on preoperative and 2-year postoperative radiographs. Anterior, posterior, and average disc heights were measured at the operated and adjacent segments. Segmental and total (C2-C7) range of motion (ROM) was measured on flexion-extension films. We analyzed the influence of preoperative disc height on the postoperative ROM, location of flexion-extension center of rotation (COR), and clinical outcomes (VAS neck and arm pain, NDI) 2-years following TDR.

**Results:** The preoperative disc height at the TDR level was 3.7 ± 0.8mm (median: 3.7; range: 2.0–5.7). Group#1 with disc height below the median height (3.0 ± 0.4mm, range: 2.0–3.6) had significantly narrower discs than Group#2 with above median disc heights (4.4 ± 0.5mm, range: 3.8–5.7mm) (p < 0.05) (Figure 1). Postoperatively the disc height increased to 5.8 ± 1.0mm at 2 years (range: 3.8–7.5mm), with no significant group difference. Narrow discs were less mobile preoperatively than taller discs (7.4 ± 3.7 vs. 11.1 ± 5.3 degrees, p < 0.05). Both groups achieved the same motion postoperatively (6.3 ± 2.8 vs. 6.4 ± 4.6 degrees, p = 0.922); thus, narrower discs had greater retention of motion than taller discs (p = 0.054).
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We further examined the response of a subset of narrow discs, so-called “collapsed discs”; those with preoperative disc height < 3.0mm (range: 2.0–2.9mm) (Figure 2). The 2-year postoperative disc height was not different compared to the overall group (5.7 ± 0.7 vs. 5.8 ± 0.9mm, p = 0.908). The index-level preoperative ROM (5.1 ± 1.9degrees, range: 2.4–8.1) was smaller than the overall group (9.1 ± 4.8degrees, range: 2.4–21.6) (p < 0.05). The postoperative index-level ROM in this subset of discs (7.6 ± 2.4degrees, range: 3.3–10.6) was greater than the overall group mean ROM (6.3 ± 3.7degrees, range: 2.0–20.6) (p = 0.04).

The index level COR for the cohort of 48 implanted levels was maintained posterior to disc midline two years after TDR surgery. The VAS neck and arm pain scores and NDI scores all significantly improved at 2-years postoperatively for the cohort of 30 patients (p < 0.05). The preoperative disc height did not influence the postoperative index level COR location, pain scores, or NDI scores (p > 0.05).

**Conclusions:** Narrower discs had larger height increase and greater retention of motion without compromising the quality of motion when compared to taller discs. This is contrary to previous biomechanical studies which showed the immediate postoperative ROM and motion quality decreased with increasing disc-space distraction. Postoperative quantity and quality of motion in narrow and collapsed discs observed in this cohort may be due to intra-operative segmental mobilization, seating of the metal endplates in the bones and viscoelastic soft-tissue relaxation over time.

The results suggest that disc-space distraction up to 2X preoperative height in a collapsed segment may not degrade the postoperative motion or clinical outcomes two years after TDR with compressible disc prosthesis; and thus, collapsed discs may be amenable to disc arthroplasty.
Figure 1.

Figure 2.

See Disclosure Index pages 40–88.