

**Abstract: 480****Effect of Total Lumbar Disc Replacement on Segmental and Lumbar Sagittal Balance and Movement**

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**Objective:** Total lumbar disc replacement (TLDR) is a motion-preserving alternative to lumbar spinal fusion for degenerative disc disease. Although in vitro cadaveric studies have provided invaluable information in preserving motion and possibly prevent abnormal loading at the adjacent level for TLDR, there is still lack evidence of in vivo consequences for sagittal balance and movement. Aim of our prospective non-randomized clinical study was to analyze the consequences for segmental and sagittal balance and movement of TLDR.

**Methods:** From October 2001 through December 2006, 1-year minimum follow-up, 78 TLDR were implanted in 57 patients. 31 (54.4%) were female, 26 (45.6%) male. Mean age at surgery was  $41.77 \pm 7.46$  ys (30- 57). 36 (63.2%) had single level TLDR, 15 (26.4%) 2-level, 3 (5.2%) 3-level, and 3 (5.2%) hybrid constructs. Replaced discs were L3-L4 in 5 (6.4%) cases, L4-L5 in 32 (41%), and L5-S1 in 41 (52.6%). AP, lateral, and flexion-extension periodical lumbar X-rays allowed to measure segmental lordosis, lumbar lordosis, segmental motion, and lumbar motion pre-, post-op, and at follow-ups. Analyses were performed using 9.2 STATA statistical software, and 12.0 SPSS version. Differences were assessed using t or Mann-Whitney tests. Samples of 3-level and hybrid constructs were too small for comparative analysis.

**Results:** Mean follow-up was  $35.02 \pm 17.58$  ms. Lumbar lordosis (Fig. 1) passed from  $43.87^\circ \pm 11.82^\circ$  pre-op to  $46.42^\circ \pm 10.83^\circ$  post-op ( $P=0.062379$ ), and  $47.98^\circ \pm 11.97^\circ$  at last follow-up ( $P=0.008544$ ). L3-L4 segmental lordosis passed from  $6.90^\circ \pm 3.51^\circ$  pre-op to  $10.85^\circ \pm 5.22^\circ$  post-op ( $P=0.026971$ ), and  $11.80^\circ \pm 2.59^\circ$  at last f-u ( $P=0.064873$ ). L4-L5 segmental lordosis passed from  $9.86^\circ \pm 5.06^\circ$  pre-op to  $13.83^\circ \pm 6.21^\circ$  post-op ( $P=0.000611$ ), and  $13.21^\circ \pm 6.11^\circ$  at last f-u ( $P=0.000631$ ). L5-S1 segmental lordosis passed from  $17.02^\circ \pm 5.32^\circ$  pre-op to  $22.46^\circ \pm 6.27^\circ$  post-op ( $P=0.000001$ ), and  $23.03 \pm 6.81^\circ$  at last follow-up ( $P= P=0.000000$ ) (Fig. 2). Concerning movement, there was no differences between pre- and post-op L3-L4 ( $P=0.656045$ ), L4-L5 ( $P=0.458793$ ), or L5-S1 ( $P=0.157879$ ) ROM (Fig. 3). Even lumbar motion had no difference between pre- and post-op. There was no differences between single and double level replacement about lumbar and segmental lordosis, and about lumbar and segmental ROM (Fig. 4 and 5).

**Conclusions:** In vivo implanted TLDR affected sagittal balance, increasing segmental and lumbar lordosis. TLDR avoid spinal fusion maintaining normal motion, both segmental and lumbar. Single and double level disc arthroplasty have similar effects.