INTRODUCTION:
Lumbar threaded interbody fusion devices are frequently used in the treatment of severe degenerative lumbar disk disease to restore normal intervertebral height and angle, decompress the neural foramina, reconstruct anatomic lordosis, and preserve normal spinal mechanics of adjacent motion segments. Several in vivo animal and cadaveric human studies have documented significant changes produced by various fusion techniques, however no patient data has been reported. This clinical study was designed to measure the immediate and long-term change in intervertebral height and angulation after insertion of a threaded interbody fusion device.

METHODS: Patient Selection. Twenty levels in eighteen consecutive patients treated with various intervertebral fusion cages achieving successful fusion were analyzed with follow-up ranging from 3 to 48 months. Radiographic Examination. Measurements from the three observers were averaged for each patient. Posterior intervertebral disk height, foraminal height, and anterior body intervertebral angle using a ruler and goniometer.

• Anterior intervertebral disk height was measured using the most anterior projection of the endplates.
• Posterior intervertebral disk height was measured between the two endplates at the posterior margin of the disk space.
• Intervertebral disk height was average of anterior and posterior heights.
• Foraminal height: the distance from the apex of the arch defining the inferior margin of the upper pedicle to the corresponding superior margin of the lower pedicle.
• Intervertebral angle: the angle formed by the anterior cortex of two adjacent vertebral bodies. The anterior sacral margin was used for S1.

RESULTS: No patient had motion observed on flexion/extension films at the initial or final postoperative evaluation.

• The variation among height measurements made by the three observers was 14.38 overall. Variability was greater for anterior intervertebral height (0.117) than for posterior (0.04). Coefficient of variation for the intervertebral height was 0.04.
• Intervertebral disk space height increased from preoperative values by an average of 5.1 mm (p<0.0001) at first follow-up after cage implantation. Intervertebral height decreased from first follow-up an average settling around the cage of 1.2 mm (p=0.07) at final follow-up. Final height remained significantly greater than preoperative height (p<0.0001). Final change in intervertebral disk height with cage placement at the L5-S1 level was lower in patients with longer postoperative follow-up [RE=0.33, β=0.098; p=0.04].
• Foraminal height increased significantly by an average of 3.4 mm (p<0.0001) as a result of cage placement. This height tended to decrease (average of 2.0 mm) from initial to final evaluation, however no statistically significant difference was demonstrated (NS) between final height and either preoperative or initial postoperative measurements.
• The change in intervertebral angle was small but always in a lordotic direction. This angle decreased, tending to settle over time (NS).

CONCLUSIONS & DISCUSSION: Intervertebral height is significantly increased by placement of a threaded interbody fusion device and well maintained in early follow-up through initial fusion consolidation. Settling occurs over time, however a significant increase in height persists in final follow-up compared with initial preoperative values.
• Foraminal height was increased by cage interbody fusion and may account for improvements in radicular symptoms reported by many patients. Settling was observed over time. Contrastingly, final foraminal height was not changed from preoperative values.
• Cylindrical interbody cages failed to significantly alter intervertebral angles, however there was a trend toward increased lordosis across the fused segment which settled only slightly over time. Tapered cages designed specifically to restore lordosis may be more successful in altering and maintaining spinal alignment.