Cadaveric Evaluation of the Avenue® L Lateral Lumbar Cage with VerteBRIDGE® Plating Technology

Introduction

The Avenue L lateral lumbar interbody cage is a zero-profile device which utilizes integrated VerteBRIDGE plating technology (Figure 1). The aim of this study was to compare the biomechanical stability of an intact spinal motion segment with spinal segments treated with Avenue L and VerteBRIDGE plating.

Figure 1: The Avenue L Lateral Lumbar Cage with VerteBRIDGE Plating Technology.

Methods

Six cadaveric spinal motion segments were collected for testing. All spinal motion segments were either L2-L3 or L4-L5. Each segment was DEXA scanned to ensure proper bone density, and then potted in epoxy. The segments were tested intact and then each segment was implanted with an Avenue L cage and VerteBRIDGE plating. The constructs were tested using a hydraulically actuated spinal loading system. Specimens were preloaded with 50 N compressive force and pure moments of ±6 N were applied in flexion-extension, lateral bending, and axial torsion. The primary outcome measure of stability was range of motion (ROM), calculated as the difference between the peak positive and peak negative rotations for both intact spine segments and spine segments implanted with Avenue L and VerteBRIDGE.

Results

Avenue L with VerteBRIDGE significantly reduced the range of motion compared to the intact spine in all directions (Figure 2).

Discussion

The results of these tests indicate that Avenue L with VerteBRIDGE demonstrates stabilization of the spinal motion segment. Furthermore, the stabilization afforded by Avenue L with VerteBRIDGE compares favorably to published results from similar testing of a lateral cage without supplemental fixation (Figure 3).[1]

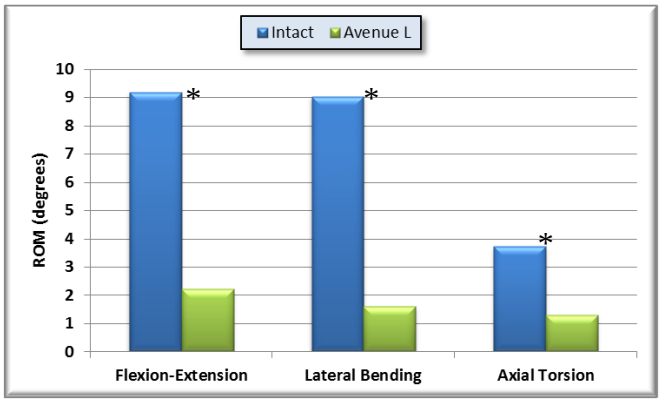

*Figure 2: Range of motion (ROM) of intact spinal motion segment and segment after fixation with Avenue L and VerteBRIDGE. * - paired t-test; $p < 0.05$*

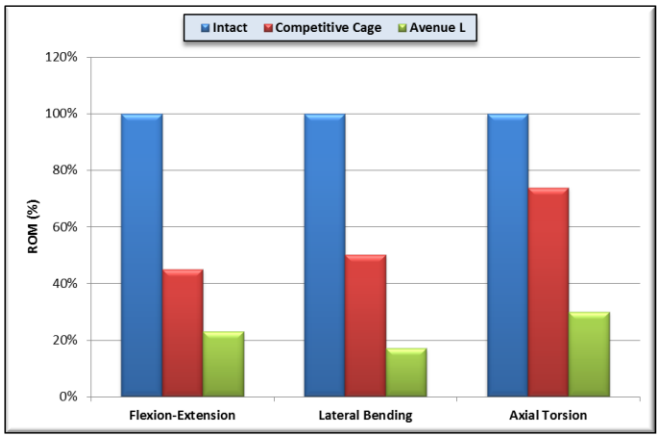

Figure 3: Range of motion of intact spine, segment with competitive cage, and segment with Avenue L and VerteBRIDGE. Competitive cage data taken from data published from similar testing.[1]

Conclusions

Avenue L with VerteBRIDGE plate fixation effectively reduces the range of motion of the spinal segment, providing a significant increase in segmental stability under load as compared to intact baseline in this cadaveric setting. Use as indicated with posterior supplemental fixation (e.g., pedicle screws) will further increase the stability of the construct.

References

Testing for Avenue L was performed by the Excelen Center for Bone & Joint Research and Education, Minneapolis, MN.

1. Laws CJ, Coughlin DG, Lotz JC, Serhan HA, Hu SS: Direct lateral approach to lumbar fusion is a biomechanically equivalent alternative to the anterior approach: an in vitro study. Spine 37:819-825, 2012.

Indications for Use:
The Avenue® L Interbody Fusion System is indicated for intervertebral body fusion of the lumbar spine, from L2 to S1, in skeletally mature patients who have had six months of non-operative treatment. The device is intended for use at either one level or two contiguous levels for the treatment of degenerative disc disease (DDD) with up to Grade I spondylolisthesis. DDD is defined as back pain of discogenic origin with degeneration of the disc confirmed by history and radiographic studies. The device system is designed for use with or without integrated fixation and must be used in conjunction with posterior supplemental fixation (e.g., pedicle screws). The device system is intended for use with autograft to facilitate fusion.