Adjacent Segment Disease (ASD) is characterized by the development of pathology at vertebral segments located above or below an implanted spinal fusion device. ASD often results in disk degeneration of these adjacent vertebral segments, a painful consequence for patients. Recently, ASD has been characterized as a potential late complication of spinal fusion procedures that may lead to additional surgical intervention. One study noted that of 49 patients who had received lumbar spinal fusion surgeries, 35% were diagnosed with ASD on an average of 13.1 years post surgery. As the number of spine surgeries rise, the exploration of ASD will become increasingly important to enhance long term quality of life for patients.

Design Parameters

Design Parameters (requested by Biomet):
- The device should be capable of manipulating a sample in at least two degrees of freedom.
- The device should apply realistic biological forces to mimic human motion.
- The device should be compatible with Biomet Spine’s Instron machines.
- The device should allow for attachment of a testing sample.
- The device should demonstrate precise, automated movement.
- The device should contain a removable electronic package.
- The device should be cost effective (< $5,000).

Conclusions

- Mechanical design and materials used in construction passed stress-fail analysis and was validated to support loads applied from lumbar spine manipulation.
- Calibration of motors and movement adhered with realistic lumbar spine motion in both speed and range protocols.

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