Clinical Significance of Hypermobility in Cervical Artificial Disc Replacements

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Introduction: Normal range of motion in terms of total flexion/extension at C4-5 averages 18.8°, C5-6 averages 18.4° and C6-7 averages 15.4°. Cervical artificial discs have been designed to emulate normal spine kinematics. The Prestige ST and the ProDisc-C are designed to allow 10° of flexion from a neutral position and 10° of extension for a total 20° of range of motion. The Byan allows 22° total range of motion.

Methods: Published FDA IDE data was evaluated from the Prestige ST, ProDisc-C and Bryan disc in terms of range of motion at the operated level. Patients with more than 14 degrees of ROM were considered hypermobile. Histograms of each CADR will be presented.

Results: Histograms of the Prestige ST, ProDisc-C and Byian disc indicate 15% of Prestige ST patients, 24% of ProDisc-C patients and 6% of the Bryan disc patients had greater than 14° of total motion in flexion/extension. These results are based on a single flexion/extension x-ray at two-year follow-up. In terms of the total group, these patients are considered to have hypermobile cervical artificial discs. Internal analysis of these hypermobile patients by each company revealed no difference in their FDA clinical success compared to the average patient with 8 degrees of ROM. Pre-operative flexion/extension views do not correlate with patients who post op develop hypermobility. Overall range of motion of the entire cervical spine remains within normal limits in these patients. Thus, more motion is occurring at the cervical artificial disc replacement than adjacent levels which may decrease the incidence of adjacent level degeneration. This is opposite compared to fusion.

Conclusion: The average range of motion reported after CADR is 8° of total flexion/extension, substantially less than the 15-18° considered normal range of motion. If the goal of artificial discs is to emulate normal spine kinematics, hypermobility may be a desirable result. At two-year follow-up no conclusions can be made whether these hypermobile patients demonstrate long-term clinical advantages.