

Which Cervical Artificial Disc Should We Choose?: An In Vivo Study.

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Introduction

There has been increasing attention on cervical arthroplasty as an alternative to arthrodesis as a way to preserve motion, reduce adjacent level degeneration, avoid reoperation, and improve patient-reported outcome. Cervical artificial discs may be categorized by design. An artificial disc may be constrained, semi-constrained, or unconstrained. An artificial disc may comprise of one, two, or three pieces. There is no federally funded *in vivo* study that directly compares different cervical artificial disc designs.

Methods

We performed cervical arthroplasty at C3/4 level in 14 healthy female adult Alpine goats. Five goats received Bryan (Medtronic) (unconstrained one-piece design); five goats received ProDisc-C (DePuy Synthes Johnson&Johnson) (semi-constrained two-piece design); and four goats received Mobi-C (LDR Biomet Zimmer) (unconstrained three-piece design). These goats were monitored in a unit for six months with regular cervical spine radiographs.

Results

All 14 goats tolerated the surgery well. All had satisfactory placement of hardware. No migration of implant occurred in the Bryan and ProDisc-C groups. 100% migration rate (4/4) was observed with Mobi-C within the first week, requiring implant removal and arthrodesis with an interbody and anterior plating. Heterotopic ossification was observed at six months in 40% of goats with Bryan (2/5). Partial heterotopic ossification (with motion preservation) was seen in 20% of goats with ProDisc-C (1/5). Cervical motion was ultimately preserved at six months in 0% of goats with Mobi-C (due to implant extrusion subsequently requiring ACDF), 60% of goats with Bryan, and 100% of goats with ProDisc-C.

Conclusions

Unconstrained three-piece design may be prone to anterior migration and disintegration. Single-piece design may be more likely to develop heterotopic ossification than multi-piece designs. Semi-constrained two-piece design was the most likely to preserve motion.

Learning Objectives

- 1) Recognize different designs of cervical artificial discs
- 2) Discuss potential complications of cervical arthroplasty
- 3) Identify the most likely cervical artificial disc design to maintain motion

Mobi-C



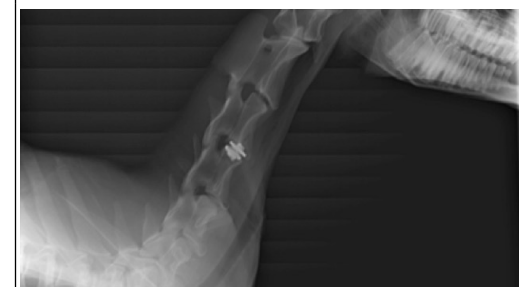
Unconstrained three-piece artificial disc (Mobi-C). a) Intraop; b) complete extrusion 1 week postop; c) revised with ACDF.

Bryan



Unconstrained one-piece artificial disc (Bryan). No migration after six months.

ProDisc



Semi-constrained two-piece artificial disc (ProDisc-C). No migration after six months.