

Does Vertebral Endplate Morphology Influence Outcomes in Lumbar Disc Arthroplasty? Part I: An Initial Assessment of a Novel Classification System of Lumbar Endplate Morphology

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ABSTRACT

BACKGROUND

The influence of lumbar endplate morphology on the clinical and radiographic outcomes of lumbar disc arthroplasty has not been evaluated to the best of our knowledge.

STUDY DESIGN AND OBJECTIVE

In this observational study of 80 patients, the objective was to formulate a reproducible and valid lumbar endplate classification system to be used in evaluating lumbar total disc replacement patients.

METHODS

A novel vertebral endplate morphology classification system was formulated after review of data related to 80 patients enrolled in a prospective, randomized clinical trial in conjunction with an application for a US Food and Drug Administration investigational device exemption. Intraobserver and interobserver analyses of the classification system were performed on the same 80 patients utilizing the classification system.

RESULTS

The initial review of the radiographs revealed 5 types of endplates: Type I (n = 82) flat endplates; Type II (n = 26) posterior lip; Type III (n = 5) central concavity; Type IV (n = 4) anterior sloping endplate; and Type V (n = 2) combination of Types I–IV. The intraobserver kappa was 0.66 and the

interobserver kappa was 0.51. These kappa values indicate “substantial” to “moderate” reproducibility, respectively.

CONCLUSIONS

In this study, we propose a lumbar endplate classification system to be used in the preoperative assessment of patients undergoing lumbar disc arthroplasty. The classification can function as a basis for comparison and discussion among arthroplasty clinicians, and serve as a possible exclusionary screening tool for disc arthroplasty. Special consideration should be given to Type II endplates to optimize proper positioning and functioning of a total disc replacement (TDR) implant. Further outcome studies are warranted to assess the clinical significance of this classification system.

The key points of our study are: (1) We present a novel lumbar vertebral endplate classification system; (2) Five types of endplates were identified and classified; (3) Intraobserver and interobserver reliability were classified as substantial and moderate, respectively; and (4) The classification system used may assist in the preoperative evaluation of patients for total disc replacement.

LEVEL OF EVIDENCE

A systematic review of cohort studies (level 2a).

Key Words: Disc replacement, lumbar, endplate, morphology. *SAS Journal*. Winter 2008. 2:16–22. DOI: SASJ-2007-0118-RR

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This manuscript was submitted October 14, 2007, and accepted for publication January 7, 2008.

Protocol approved by Yale Human Investigation Committee.