INTERNATIONAL JOURNAL of SPINE SURGERY

Response to editorial regarding a novel surgical treatment option in which posterior dynamic stabilization is used to correct coronal plane tilt of a lumbar total disc replacement

Wayne K. Cheng and Daniel K. Palmer

Int J Spine Surg 2011, 5 (4) 131
doi: https://doi.org/10.1016/j.esas.2011.07.002
http://ijssurgery.com/content/5/4/131

This information is current as of April 26, 2024.

Email Alerts Receive free email-alerts when new articles cite this article. Sign up at: http://ijssurgery.com/alerts

The International Journal of Spine Surgery
2397 Waterbury Circle, Suite 1,
Aurora, IL 60504, Phone: +1-630-375-1432
© 2011 ISASS. All Rights Reserved.

INTERNATIONAL SOCIETY for the ADVANCEMENT of SPINE SURGERY

Downloaded from http://ijssurgery.com/ by guest on April 26, 2024

Available online at www.sciencedirect.com
SciVerse ScienceDirect
SAS Journal 5 (2011) 131
SAS Journal
www.sasjournal.com

Response to Letter to the Editor

Response to editorial regarding a novel surgical treatment option in which posterior dynamic stabilization is used to correct coronal plane tilt of a lumbar total disc replacement

We recently described a novel surgical treatment option in which posterior dynamic stabilization (PDS) is used to correct coronal plane tilt of a lumbar total disc replacement (TDR).[1] Clinical and radiographic outcomes have been satisfactory. Araghi and Ferrara[2] have pointed out the potential for system mismatch in hybrid constructs. This is important, though speculative.

As shown by McAfee et al,[3] the underlying cause of radiographically depicted disc tilting may be rotational instability. Single-level lumbar TDR was shown to increase axial range of motion (ROM) to 160% of the axial ROM in the intact spine.[3] In addition, the neutral zone in axial rotation was increased to approximately 130% that of the intact spine.[3,4] On the basis of an article by Niosi et al,[5] the Dynesys system (Zimmer Spine, Warsaw, Indiana) potentially restores axial ROM and the neutral zone. A combination of these systems may therefore be complementary rather than conflicting.

It is also possible that in a hybrid construct, there will be dominance of the more rigid system on overall motion rather than continued interaction between the systems.[3,4,6] The Dynesys system, while dynamic, has been shown to be motion limiting.[5,7] On the other hand, biomechanical studies comparing TDR with the intact spine do not show such motion limitations.[6] Therefore control of motion in a TDR-Dynesys hybrid construct would likely be dominated by the Dynesys system, with minimal influence from the more motion-tolerant TDR, thus negating concerns regarding potential complications of biomechanically competitive hybrid pairings.

Patient preferences are crucial components of decision making when treating failed TDRs. In circumstances where the patient is strongly against the use of a fusion system, posterior dynamic stabilization may be the only alternative. Accordingly, a more comprehensive biomechanical study should be performed to better understand the influences of such hybrid constructs on instantaneous centers of rotation as well as on the motion-dampening properties of each system.

Wayne K. Cheng, MD
Daniel K. Palmer, BS
Department of Orthopaedic Surgery
Loma Linda University
Loma Linda, California
E-mail address: md4spine@yahoo.com

References

1. Cheng WK, Palmer DK, Jadhav V. Novel indication for posterior dynamic stabilization: correction of disc tilt after lumbar total disc replacement. *SAS J* 2011;5:44–7.
2. Araghi A, Ferrara L. Letter to the editor: Novel indication for posterior dynamic stabilization: correction of disc tilt after lumbar total disc replacement. *SAS J* 2011;5:95.
3. McAfee PC, Cunningham BW, Hayes V, Sidiqi F, Dabbah M, Sefter JC, et al. Biomechanical analysis of rotational motions after disc arthroplasty: implications for patients with adult deformities. *Spine (Phila Pa 1976)* 2006;31(Suppl):S152–60.
4. Cunningham BW, Gordon JD, Dmitriev AE, Hu N, McAfee PC. Biomechanical evaluation of total disc replacement arthroplasty: An in vitro human cadaveric model. *Spine (Phila Pa 1976)* 2003;28:S110–7.
5. Niosi CA, Zhu QA, Wilson DC, Keynan O, Wilson DR, Oxland TR. Biomechanical characterization of the three-dimensional kinematic behaviour of the Dynesys dynamic stabilization system: an in vitro study. *Eur Spine J* 2006;15:913–22.
6. Panjabi M, Malcolmson G, Teng E, Tominaga Y, Henderson G, Serhan H. Hybrid testing of lumbar CHARITE discs versus fusions. *Spine (Phila Pa 1976)* 2007;32:959–66; discussion 967.
7. Gédet P, Haschtmann D, Thistlethwaite PA, Ferguson SJ. Comparative biomechanical investigation of a modular dynamic lumbar stabilization system and the Dynesys system. *Eur Spine J* 2009;18:1504–11.

1935-9810 © 2011 SAS - The International Society for the Advancement of Spine Surgery. Published by Elsevier Inc. All rights reserved.
doi:10.1016/j.esas.2011.07.002

Downloaded from http://ijssurgery.com/ by guest on April 26, 2024