Cervical total disc replacement C5/6

Petr Suchomel · Pavel Barsa

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Learning targets

- To learn the correct indication for a CTDR.
- To learn the proper surgical technique for a CTDR implantation.

Introduction

Anterior cervical discectomy and fusion (ACDF) was the standard treatment for cervical disc degenerative disease (CDDD), and an alternative to conservative therapy, for several decades [1]. While highly successful in the diseased segment, a fusion procedure is likely to be detrimental to the remaining motion segments [2, 3]. On the other hand, the cervical total disc replacement (CTDR) technique aims to decrease the incidence of adjacent segment disease (ASD) through motion pattern preservation, at both the operated level and the adjacent ones [4]. One of the most important issues of a successful CTDR application is the correct surgical indication and the proper insertion technique.

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P. Suchomel (✉) · P. Barsa
Neurocenter, Hospital of Liberec, Liberec, Czech Republic
e-mail: petr.suchomel@nemlib.cz

Case description

A 35-year-old female patient has suffered from cervico-brachial syndrome for more than 6 months. Despite intensive conservative treatment, the neck and arm pain has worsened in the last month. Currently she has some neck pain, and intensifying right side arm pain in the C6 root distribution. She has neither a neurologic deficit, nor walking disturbances. On plain films, mild spondylotic changes in segment C5/6 were detected, but the disc is high enough and the segmental movement well preserved.

MRI confirms a right paramedian disc herniation, compromising the neural foramen at the right C6 nerve root.

Surgical procedure

The anesthetised patient was carefully positioned supine on a radiolucent operating table with her head and neck in strictly neutral position (no hyperextension, no rotation). The shoulders were pushed caudally by traction, to allow clear fluoroscopic view of the target C5/6 segment. Fluoroscopy and metal markers were used to locate the correct incision point.

After disinfection and wrapping the horizontal right side skin incision was performed to reach the perpendicularly spreading fibres of the platysma muscle. A longitudinal platysma split allows deeper access along the anterior border of the STC muscle, to the anterior cervical spine

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surface. The midline was estimated, according to the position of both bellies of the longus colli muscle, and confirmed with the help of AP fluoroscopy. The midline point was marked on the upper third of the C5 vertebra with a high speed drill. The radiolucent wound distractor was fixed under the longus colli muscles. The intervertebral disc was opened and partially removed. A long shaft Caspar screw was inserted nearly bicortically to C5, perpendicularly to its posterior wall and directly into the previously marked midline point. Similarly the C6 distraction screw was inserted and, after a slight distraction, the rest of the soft degenerated disc material was removed. The final parallel distraction was achieved by specially designed distraction forceps, to avoid undesirable segmental lordotization.

The rest of the disc tissue, the extruded material and the PLL were microsurgically removed. The appropriate trial implant (5 mm high, 16 mm wide and 14 mm deep) was attached to a universal self-locking trial holder and inserted, under fluoroscopic control, into the C5/6 space along its axis, respecting the midline and correctly in the axial plane. The segmental distraction was released to lock the trial implant in place. A movable safety stop fixed the trial implant at this point, to allow detachment of the trial holder and attachment of the drill guide holder. The groove for the lower implant keel was drilled, and the trial implant removed. The irregularities of the groove cut were cleaned by a special sharp sickle and a small chisel. Attached to the universal implant holder, the original active C implant (size S 5 mm), corresponding to the used trial size, was inserted along the disc space axis. Finally the correct position of the upper implant dish was obtained. All the previously mentioned manoeuvres were controlled under lateral fluoroscopy. The wound was closed in two layers with a suction drain, without apparent bleeding.

Postoperative information

The Philadelphia collar was used until the patient woke up from anaesthesia. She spent the first night in a recovery room, because of potential cervical wound bleeding. The patient was mobilised the next day and discharged home on day 3. The previously described cervicobrachial syndrome disappeared immediately after surgery.

Discussion and conclusion

Overall results of CTDR implantations are very good and promising [5, 6]. Patients are usually rapidly mobilized

without major restrictions, and the clinical results are, in general, comparable to or better than the control groups treated with ACDF. Furthermore, revision rates and secondary procedures for ASD are less frequent when motion preservation techniques are utilized [4, 7]. On the other hand, an unpredictable frequency of spontaneous fusion (in our view up to 20–30 %) can be expected during long-term follow-up. Although our results show no evidence of new morbidity connected with spontaneous fusion, the expected motion preservation benefit may be less than initially anticipated [8]. The verdict on adjacent segment protection with motion preservation is still to be determined. It seems that one of the most important factors, influencing the motion preservation, is the proper selection of CTDR candidates. In our opinion, the best indication is the soft disc prolapse in a moving segment, high enough and without marked spondylotic changes.

Conflict of interest None.

References

1. Hilibrand AS, Yoo JU, Carlson GD, Bohlman HH (1997) The success of anterior cervical arthrodesis adjacent to a previous fusion. *Spine (Phila Pa 1976)* 22:1574–1579
2. Goffin J, van Loon J, Van Calenbergh F, Plets C (1995) Long-term results after anterior cervical fusion and osteosynthetic stabilization for fractures and/or dislocations of the cervical spine. *J Spinal Disord* 8:500–508 (discussion 499)
3. Hilibrand AS, Carlson GD, Palumbo MA, Jones PK, Bohlman HH (1999) Radiculopathy and myelopathy at segments adjacent to the site of a previous anterior cervical arthrodesis. *J Bone Joint Surg Am* 81:519–528
4. Robertson JT, Papadopoulos SM, Traynelis VC (2005) Assessment of adjacent-segment disease in patients treated with cervical fusion or arthroplasty: a prospective 2-year study. *J Neurosurg Spine* 3:417–423
5. Murrey D, Janssen M, Delamarter R, Goldstein J, Zigler J, Tay B, Darden B (2009) Results of the prospective, randomized, controlled multicenter Food and Drug Administration investigational device exemption study of the ProDisc-C total disc replacement versus anterior discectomy and fusion for the treatment of 1-level symptomatic cervical disc disease. *Spine J* 9:275–286
6. Sasso RC, Smucker JD, Hacker RJ, Heller JG (2007) Clinical outcomes of BRYAN cervical disc arthroplasty: a prospective, randomized, controlled, multicenter trial with 24-month follow-up. *J Spinal Disord Tech* 20:481–491
7. Mummaneni PV, Burkus JK, Haid RW, Traynelis VC, Zdeblick TA (2007) Clinical and radiographic analysis of cervical disc arthroplasty compared with allograft fusion: a randomized controlled clinical trial. *J Neurosurg Spine* 6:198–209
8. Suchomel P, Jurák L, Beneš V, Brabec R, Bradáč O, Elgawhary S (2010) Clinical results and development of heterotopic ossification in total cervical disc replacement during a 4-year follow-up. *Eur Spine J* 19(2):307–315