Anterior cervical discectomy and implantation of an artificial disc (Prestige, Medtronic)

Jens Lehmberg · Bernhard Meyer

© Springer-Verlag Berlin Heidelberg 2013

Keywords Degenerative spine disease · Cervical disc · Foraminal stenosis artificial disc implant

Learning targets

How to perform the approach, decompression, and implantation of an artificial cervical disc.

Introduction

The ventral approach to the cervical spine has more and more shown its advantages over the years. Although acceleration of adjacent level disease by fusion after anterior cervical discectomy has not been proven, the argument of keeping a segment mobile in physically active individuals and non-inferiority to the standard favours artificial disc implantation in very selected patients.

Case description

The 45-year-old female patient, professional dancer, presented in our outpatient clinic with right sided pain

radiating from the neck into the complete C6 dermatome for more than 6 months. No motor or sensory deficit was found. The MRI of the cervical spine showed degenerative disc disease in the level C5/6 right sided with compression of the nerve root by a foraminal stenosis. Conservative treatments were undertaken without a lasting pain relief. The very well informed patient asked for an artificial disc replacement, which she considered important for continuation her professional dancing career

Surgical procedure (just a very short step-by-step description)

Positioning

The patient is positioned supine in manner that the cervical spine remains in a neutral posture with less reclination than for a standard fusion. The arms are positioned on the table, not on armrests. Pulling down the shoulder to enhance visibility of the lower cervical spine in fluoroscopy is avoided

Skin incision

A horizontal skin incision above the level C5/6 is marked with the use of the fluoroscope from midline extending 3 cm lateral. The skin incision is left sided to reduce the risk for recurrent laryngeal nerve injury.

Watch surgery online

Electronic supplementary material The online version of this article (doi:10.1007/s00586-013-2705-9) contains supplementary material, which is available to authorized users.

J. Lehmberg (✉) · B. Meyer
Department of Neurosurgery, Klinikum rechts der Isar,
Technische Universität München, Munich, Germany
e-mail: Jens.Lehmberg@lrz.tu-muenchen.de

B. Meyer
e-mail: bernhard.meyer@lrz.tum.de

Soft tissue preparation

The platysma is separated from the subcutis and splitted sharply along the fibre orientation. The soft tissue medial to the anterior sternocleidomastoid muscle is cut. The sheath of the omohyoid muscle is separated from the thyrohyoid muscle and lateralised. Retracting the trachea and esophagus to the contralateral side opens the approach to the prevertebral fascia and the spine. Carotid artery is covered by the omohyoid muscle and soft tissue. The disc level is controlled with fluoroscopy. The insertions of the longus colli muscle are divided from the cervical bodies with bipolar and scissors. Vertebral body posts are placed in C5 and C6, i.e. above and below the planned discectomy site. Retractor blades are positioned under the longus colli muscle. The retractor arms are slipped over the posts.

Microdiscectomy

From now, the microscope is used. The anterior longitudinal ligament and the fibrous ring of the disc are incised sharply. The disc is separated from the vertebral bodies above and below. A large piece of the disc is excised.

Drilling

The endplates are trimmed with the fluted drill to get rid of all disc material. The bone directly ventral to the posterior longitudinal ligament is drilled in an undermining fashion with a diamond drill. This enables decompression of the spinal canal from osteophytes. Thereafter, a bilateral uncoforaminectomy is performed. This is also done with the diamond drill. We consider a decompression of both sides essential in motion preservation.

Soft tissue decompression

The posterior longitudinal ligament is split with a hook. Thereafter the posterior longitudinal ligament is excised with the Kerrison rongeur. If possible, the lateral venous plexus above the nerve root is separated from the ligament to avoid bleeding. Prolonged bipolar coagulation is avoided not to injure the nerve root. Instead, gelatine sponge is applied to glue the small holes in the venous plexus with local thrombin. Soft tissue above the nerve root is split/disconnected by a hook. Again, the Kerrison rongeur is avoided in this location near the vertebral artery.

Implantation of the artificial disc

To get parallel endplates, the rasp is used. Attention is paid that all bumps are flattened. The probe is inserted

and checked in fluoroscopy for the appropriate implant height (craniocaudal) and depth (ventrodorsal). In this case, a 7 × 14 mm implant was chosen. For this implant model without screw fixation of the both parts of the implant to the vertebral body, rails are cut to hold the implant in place. Therefore, four holes are drilled with a special instrumentation, thereafter, the rails are cut with another instrument. Now, the site is prepared for the implantation. The artificial disc is implanted under fluoroscopic control. Safety stops bilaterally at the ventral end of the implant help to avoid placement of the implant too far dorsally.

Closure

The retractor screws are explanted. A drainage is inserted if needed. The platysma is readapted with some single stitches. The skin is sutured subcutaneously.

Postoperative information

No specific advices are given for postoperative attitude. No collar is needed. Sports are allowed immediately without specific restrictions in a progressive manner. Up to now, no serious side effects have been encountered even in patients doing competitive sports.

Discussion and conclusion

One of the major concerns of anterior cervical discectomy and fusion is that the fusion of one or even more levels may promote adjacent level disease. Therefore, artificial discs have been implemented in the surgical armamentarium in the 90's. In the last 2 years, several prospective randomized trials have been published, reporting the results under FDA IDE protocols to study cervical arthroplasty. The essential conclusion of these trials was that cervical arthroplasty is at least as successful as the fusion control in a non-inferiority trial design [1, 2]. Now, a meta-analysis combining the four trials investigating the four major devices on the market has been published [3]. The pooled primary success results suggest that cervical arthroplasty is superior to ACDF not only in overall success, but also neurological success, and survivorship outcomes at a midterm follow-up of at least 2 years. Keeping in mind that these trials included one level soft disc prolapses, it is obvious that there is a narrow indication for these devices.

Conflict of interest None.

References

1. Burkus JK, Haid RW, Traynelis VC, Mummaneni PV (2010) Long-term clinical and radiographic outcomes of cervical disc replacement with the Prestige disc: results from a prospective randomized controlled clinical trial. *J Neurosurg Spine* 13(3): 308–318
2. Sasso RC, Anderson PA, Riew KD, Heller JG (2011) Results of cervical arthroplasty compared with anterior discectomy and fusion: four-year clinical outcomes in a prospective, randomized controlled trial. *J Bone Joint Surg Am* 93(18):1684–1692
3. McAfee PC, Reah C, Gilder K, Eisermann L, Cunningham B (2012) A meta-analysis of comparative outcomes following cervical arthroplasty or anterior cervical fusion: results from 4 prospective multicenter randomized clinical trials and up to 1226 patients. *Spine(Phila Pa 1976)* 37(11):943–952