

## C6–C7 cervical disc arthroplasty in cervical disc herniation

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**Keywords** Cervical degenerative disc disease · Cervical disc arthroplasty · Range of motion

### Learning targets

- Learn the anterior Smith–Robinson approach of the cervical spine.
- Learn the technique of cervical spine arthroplasty and anterior spine discectomy.
- Learn how to assess the positioning the prosthesis on the frontal and sagittal plane.
- Understand the importance of posterior longitudinal ligament resection to remove disc herniation.

### Introduction

Cervical degenerative disc disease is a common cause of radiculopathy and myelopathy. When neurological symptoms appear without sustained remission, an operative management can be proposed to treat the compression. The goal of anterior cervical discectomy is to release the neural elements. Local kyphosis, recurrent compression of the nerve root caused by collapse of the disc space or increased

postoperative neck and scapular pain, can be observed with anterior cervical discectomy without fusion [1]. Anterior cervical discectomy and fusion (ACDF) is considered as a “well-accepted surgical option” for treatment of symptomatic cervical disc disease [2]. It offers the possibility to maintain segmental lordosis, and preserve anatomical disc space height. Its principal disadvantage is the loss of motion segments, which may lead to a higher incidence of degeneration and segmental instability [3]. Cervical disc arthroplasty (CDA) is an alternative to ACDF with the aim of preserving motion at the treated level. Preserving motion is especially interesting for young patients to decrease adjacent segment degeneration. CDA should only be justified for patients with persisting disc motion highlighted on preoperative dynamic X-rays.

### Case description

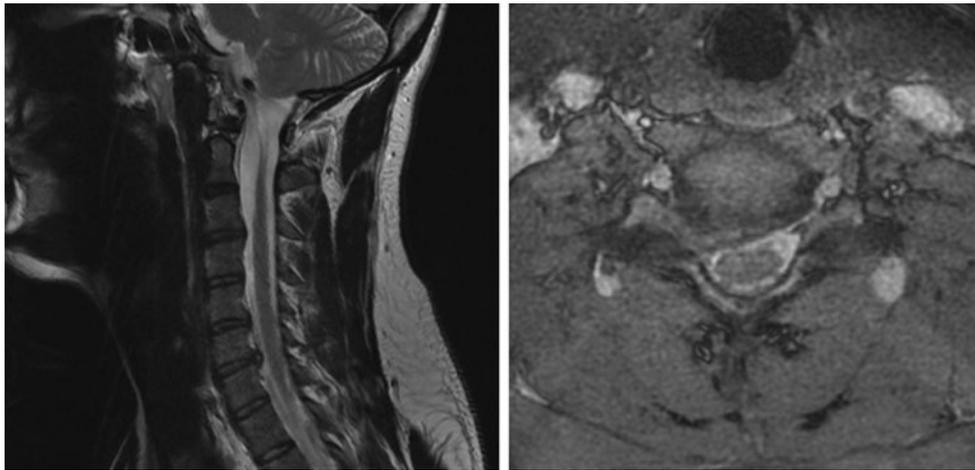
This case describes a 27-year-old man presenting a right C6–C7 disc herniation with persisting neurological signs since 4 months. The patient presented a C7 right radiculopathy with no neurological deficit but he complained of writing difficulties. MRI (Fig. 1) shows a right C6–C7 herniated disc explaining the symptoms. The patient completed auto-evaluation with NDI (16 %). Dynamic flexion and extension X-rays showed a good C6–C7 disc motion (Fig. 2). C6–C7 CDA was proposed to the patient to relief his pain, improve his difficulties to write and shorten the work stoppage.

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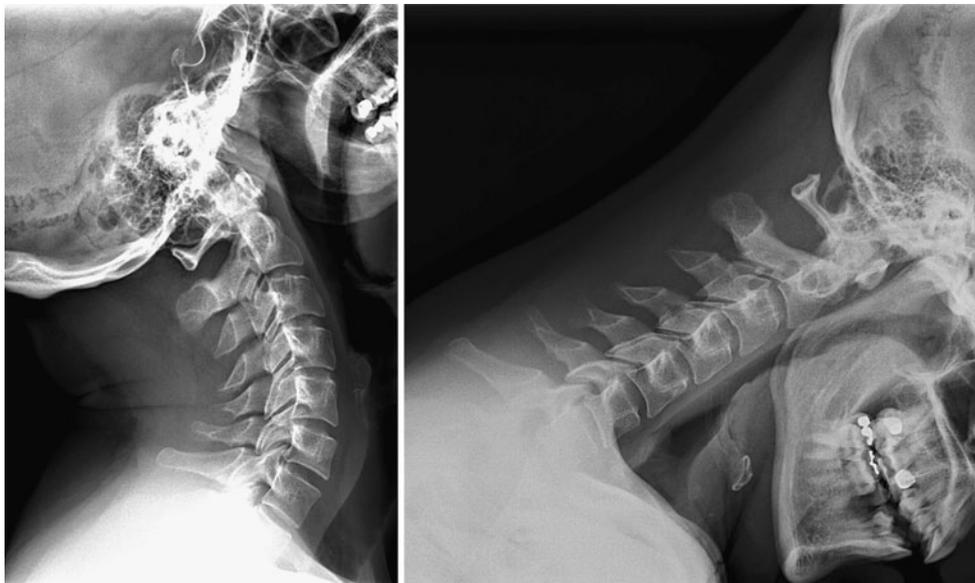


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**Fig. 1** T2 sequence MRI illustrating the C6–C7 cervical disc herniation and right C7 root compression



**Fig. 2** Dynamic X-ray showing persisting motion at C6–C7 level

### Surgical procedure

A classic right Smith–Robinson approach was performed. Special attention should be made to detect the middle of the intervertebral disc. The prosthesis needs to be perfectly centred in the frontal plane for an optimal motion. The middle line can be detected between the two longus cervicis muscles before retracting them to C6–C7 disc, this method is, however, not accurate. But the most reliable method is to identify the mid-distance between right and left uncus after complete disc removal [4]. An anterior cervical C6–C7 complete discectomy was realised from the right to the left uncus. It is important to sharpen C6 inferior endplate and C7 superior endplate for a better holding of the implant. To complete the discectomy, we think that the posterior longitudinal ligament must be entirely removed since most of the

herniated disc pass through the ligament. Uncus osteophytis have to be removed completely to avoid the postoperative radiculopathy. The prosthesis can then be placed. For the sagittal plane, the position of the implant can be controlled easily by fluoroscopy. Prosthesis size have to be large, this allow a large surface of contact and less risk of subsidence. The height has to be comparable to healthy disc above or below; too high prosthesis might be responsible of neck pain by facet overload. Before the wound closure, a drain was positioned to reduce the risk of postoperative haematoma.

### Postoperative information

The patient stands up the day after the surgery with X-ray control at day 1 after the drain removal. No cervical collar

**Fig. 3** Postoperative X-ray showing the good position of the implant, a satisfying segmental lordosis and disc height



is needed and the patient left the hospital at day 2 with an improvement of the radicular pain. The postoperative X-ray (Fig. 3) shows the good position of the implant, a satisfying disc height and cervical lordosis.

## Discussion and conclusion

Reoperation rates for adjacent segment degeneration have been documented at a rate of 2.9 % of patients per year, and 25.6 % of patients undergoing cervical fusion will require surgery for recurrent symptoms within 10 years of the index fusion [5]. CDA allows maintaining disc height, preserving motion at operated level and normal motion at adjacent levels reducing kinematic strain [6]. It is still uncertain whether total disc replacement is more effective and safer than fusion since there are few randomised trials controlling efficacy of both surgical procedures. CDA seems to have lower risks of reoperation related to adjacent segment degeneration and complication of dysphagia, and a higher rate of neurological and overall success at 2 years postoperatively. However, there is no statistical difference in NDI, neck and arm pain evaluation, prevalence of complications related to the implant and reoperation related to primary surgery between the two surgical procedures [7]. The risks of two surgical interventions are almost similar, including esophageal perforation, vertebral artery injuries, or injury to the neural structures. CDA has shown its capacity to maintain range of motion on operated disc [8], and reduces kinematic strain on adjacent levels. Since the risks of the procedure remain comparable to ACDF, CDA seems to

be a satisfying alternative for young patients with preoperative preserved motion.

**Conflict of interest** J.M. Vital is co-conceptor of the prosthesis.

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