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Case report

Conversion paralysis after cervical spine arthroplasty: A case report and literature review



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ABSTRACT

We report a case of conversion paralysis after cervical spine arthroplasty performed in a 45-year-old woman to treat cervico-brachial neuralgia due to a left-sided C6–C7 disc herniation. Upon awakening from the anaesthesia, she had left hemiplegia sparing the face, with normal sensory function. Magnetic resonance imaging (MRI) of the brain ruled out a stroke. MRI of the spinal cord showed artefacts from the cobalt–chrome prosthesis that precluded confident elimination of mechanical spinal cord compression. Surgery performed on the same day to substitute a cage for the prosthesis ruled out spinal cord compression, while eliminating the source of MRI artefacts. Findings were normal from follow-up MRI scans 1 and 15 days later, as well as from neurophysiological testing (electromyogram and motor evoked potentials). The deficit resolved fully within the next 4 days. A psychological assessment revealed emotional distress related to an ongoing divorce. The most likely diagnosis was conversion paralysis. Surgeons should be aware that conversion disorder might develop after a procedure on the spine, although the risk of litigation requires re-operation. Familiarity with specific MRI sequences that minimise artefacts can be valuable. A preoperative psychological assessment might improve the detection of patients at high risk for conversion disorder.

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1. Introduction

Intervertebral disc arthroplasty is an effective treatment for cervico-brachial neuralgia caused by disk herniation in patients with preserved cervical spine mobility. In randomised controlled trials, this technique produced similar medium-term outcomes to those obtained with anterior cervical spine fusion [1,2]. In addition to technical errors in implantation and centring of the artificial disc, complications associated with the anterior cervicotomy approach to the cervical spine may arise, although dysphagia seems less common than after anterior fusion [3].

Hysterical paralysis, or conversion motor disorder, is a rare condition sometimes seen after spinal surgery [4]. Motor loss in a non-anatomic topographic distribution develops suddenly, shortly after a triggering event responsible for psychological distress [5,6]. When this event is a surgical procedure, the diagnosis is particularly challenging. Surgery can cause neurological deficits, and metal implants can generate artefacts on imaging studies. These facts, combined with concern about litigation, may prompt a

re-operation. To our knowledge, only a few cases of conversion motor disorder after spinal surgery have been reported [7,8].

We report a clinical case that is instructive in two ways: it raises awareness that spinal surgery can be followed by conversion paralysis, thereby increasing the likelihood of appropriate treatment; and it supports the usefulness of obtaining machine-specific magnetic resonance imaging (MRI) sequences that limit the production of artefacts by implants.

2. Case report

A 45-year-old woman with left cervico-brachial neuralgia due to a left-sided C6–C7 disc herniation without disruption of the posterior longitudinal ligament was admitted for arthroplasty (Figs. 1 and 2). Preoperatively, the Visual Analogue Scale (VAS) pain score was 7/10 and there was no motor deficit. Her only complaints were related to the C6–C7 nerve root pain. She had received non-operative treatment several months earlier, to no avail. Her medical history was unremarkable. No psychological assessment was done before surgery.

C6–C7 arthroplasty was performed on an outpatient basis, under general anaesthesia and with fluoroscopic guidance. The patient

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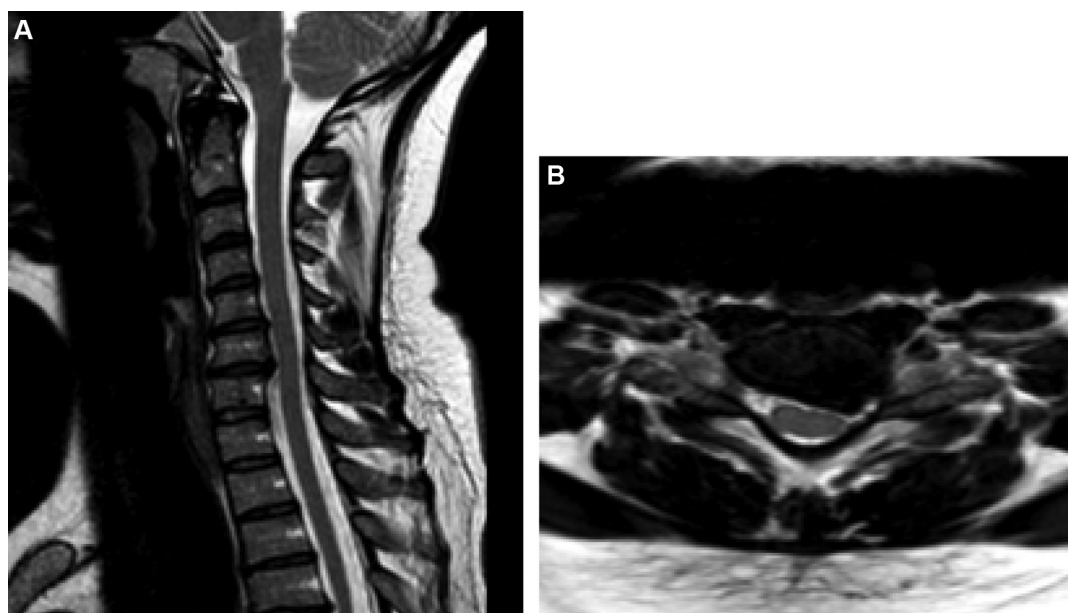


Fig. 1. Preoperative MRI, T2-weighted sequence, after non-operative treatment: persistent C6–C7 left-sided disc herniation with no breach in the posterior longitudinal ligament. A. Sagittal view. B. Axial view

was in the supine position, with traction applied to both upper limbs by adhesive tape and a small roll under the neck to restore the normal cervical lordosis. This position allowed satisfactory fluoroscopic monitoring of the C6–C7 space and adjacent vertebral bodies. A right antero-lateral cervicotomy with a horizontal incision was performed as described by Smith and Robinson [9]. A Mobi-C® cervical disc (LDR, Austin, TX, USA) was implanted by an experienced surgeon using the standard technique. No bleeding occurred during surgery and, consequently, no drain was inserted. The final antero-posterior and lateral fluoroscopic views were satisfactory. No adverse events occurred during the procedure; in particular, there was no blood pressure drop or dysautonomia. Interestingly, the procedure was recorded on film, as the patient had consented to participate in a film about outpatient disc herniation surgery. She had also accepted to be filmed during

the visits with the surgeon and anaesthesiologist 2 weeks before surgery.

Upon awakening from the anaesthesia, she had left hemiplegia sparing the face. The motor loss was complete initially, then incomplete with a marked decrease in muscle strength. Sensation was normal and the urethral and anal sphincters were spared. Bladder overdistension developed, requiring the insertion of a urinary catheter. Pain and temperature sensation on the right side of the body was normal, ruling out Brown–Sequard syndrome. Repeated neurological examinations by different healthcare providers produced inconsistent results. Thus, the patient initially had complete hemiplegia sparing the face then hemiparesis, tetraparesis and, finally, hemiparesis again. In addition, a neurologist specialized in neurovascular disorders found a high sensory level, which had not been apparent during our previous assessments. There were no pyramidal manifestations, and the deep tendon reflexes were normal and symmetrical. Nevertheless, MRI of the brain and spinal cord was performed on an emergency basis, 3 hours after surgery. There was no evidence of stroke, and the vertebral arteries and spinal cord vessels appeared normal on the post-gadolinium images. However, artefacts produced on the spinal cord images by the artificial disc did not allow us to unequivocally rule out spinal cord compression (Fig. 3).

A second surgical procedure was therefore performed, 7 hours after the first. No haematoma was found behind the artificial disc, which was not causing compression. The disc was replaced by a cage made of polyetheretherketone (PEEK) with self-stabilising screws (AXEL®, PROSTEEL, Ramonville-Saint-Agne, France) (Fig. 4). Additional posterior decompression was not performed. There was no bleeding and, consequently, no drain was inserted.

When she awakened, her motor function was nearly completely normal. MRI performed 1 day and 15 days later showed no spinal cord abnormalities (Figs. 5 and 6). Findings were normal from neurophysiological tests, including electromyography and motor evoked potentials. On the 4th postoperative day, she had recovered normal motor function. At discharge on day 7, she had no residual deficit and her VAS pain score was 2/10. The absence of any evidence of organic disease and the results of a postoperative psychological assessment indicated a diagnosis of conversion paralysis.



Fig. 2. Lateral fluoroscopic view of the prosthesis during surgery.

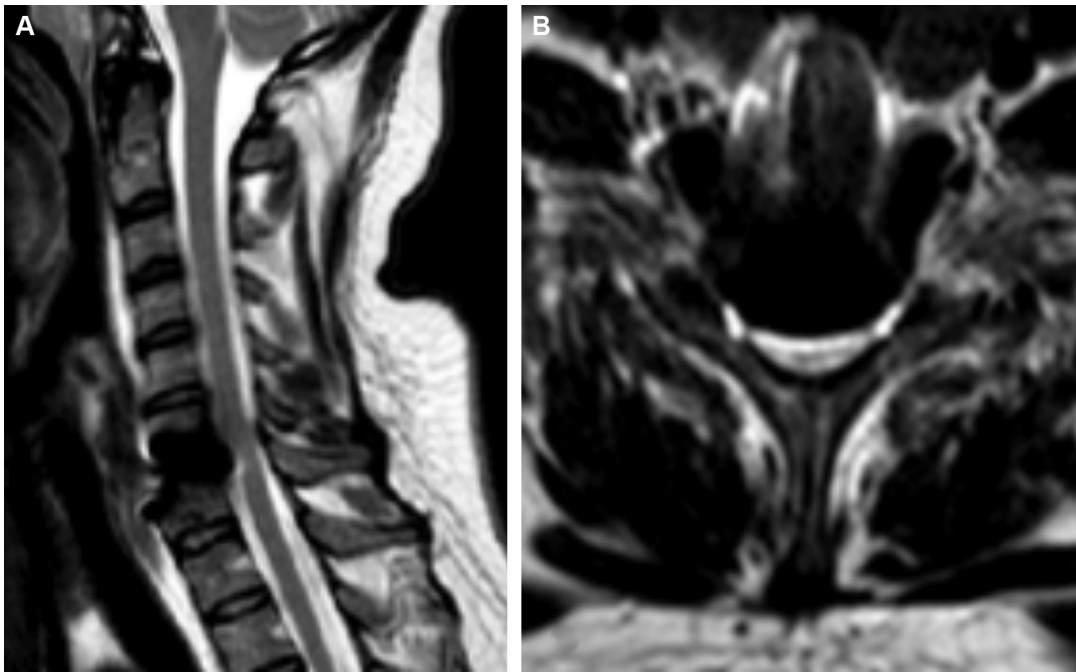


Fig. 3. MRI of the spinal cord, T2-weighted sequence: artefacts generated by the prosthesis on sagittal (A) and axial (B) views.

3. Discussion

Over the last few years, cervical spine arthroplasty has gained widespread acceptance as a treatment for cervico-brachial neuralgia in patients with preserved neck mobility. Most studies showed no significant differences in short- and medium-term outcomes

compared to interbody cage fusion. Nevertheless, the results of arthroplasty are encouraging, with less loss of motion at adjacent levels [1,2].

Conversion paralysis after artificial disc implantation is exceedingly rare but not unheard of [4]. To our knowledge, only a few cases of conversion paralysis have been reported after spinal surgery

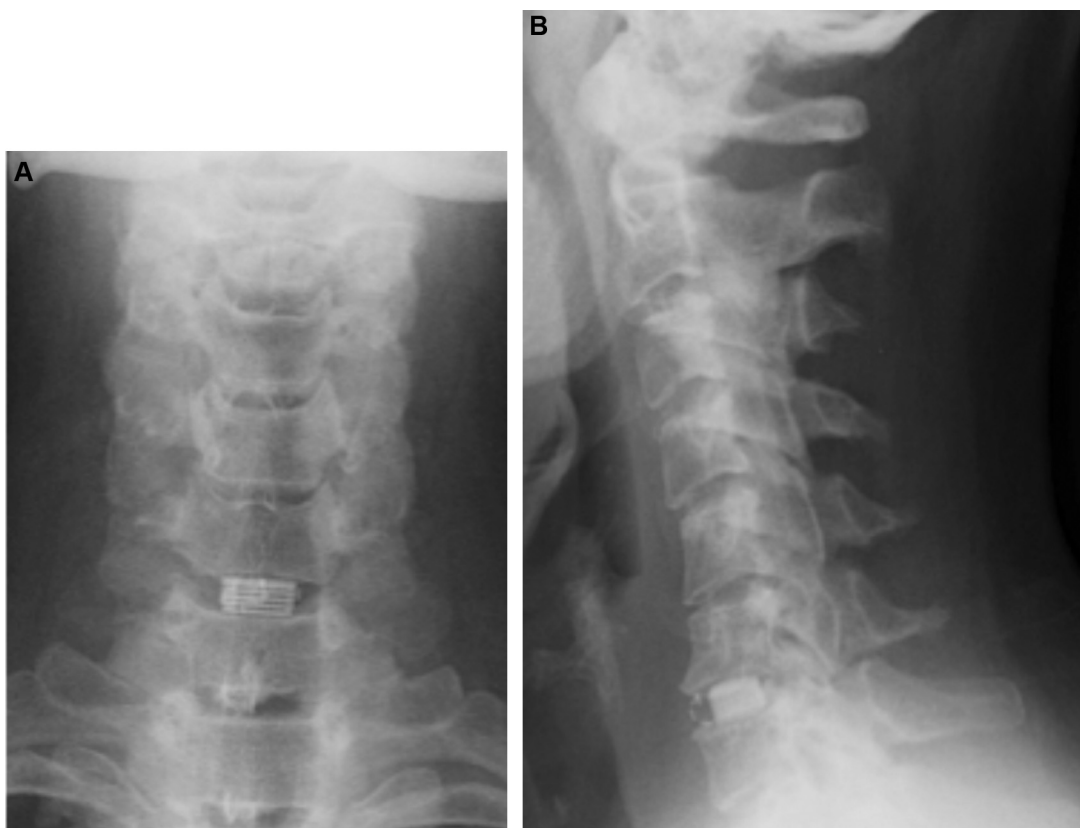


Fig. 4. Radiographs of the cervical spine, antero-posterior (A) and lateral (B) projections: the cage is visible in the C6–C7 space.

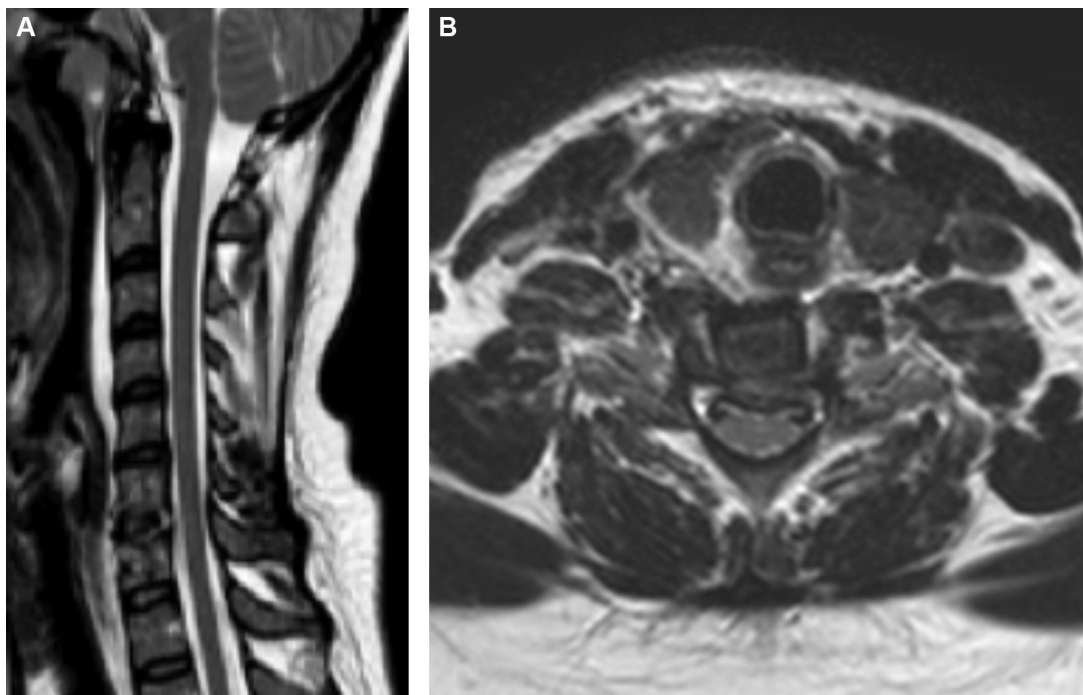


Fig. 5. MRI of the spinal cord, T2-weighted sequence, on the day after surgery: C6–C7 cage and absence of spinal cord abnormalities on the sagittal (A) and axial (B) images.

[7,8]. Several presentations exist, which are associated with different levels of diagnostic difficulty. A non-anatomic distribution of the deficit suggests a non-organic cause. A traumatic, psychological, or social trigger should be sought. Findings are normal from the imaging and neurophysiological tests. Given the high costs generated by conversion paralysis, efforts have been made to develop a diagnostic tool based on a standardised clinical evaluation. Such a tool may be particularly helpful in atypical forms with alterations in the deep tendon reflexes, rectal and genital sensation, and/or urethral and anal sphincter function [10]. The Spinal Injuries Centre test, developed in a prospective study by Yugué et al., involves first asking the patient to actively flex the knee then passively flexing

the knee. The test is positive if the patient cannot actively flex the knee but maintains the passively imposed flexed position. The sensitivity of this test can be improved by talking in order to distract the patient. The test was positive in all patients with conversion paralysis [10]. Another useful clinical test in patients with asymmetrical motor loss is the Hoover test, which is based on primary walking reflexes. It is positive if involuntary extension of the affected side occurs during flexion of the hip on the normal side against resistance [11].

The treatment of conversion paralysis is controversial. Autosuggestion, placebos, supportive psychotherapy, and hypnosis have been used. The goal is to lead the patient to recognise that the

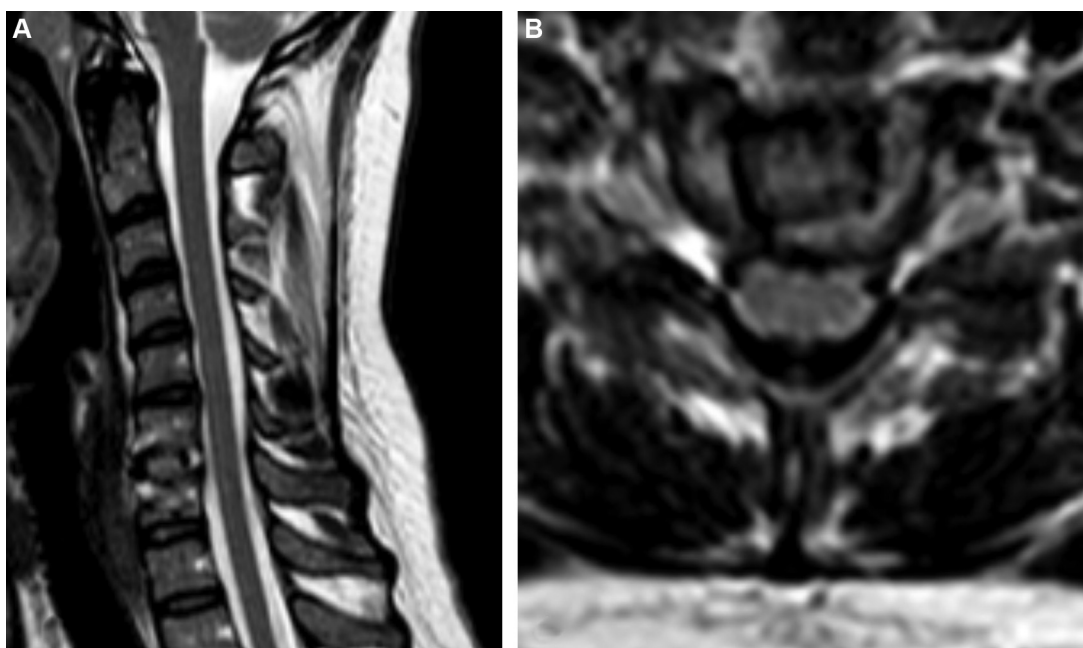


Fig. 6. MRI of the spinal cord, T2-weighted sequence, on day 15 after surgery: C6–C7 cage and absence of spinal cord abnormalities on the sagittal (A) and axial (B) images.

disorder is not organic, by explaining the results of the investigations in a non-judgmental manner [4,7]. The prognosis of conversion paralysis is debated, although at least partial recovery occurs in most cases after a variable period [4,5].

In our patient, the chrome-cobalt artificial disc produced artefacts on the spinal cord MRI scan. As a result, spinal cord compression could not be confidently ruled out, and re-operation was therefore required. The amount of artefacts varies with the type of prosthesis. All-ceramic or ceramic-polyethylene discs do not hinder the analysis of the operated level, in contrast to metal discs, even those made of titanium [12,13]. After our experience with this patient, we learned that specific MRI sequences could be used to minimise the artefacts generated by metal implants.

During follow-up visits to our outpatient clinic, no residual abnormalities related to the conversion paralysis were noted, and the clinical outcome of the cervico-brachial neuralgia treatment was excellent. The diagnosis of conversion disorder is always difficult. Transient myelopraxia cannot be completely ruled out. Nevertheless, in our patient, the results of the neurophysiological tests and follow-up MRI scans do not support this diagnosis. In most of the previously reported cases of post-surgical conversion paralysis, the motor loss developed after a symptom-free interval. In our patient, the presence of hemiplegia upon awakening from the anaesthesia suggested a need for re-operation [7,8]. Nevertheless, immediate motor loss has been described [14]. In addition to the objective data from the physical examination and investigations, the setting can make a major contribution to the diagnosis of conversion disorders. In our patient, filming the preoperative visits resulted in more emphasis than usual being placed on patient information about the risks inherent in surgical procedures, which may have set the scene for dramatization of the events. In addition, during several interviews with a psychologist, the patient described a stressful family situation, with a recent divorce leaving her responsible for three older children, as well as concern about the surgical procedure, possibly amplified by the filming. The diagnosis requires the presence of the DSM-IV-TR criteria for conversion disorder:

- one or more symptoms affect voluntary motor or sensory function;
- psychological factors are judged to be associated with the symptom, because the initiation or exacerbation of the symptom is preceded by conflicts or other stressors;
- the symptom is not feigned;
- the symptom cannot, after appropriate investigation, be fully explained by a general medical condition, the direct effects of a substance, or a culturally sanctioned behaviour;
- the symptom causes clinically significant distress, warranting medical evaluation;
- the symptom is not limited to pain or sexual dysfunction, does not occur exclusively during the course of somatisation disorder, and is not better accounted for by another mental disorder [15].

A preoperative psychological assessment may help to identify high-risk patients.

In sum, conversion paralysis after cervical disc replacement is exceedingly rare. Awareness of this complication should allow an early diagnosis, in particular by prompting a detailed neurological evaluation, which shows a non-anatomic pattern of motor loss indicating a non-organic cause. At the slightest doubt, MRI of the brain and spinal cord should be obtained on an emergency basis, using specific artefact-minimising sequences, to look for evidence of stroke or spinal cord damage. Neurophysiological testing with an electroneuromyogram and, above all, motor evoked potentials, may assist in the diagnosis. Appropriate treatment, including supportive psychotherapy should be started, while keeping in mind that conversion paralysis is a diagnosis of exclusion.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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