Acute Paraplegia Due to Nucleus Herniation of a Mobi-C Implant without Trauma: Case Report of a Rare Complication

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INTRODUCTION

Cervical artificial discs (CADs) are a surgical option in selected patients with cervical spinal disc degeneration. Although CADs have been available for many years, concerns persist regarding long-term safety, durability, and implant-related failure. We report a case of nucleus herniation of a Mobi-C implant without trauma, which is a rare complication. Two years after implantation of a Mobi-C implant, a 47-year-old man presented with acute paraplegia without a history of trauma. On cervical magnetic resonance imaging, a T2-high signal intensity lesion was noted in the ventral aspect of the spinal cord at the T1-2 level. During emergent surgery, nucleus herniation of the Mobi-C was detected. After surgery, the patient could walk without assistance. Posterior herniation of the Mobi-C nucleus without trauma is a rare complication that should be considered in surgical planning and follow-up.

Key Words: Arthroplasty; Cervical vertebrae; Intervertebral disc; Paraplegia

CASE REPORT

A 47-year-old man, who had previously undergone a C7-T1 arthroplasty with the insertion of a Mobi-C cervical disc prosthesis for myelopathy 2 years ago at another institution, visited the emergency room with severe upper back pain and acute paraplegia. There was no history of spinal trauma, tumor, or infection preceding neurological deterioration. Dynamic cervical X-rays and computed

Fig. 1. (A) Preoperative cervical X-ray and (B, C) computed tomography scans showed no abnormal findings.
tomography (CT) scans showed no significant findings, but significant artifacts were present in the cervical region due to the previous cervical prosthesis (Fig. 1). Cervical magnetic resonance imaging showed a T2-high signal intensity lesion in the ventral aspect of the spinal cord at the T1-2 level (Fig. 2). It was not clear what the lesion represented. The CT myelogram was not considered due to the possibility of infection. Emergent surgical exploration was performed due to the acute onset of paraplegia.

After exposure of the vertebra, 14-mm Caspar pins were drilled into the C7 and T1 vertebral bodies for distraction. The plates of the prosthesis had subsided into the upper and lower vertebra, but removal of both plates was possible after drilling the junction. Posterior herniation of the nucleus was detected (Fig. 3). T1 corpectomy was performed to remove the nucleus of the prosthesis completely and safely. A titanium mesh cage filled with autologous bone was implanted and fixed using a ventral plate (Fig. 4). The patient underwent physical therapy and occupational therapy following his emergent operation. One month after surgery, the patient could walk without assistance.

The requirement for informed consent was waived due to the retrospective design and minimal risk of the study.

**DISCUSSION**

A multicenter prospective study with at least 10 years of follow-up was reported for one- and two-level cervical arthroplasty using Mobi-C11). At postoperative 10 years, patients maintained significant improvements in neck pain, arm pain, neck disability index, and segmental range of motion. No significant difference was found in the incidence of clinically relevant adjacent segment disease and motion-restricting heterotopic ossification between 7 years and 10 years postoperatively. CAD with a Mobi-C implant was concluded to be a favorable option as an effective surgical treatment for one- or two-level cervical disc degeneration.

However, due to the limited reporting of adverse events related to CADs, careful interpretation of the clinical risk is required23). In randomized controlled trials of CAD treatment, the incidence of adverse events was very heterogeneous and showed significant variation15). The reported modes of device failure include disc loosening, device or core migration, cracking of the implant sheath, and postoperative kyphosis5,10,16). A previous study reported four patients who developed segmental kyphosis at the implant level after treatment with Mobi-C7). The authors considered chronic device failure to be a cause of delayed segmental kyphosis. Inadvertent locking of the Mobi-C in extreme flexion may contribute to mechanical
failure. Furthermore, the mobile-bearing inside the Mobi-C flexes beyond the normal range of physiological motion. In the present study, implant failure occurred 2 years postoperatively without physiologically abnormal conditions or trauma. In the preoperative cervical X-ray of the present case, the superior endplate of the Mobi-C is located quite behind compared to the lower endplate (Fig. 5). This could be thought of as a clue to mechanical failure. A possible cause of nucleus herniation is that the motion of Mobi-C may exceed the physiological range, while the structure of the implant is insufficient to limit it. The components of Mobi-C include superior and inferior cobalt chromium molybdenum alloy endplates coated with plasma-sprayed titanium and hydroxyapatite coating and a polyethylene mobile bearing insert. The interface between the inferior plate and the insert has two lateral stops to prevent excessive movement and migration of the nucleus. However, the inner surface of the superior plate lacks a similar feature. To our knowledge, herniation of Mobi-C is a very rare case with only 5 patients reported (Table 1). Artificial disc migration is more common on the ventral side. However, acute paraplegia due to posterior herniation of the nucleus of a CAD without trauma is very rare. The imaging diagnosis was limited due to the presence of metal artifacts. The surgical treatment was also difficult because corpectomy should be performed to facilitate the removal of implants and adequate decompression of the spinal cord. This complication should be considered when counseling a patient about the surgical options for managing cervical degenerative disc disease and during the follow-up period after CAD surgery.

**CONCLUSION**

Implant failure of Mobi-C, especially nucleus herniation, may occur without trauma. Metal artifacts cause difficulty in the imaging diagnosis. This complication should be considered in surgical planning and follow-up.

**CONFLICTS OF INTEREST**

No potential conflict of interest relevant to this article was reported.

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**Table 1. Reports of core herniation of Mobi-C in the literature**

| No | References | Year | Age/Sex | Level | Preoperative symptoms | Reoperation | Time between surgery | Neurological improvement |
|----|------------|------|---------|-------|-----------------------|-------------|---------------------|------------------------|
| 1  | DiCesare et al.7 | 2020 | 26/M | C5-6 | Neck pain & Lt. arm pain | C5-6 ACDF | 1 week | Resolution of all symptoms |
| 2  | DiCesare et al.7 | 2020 | 48/M | C5-6 & Neck & bilateral arm pain C6-7 | C5-6 & C6-7 ACDF | 2.5 years | Resolution of all symptoms |
| 3  | DiCesare et al.7 | 2020 | 60/M | C4-5 | Neck pain & arm pain | C4-5 ACDF | 2.5 years | Resolution of all symptoms |
| 4  | DiCesare et al.7 | 2020 | 36/M | C5-6 | Neck & arm pain | Mobi-C disc replacement | 1 week | Resolution of all symptoms |
| 5  | Pitsika and Nissen16 | 2020 | 44/F | C6-7 | Gradually worsening myelopathy | C6, 7 corpectomy | 6 years | Resolution of all symptoms |

M: male; F: female; Lt.: left; ACDF: anterior cervical discectomy and fusion.
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