Complications of Cervical Disc Prosthesis Dislocation: A Retrospective Clinical Study

Servikal Disk Protezi Dislokasyonunun Komplikasyonları: Retrospektif Bir Klinik Çalışma

Yener Akyuva1, Özkan Özger2, Boran Urfalı1, Necati Kaplan3, Ali Maksut Aykut1

1Hatay Mustafa Kemal University, Tayfur Ata Sökmen Faculty of Medicine, Department of Neurosurgery, Hatay, Turkey
2Istanbul Rumeli University, Medicalpark Çanakkale Hospital, Clinic of Neurosurgery, Istanbul, Turkey
3Istanbul Rumeli University, Çorlu Reyap Hospital, Clinic of Neurosurgery, Istanbul, Turkey

Cite this article as: Akyuva Y, Özger Ö, Urfalı B, Kaplan N, Aykut AM. Complications of Cervical Disc Prosthesis Dislocation: A Retrospective Clinical Study. J Acad Res Med 2021;11(1):1-4

ABSTRACT

Objective: The most commonly used method for the surgical treatment of cervical disc herniation (CDH) is anterior disc excision with Smith-Robinson’s approach. Following the excision of pathological disc space, disc prosthesis is placed if a continuation of dynamic movement in the disc space is desired and a cervical cage is placed for the purpose of fusion. Cervical disc prosthesis seems superior to cervical cage; however, it is not suitable for every patient and can cause serious complications. Our study include data of patients who developed complications following the dislocation of cervical prosthesis and who were referred to our clinic. The aim of our study is to emphasize that the cervical prosthesis is not suitable for every patient and may cause serious complications.

Methods: Data of the patients who were operated due to the diagnosis of CDH in other centers and underwent revision surgery for the development of cervical prosthesis dislocation between 2013 and 2020 were collected.

Results: This study analysed the data of four male and three female patients. The median value of patient ages was 42 (28-53). Neck pain and swallowing difficulty were the most common reasons for admission to the clinic. Dislocation was found to develop after trauma in three patients. Anterior and posterior dislocations were found to develop in five and two patients, respectively. Seven patients underwent revision surgery. All these patients were found to have dislocations at the C5-6 level.

Conclusion: The prosthesis to be placed in the surgical treatment of CDH should be determined based on the patient. Detailed information should be provided to the patient for whom cervical disc prosthesis is to be placed and prosthesis of the most appropriate size for disc space should be placed properly.

Keywords: Cervical disc herniation, cervical prosthesis, prosthesis dislocation

ÖZ

Amaç: Smith-Robinson yaklaşımı ile anterior disk (SDH) eksizyonu, servikal disk herniasyonunun (SDH) cerrahi tedavisinde en sık kullanılan yöntemdir. Patolojik disk boşluğunun eksizyonu takiben disk aralığına dinamik hareket devam etmesi istenişyorya disk protezi, füzyon için servikal kafes yerleştirilir. Servikal disk protezi, servikal kafesten daha üstün görünmektedir; ancak her hasta için uygun değildir ve ciddi komplikasyonlara neden olabilir.

Yöntemler: 2013-2020 yılları arasında SDH tanısıyla diğer merkezlerde ameliyat edilen ve servikal protez disloksiyonu nedeniyle revizyon ameliyatı geçiren hastaların verileri toplandı.

Bulgular: Çalışmada dört erkek ve üç kadın hastanın verileri analiz edildi. Ortanın değer 42 (28-53) idi. Boyun ağrısı ve yutma güçlüğü klinikte devam etmesi istenişyorya disk protezi, füzyon için servikal kafes yerleştirilir. Servikal disk protezi, servikal kafesten daha üstün görünmektedir; ancak her hasta için uygun değildir ve ciddi komplikasyonlara neden olabilir.

Sonuç: Boyun fıtıklarının cerrahi tedavisinde yerleştirilecek protez hastaya göre belirlenmelidir. Boyun diski protezi yerleştirilmesine karar verilen hastaya detaylı bilgi verilmesi, disk boşluğuna en uygun büyüklüktü protez uygun şekilde yerleştirilmelidir.

Anahtar kelimeler: Servikal disk hernisi, servikal protez, protez disloksiyonu

ORCID IDs of the authors: Y.A. 0000-0002-2424-3117; Ö.Ö. 0000-0001-7257-8379; B.U. 0000-0003-2854-6833; N.K. 0000-0001-5672-0566; A.M.A. 0000-0002-7651-7132.
INTRODUCTION

Cervical disc herniation (CDH) is a disease that affects the spinal cord and spinal nerve roots and it most commonly arises at ≥30 years age. It may result in radiculopathy or myelopathy. Anterior cervical discectomy was first described by Smith and Robinson in 1955 and Cloward in 1958. Since then, the anterior approach has become the preferred and frequently used modality for the treatment of CDH (1). The necessity of implant placement in the intervertebral space has been discussed with the widespread use of the anterior approach. Following long-lasting research, it has been found that the implant placed in the intervertebral space provides expansion in the neural foramina and, therefore, it should be used (1-3). Today, research on this subject has mostly focused on which implant is more suitable for patients. The placement of cervical prosthesis that allows dynamic movements in the disc space or cervical cage that provides cervical spine fusion. There are studies reporting that cervical prosthesis allows minimal dynamic movement and prevents the development of the adjacent segment disease. Furthermore, cervical prosthesis has several advantages, such as early return to work, no requirement for neck collar and better clinical outcomes, compared to other implants (4,5). However, in literature, the number of studies reporting the complications caused by the use of cervical prostheses is limited. This study aimed to investigate and present data of patients who developed complications following the dislocation of cervical prosthesis and who were referred to our clinic.

METHODS

This study presented the data of seven patients who were operated for cervical prosthesis dislocation in the Neurosurgery Clinic of Hatay Mustafa Kemal University Tayfur Ata Sökmen Medical Faculty Hospital between 2013 and 2020. After the patients’ data were evaluated retrospectively, they were found suitable for the purpose of the present study and were included in this study. Preoperative neurological examination information, radiological examinations and operative reports of all patients included in the study were reviewed. Patients who met the study criteria were included in the study. Written consent was obtained from the participants for their records to be included in the study. All data were collected in accordance with the principles of Declaration of Helsinki. This retrospective study was approved by the Non-Interventional Clinical Research Ethics Committee of Hatay Mustafa Kemal University (approval number: 17, date: 03/09/2020).

Statistical Analysis

Basic complementary statistical methods were applied using Microsoft Office Excel 2010. Results were expressed as mean for average or percentage (%) for frequency.

RESULTS

Data of four male and three female patients who were operated due to diagnosis of CDH in other centres and underwent surgery for the placement of a cervical prosthesis in the disc space were analysed (Figure 1). The median value of patients age was 42 (minimum: 28, maximum: 53). Neck pain and swallowing difficulty were the most common reasons for admission to the clinic. Cervical prosthesis dislocation was found to occur after trauma in three patients. One patient developed posterior dislocation and associated spinal shock after trauma, while one patient developed C6 vertebral fracture. Five and two patients developed anterior and posterior dislocations, respectively. Analysis of the early postoperative examinations showed that the prosthesis was closer to the anterior in the sagittal plane in three patients and it was not in the midline in the coronal plane in one patient (Figure 2). All the seven patients underwent revision surgery. After the dislocated cervical prosthesis was removed, cervical cage was placed in six patients and corpectomy cage was placed in one patient, since there was a vertebral fracture (Figure 3A). Dislocation was found to be at the C5-6 cervical disc level in all patients. One patient with anterior dislocation died due to mediastinitis induced by oesophageal perforation (Figure 3B) and another patient with posterior dislocation died due to spinal cord injury. One patient developed cerebrospinal fluid (CSF) fistula (Figure 3C) and one
The pre-operative examinations of the patients showed that three multiple cervical disc pathologies, severe degeneration of cervical patients with rheumatological diseases, advanced spondylosis, indications, the prosthesis was reported to be contraindicated for arthroplasty. In a study by Yalcin et al. (6) on cervical arthroplasty, recent studies have focused on cervical surgery for placement of cervical disc prosthesis is also called surgery are eliminated (4,5). Limitation of movement at the level where the prosthesis is placed seems to be a more advantageous procedure, since there is no treatment of complications and adjacent segment disease that have been rapid advances in disc prosthesis implantation following decompression, stabilisation, or both procedures can be performed in the surgical treatment. Following decompression, spinal fusion is performed in the disc space (1). A revision surgery is required for the treatment of complications and adjacent segment disease that develop after the fusion surgery. In light of these data, there have been rapid advances in disc prosthesis implantation following decompression in the cervical region. Cervical disc prosthesis seems to be a more advantageous procedure, since there is no limitation of movement at the level where the prosthesis is placed and due to the fact that complications resulting from fusion surgery are eliminated (4,5).

Surgery for placement of cervical disc prosthesis is also called cervical arthroplasty. Recent studies have focused on cervical arthroplasty. In a study by Yalcin et al. (6) on cervical arthroplasty indications, the prosthesis was reported to be contraindicated for patients with rheumatological diseases, advanced spondylosis, multiple cervical disc pathologies, severe degeneration of cervical lordosis and a history of trauma. In the present study, analysis of the pre-operative examinations of the patients showed that three patients underwent two-level CDH surgery. Furthermore, pre-operative severe osteoarthrodegenerative findings were detected in two elderly patients (aged 51 and 53 years). It was observed that cervical lordosis flattened and that kyphosis started to develop in three patients.

Researches about cervical prosthesis complication increase in literature, as in our study, whether biomechanical studies are sufficient or not has become a matter of debate. Brooke et al. (7) reported that dislocation may also occur in the use of cervical prostheses with carbon fibre technology. Subsequent studies have mostly focused on the need for prostheses with better adhesion to the endplates. Therefore, screwed cervical prostheses have been investigated, but it was found that they increase the operative time and may damage the vertebral bodies. While prostheses that fit between the endplates have been reported to be sufficient in several studies, some studies have shown that porous-coated implants prevent fusion development and mobilisation of prosthesis in the endplates (5,7,8). The prostheses removed in the present study were observed to be implants with a sharp tip attached to the endplates and they were procured from four different medical brands. Furthermore, the physicians who performed the first operations were different.

Post-traumatic dislocations of the cervical prosthesis were observed in three patients included in this study. Cervical prostheses may be dislocated in cases of exposure to excessive vibration or high-energy traumas, since they do not support fusion between the vertebrae (9). Yang et al. (10) demonstrated that the prosthesis was loosened and malposed in the disc space after trauma in some patients. In a case report by Niu et al. (11), the prosthesis dislocated after strain was shown to cause serious complications in a sea sports athlete. Therefore, not only spinal indications, but the patient’s profession, or exercises or sports that the patient does should be questioned in cases where surgical treatment for CDH is planned.

In the present study, anterior dislocation was found to develop in five patients. The most common complication accompanying neck pain was observed to be swallowing difficulty in these patients. One patient developed oesophageal injury and mediastinitis. After posterior migration, one patient developed CSF fistula and another patient developed spinal shock. Posterior migration was observed to be more dangerous and was found to have a more mortal course, while serious complications were observed in anterior dislocation.

The present study mostly focused on the dislocation of cervical prosthesis, which is an early complication of cervical prosthesis. Mehren et al. (12) found that fusion developed in the long-term follow-up of patients who underwent cervical arthroplasty and that although it prevented adjacent segment disease pathology in the early period, there was no difference in the later period when compared to the fusion. Our study focuses on early complications caused by cervical prostheses. There is a need for longer-term studies that include larger patient groups.
Study Limitations

This study was not conducted in a clinic where cervical prosthesis operation is conducted and only complicated cases were treated. Therefore, this study does not provide sufficient information about the incidence of complications or other effects.

CONCLUSION

Cervical disc prosthesis seems superior to cervical cage placement; however, it is not suitable for every patient, as it may lead to serious complications. Detailed information should be provided to the patient for whom cervical disc prosthesis is to be placed and prosthesis of the most appropriate size for disc space should be placed properly.

REFERENCES

1. Kaplan N, Akyuva Y, Güven G, Kabatas S, Murat Taskin M. Radiological and clinical comparison of the results of patients with fusion and unfusion cervical anterior microdiscectomy with the help of cases and literature. J Acad Res Med 2020; 10: 48-56.
2. Gore DR, Sepic SB. Anterior discectomy and fusion for painful cervical disc disease. A report of 50 patients with an average follow-up of 21 years. Spine (Phila Pa 1976) 1998; 23: 2047-51.
3. Chong E, Pelletier MH, Mobbs RJ, Walsh WR. The design evolution of interbody cages in anterior cervical discectomy and fusion: a systematic review. BMC Musculoskelet Disord 2015; 16: 99.
4. Traynelis VC. The Prestige cervical disc replacement. Spine J 2004; 4(Suppl 6): S310-4. doi: 10.1016/j.spinee.2004.07.025.
5. Duggal N, Pickett GE, Mitsis DK, Keller JL. Early clinical and biomechanical results following cervical arthroplasty. Neurosurg Focus 2004; 17: E9. doi: 10.3171/foc.2004.17.3.9.
6. Yalcin MB, Gokce A, Gokay NS. The Indications for Cervical Disc Prosthesis. J Turk Spinal Surg 2010; 21: 273-8.
7. Brooke NS, Rorke AW, King AT, Gullan RW. Preliminary experience of carbon fibre cage prostheses for treatment of cervical spine disorders. Br J Neurosurg 1997; 11: 221-7.
8. McAfee PC, Cunningham B, Dmitriev A, Hu N, Kim SW, Cappuccino A, et al. Cervical disc replacement-porous coated motion prosthesis: a comparative biomechanical analysis showing the key role of the posterior longitudinal ligament. Spine (Phila Pa 1976) 2003; 28: S176-85. doi: 10.1097/01.BRS.0000092219.28382.0C.
9. Wagner SC, Kang DG, Helgeson MD. Traumatic migration of the Bryan cervical disc arthroplasty. Global Spine J 2016; 6: e15-20. doi: 10.1055/s-0035-1550092.
10. Yang CC, Tang CL, Tseng CY, Tsou HK. Metallosis after traumatic loosening of Bryan cervical disc arthroplasty: a case report and literature review. Eur Spine J 2018; 27: 415-20.
11. Niu T, Hoffman H, Lu DC. Cervical artificial disc extrusion after a paragliding accident. Surg Neurol Int 2017; 8: 138.
12. Mehren C, Suchomel P, Grochulla F, Barsa P, Soukova P, Hradil J, et al. Heterotopic ossification in total cervical artificial disc replacement. Spine (Phila Pa 1976) 2006; 31: 2802-6.