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Original Article

Stand-Alone Cervical Cage for Cervical Radiculopathy: A Retrospective Study

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ABSTRACT

Background: Cervical radiculopathy is a clinical condition characterized by unilateral arm pain, numbness and tingling in a dermatomal distribution in the hand, and weakness in specific muscle groups. This condition can be treated with nonsurgical or surgical methods. This study aims to evaluate the outcome of the stand-alone cervical cage surgical method for cervical radiculopathy at our hospital institution from 2013 to 2017.
Methods: This is a retrospective observational study on every patient who underwent a stand-alone cervical cage procedure for cervical radiculopathy at our hospital institution from 2013 to 2017. The study was conducted from December 2017 until April 2018. We evaluated the clinical outcome with the Neck Disability Index (NDI). The data were collected from medical records, and postoperative follow-up was done by house visits, phone calls, and outpatient visits.
Results: Five male and one female subject with a mean age of 58 years (range, 45–65 years) underwent the procedure; one patient passed away three years postoperatively due to events unrelated to the operation; one patient could no longer be reached. Four patients had an increasing NDI score postoperatively. There were no postoperative complications.
Conclusion: Stand-alone cervical cage appears to be a safe and effective treatment, providing a favorable clinical outcome for cervical radiculopathy at our hospital institution from 2013 to 2017.

Keywords: Cervical radiculopathy; Human and medicine; Neck disability index; Stand-alone cervical cage

INTRODUCTION

Degenerative cervical spine disease is a pathological change in the cervical spine associated with the degenerative process, also referred to as cervical spondylosis. Although most degenerative changes in the cervical spine are often asymptomatic, they can manifest as three main complex symptoms: axial neck pain, radiculopathy, myelopathy, or a combination.[1,2] Axial neck pain refers to pain along the cervical spine and paraspinal muscles. Cervical radiculopathy is characterized by neck pain that radiates to the arm and can be accompanied by radicular sensory or motor deficits.

Stabilization is one of the operative options in managing cervical injuries. Initially, this technique was mostly performed for non-trauma cases, and there was controversy regarding its use in trauma cases.[3,4] In association with these methods, cervical intervertebral disc replacement by a stand-alone cage provides immediate load-bearing assistance to the anterior column and may promote arthrodesis. Meanwhile, data doc-

ument relatively persistent complications in stand-alone cage-assisted anterior cervical discectomy and fusion (ACDF), such as cage subsidence and cervical kyphosis.[5–7]

ACDF is the gold standard for the operative treatment of degenerative cervical spine disease. Stand-alone cervical cage fusion is a surgical technique that is performed to stabilize the affected segment of the cervical spine, maintain foraminal height, and preserve the normal sagittal alignment of the spine. This procedure is indicated for patients with recurrent and disabling neck pain that has not responded to non-operative treatment, as well as for patients with progressive and significant neurological deficits. The stand-alone cervical cage is a device that is implanted between the vertebral bodies to replace the damaged disc and provide stability to the spine. The cage is typically made of titanium or polyetheretherketone (PEEK), and it is filled with bone graft material to promote fusion of the vertebrae. The advantages of stand-alone cervical cage fusion include a lower risk of complications compared to traditional ACDF, a shorter hospital stay, and a faster recovery time. However, it is important to note that stand-alone cage fusion is not appropriate for all patients with cervical radiculopathy. The decision to proceed with this procedure should be made on an individual basis, taking into account the patient's specific clinical presentation and anatomical factors.[5–7]

In this study, we evaluated the outcome of a stand-alone cervical cage for cervical radiculopathy in our hospital institution clinically.

METHODS

Study Design

This study was a retrospective observational study of patients who underwent a stand-alone cervical cage procedure for cervical radiculopathy at Dr. Soetomo General Academic Hospital, Surabaya, from 2013 to 2017. The research was conducted at the Orthopedic Outpatient Clinic from December 2017 to April 2018.

Study Population and Sample

All male and female patients who underwent the stand-alone cervical cage procedure for cervical radiculopathy were included in the study population.

Data Collection

Patient characteristics such as age, sex, and duration of follow-up were recorded.

Outcome Measures

The primary outcome measure was the patient's self-reported neck pain-related disability, assessed using the 10-item Neck Disability Index (NDI) questionnaire. The NDI is a self-report questionnaire used to determine how neck pain affects a patient's daily life and to assess the self-rated dis-

Table 1. Patients Profile

Case	Age (years)	Sex	Follow up duration	Pre-operative NDI Score	Post-operative NDI Score
1	61	F	N/A	N/A	N/A
2	65	M	N/A	N/A	N/A
3	45	M	2 years	42	16
4	58	M	8 months	48	14
5	62	M	2 years	44	12
6	55	M	3 years	50	22

ability of patients with neck pain. The NDI was used to assess both pre-operative and post-operative outcomes in all patients.

RESULTS

Of the six patients who underwent a stand-alone cervical cage procedure between 2013 and 2017, five were men with an average age of 58 years (range, 45-65 years). Two patients were lost to follow-up: one died three years after the procedure from a cause unrelated to the surgery, and one could not be reached. The remaining four patients had follow-up durations ranging from eight months to four years.

Four of the six patients who were evaluated experienced an increase in post-operative Neck Disability Index scores. No postoperative complications, such as surgical wound infection, speech disorders due to recurrent laryngeal nerve injury, or airway and esophageal disorders, were observed. No patient reported limited neck movement after the procedure. All patients showed improvement in NDI scores after the operation. Table 1 showed a decrease in NDI scores; lower scores indicate better clinical results.

DISCUSSION

Cervical radiculopathy is a common and often debilitating condition that affects the cervical nerve roots, resulting in pain, numbness, tingling, and weakness in the neck, shoulders, arms, and hands. It occurs when the nerve roots are compressed or irritated, often due to degenerative changes in the cervical spine, such as herniated discs, bone spurs, or spinal stenosis. The condition can significantly impact a person's quality of life, limiting their ability to perform daily activities and participate in recreational activities.[1,8] The goal of therapy for cervical radiculopathy is to relieve pain, prevent neurological damage, improve functional limitations, and restore or enhance neurological function, both operatively and nonoperatively. Operative treatment is performed when there is evidence of progressive neurological deficits, compression of nerve fibers, and persistent radiculopathy symptoms and signs that have been treated conservatively for at least 6–12 weeks.[4,9]

The use of stand-alone intervertebral cages effectively restores intervertebral disc height and lordosis, providing load-bearing support to the anterior column and inhibiting graft collapse. However, stand-alone cages have been associated with complications such as non-union and subsidence into the endplates. Some surgeons suggest that plate-assisted cervical fusion may offer better outcomes than stand-alone cages.[10,11]

Nonunion and subsidence are recognized complications of anterior cervical discectomy and fusion using stand-alone cages. Risk factors for these complications include over-distraction, endplate damage, and osteoporosis. Adequate preparation of both endplates to avoid damage to the bony cartilage is essential to minimize subsidence after ACDF with a stand-alone cage.[8,12]

A study in elderly cervical radiculopathy patients showed a significant correlation between patient pain scores and functional limitations as measured by Oswestry Disability Index scores ($p < 0.0001$).[13] n the present study, the Neck Disability Index was used to evaluate patient progress at follow-up. There were no complications or postoperative neurological deterioration observed in this study. Another study showed significant improvement in patient VAS scores at one year, and this improvement was maintained at three years postoperatively. That study included 51 patients who underwent 2-level ACDF and 39 patients who underwent 1-level ACDF, usually at the C5/C6 (65%) level.[8] Assessment of

disability scores on the neck using the NDI showed an increase in all cases. Quality of life reflects the ability of individuals to cope with and adapt to their new living conditions.[14,15]

This study has several limitations. The small sample size of only six patients limits the generalizability of the findings to a larger population. Additionally, the variable follow-up duration, ranging from eight months to four years, may have affected the accuracy of the outcome assessments. The study also relied on the NDI questionnaire, which is a self-reported measure and may be subject to recall bias and individual interpretation. Finally, this study was conducted at a single institution, which may limit the generalizability of the findings to other settings.

Further research should focus on larger studies with longer follow-up durations and more comprehensive outcome measures to confirm the long-term efficacy of stand-alone cervical cage procedures for cervical radiculopathy. This research should include comparative studies with other surgical techniques and investigate factors that may predict better outcomes, such as patient demographics, disease severity, and surgical technique.

CONCLUSION

A stand-alone cervical cage is one treatment option for cervical radiculopathy. Operative therapy is carried out with an indication of a failure of nonoperative therapy. Patient follow-up measurements in this study use the neck disability index with the results of increasing scores in all patients that can be evaluated after follow-up. In this study, we evaluated the clinical outcome of a stand-alone cervical cage for cervical radiculopathy in our hospital institution from 2013 to 2017 and shows a safe and effective procedure providing a favorable clinical outcome. Radiological evaluation and more samples are needed for further study.

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