Original Article

Improvement and Complications after Two-Level ACDF Surgery at a Tertiary Care Facility: A Retrospective Study

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ABSTRACT

Objective: To assess immediate and long-term outcomes and complications of two-level ACDF in patients with degenerative cervical disc disease.

Materials & Methods: A retrospective study was carried out in the Department of Neurosurgery at Prime teaching hospital, Peshawar. Patients with symptoms of cervical radiculopathy and radiculomyelopathy with two-level cervical disc disease were included. Patients with trauma, single-level disease, and those who had cervical corpectomy were excluded. Age, gender, Nurick Grading, level of involvement, and post-op outcomes were recorded.

Results: 27 cases among which 18 were males and 9 females were studied. 21 patients had radiculopathy while 6 had radiculomyelopathy. The mean age was 46 years. Nurick grade was from 2 to 6. ACDF was chosen as the procedure of choice. Follow-up involved the immediate post-op period for dysphagia, hoarseness of voice, and any neurological deficit, at 6 months and one year for outcomes of pain relief, improvement in paresthesia, and spasticity.

Conclusion: ACDF is a safe and recommended procedure for 2-level cervical disc disease in terms of pain relief, paresthesia, and spasticity with acceptable complications.

Keywords: ACDF, cervical spondylotic myelopathy, spasticity.

INTRODUCTION

Degenerative cervical myelopathy is a common type of cervical spine problem in elderly patients that results in disability and affects the quality of life.¹ Patients with degenerative cervical spine are at risk of developing spondylotic radiculopathy or myelopathy. Cervical radiculopathy is a condition in which a cervical nerve root is compressed in the cervical spine, which causes pain or numbness and/or sensory or motor deficit in the upper
limbs, whereas cervical myelopathy is a condition in which there is compression on the cervical spinal cord causing sensory or motor deficit in the upper or lower limbs depending on the severity of compression. The possible causes of cervical radiculopathy or myelopathy can be spondylosis, disc herniation, hypertrophy or ossification of ligaments or calcifications, bony spur, and facet hypertrophy. Cervical degenerative disc disease is more common in elderly males and is found in patients mostly after their late 40s with a mean age of 47 years (range is 21 – 72 years). The common presenting complaints are neck pain, weakness of limbs, radiating pain, paresthesia, stiffness in the upper or lower limbs, gait abnormalities, and/or bladder dysfunction. Clinical examinations including tone, power, reflexes, sensory examinations, gait assessment, and specific maneuvers like Hoffmann’s sign, Spurling, and Lhermitte’s sign are carried out to reach a diagnosis. Visual analog scale (VAS) for arm and neck pain and Nurick grading scale was used to grade myelopathy. Anterior cervical discectomy and fusion (ACDF) and Anterior cervical corpectomy and fusion (ACCF) are two effective procedures to decompress the spinal cord in patients with significant spinal canal stenosis and restore cervical lordosis. In cases where cord compression is secondary to a disc pathology, ACDF is preferred over ACCF because there is less blood loss, a short hospital stay, and lesser complications. However, when the compression area involves the vertebral body, ACCF is the procedure of choice because the outcome is more satisfactory. Two-level cervical degenerative disc disease is effectively treated with ACDF as with one-level cervical degenerative disc disease. Polyetheretherketone (PEEK) cages and allografts are commonly used in ACDF. However, in our study, we have used PEEK cages only. ACDF using a stand-alone PEEK cage with two screws fixed in the superior and inferior vertebral body is considered a safe and effective treatment option for fusion in patients with two levels of cervical degenerative disc disease.

We aimed to assess the two-level ACDF procedure as a better alternative to ACCF in cases with two-level cervical degenerative disc disease.

MATERIALS AND METHODS

Study Design
This was a retrospective study conducted at Prime Teaching Hospital in Peshawar between January 2019 and December 2021.

Inclusion Criteria
Individuals of all ages and both genders who had two-level cervical disc degeneration on MRI and symptoms of degenerative cervical radiculopathy and radiculomyelopathy were included.

Exclusion Criteria
Patients with a previous cervical corpectomy, traumatic myelopathy, and illness at one level or more than two levels were excluded from the study.

Surgical Management
From hospital notes and patient records, the pertinent demographic and clinical information were taken. All patients underwent Anterior Cervical Discectomy and Fusion (ACDF) at two levels. The degree of neurological impairment was evaluated using the Nurick grading system.

Data Collection & Analysis
Descriptive statistics were employed to describe the variables, and percentages were used to provide improvement and complication information.

Data Collection
Data were collected from medical records of patients who underwent two-level anterior
cervical discectomy and fusion (ACDF) between January 2019 and December 2021. The variables collected included age, gender, primary symptoms, duration of symptoms, Nurick grading, and immediate and long-term outcomes (pain relief, improvement in numbness and spasticity) and complications (new neurological deficits, infection, CSF leakage, dysphagia and hoarseness of voice).

**Statistical Analysis**
The data were analyzed using descriptive statistics in SPSS Version 22.0. The frequency, percentages, mean, and median were calculated and presented. The immediate and long-term outcomes were expressed as percentages.

**RESULTS**

**Age & Gender Distribution**
7 cases were included in this study. The Nurick grading was from grade 2 to grade 6. The mean age is 46 years. 18 were male and 9 were female patients.

**Clinical Features**
Primary symptoms were neck pain radiating to one or both upper limbs and lower limbs along with numbness and spasticity for a mean duration of 7 months. Among 27 cases, 21 had radiculopathy and 6 had radiculomyelopathy.

After neurological examination and investigations including MRI Cervical Spine and Flexion Extension X-rays, Anterior cervical discectomy and fusion (ACDF) were chosen as the procedure of choice. These patients were followed at the immediate post-op period for dysphagia, hoarseness of voice, and breathing complications and 6 months and one-year intervals for clinical outcomes in terms of pain relief, improvement in numbness and spasticity results shown in Figures 1 to 3, and Tables 1 to 6.
Table 1: Immediate and long-term outcomes of two-level ACDF.

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<thead>
<tr>
<th>Outcome</th>
<th>Number</th>
<th>Percentage (%)</th>
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<tbody>
<tr>
<td>Dysphagia</td>
<td>5</td>
<td>(18.5)</td>
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<tr>
<td>New neuro-deficit (weakness)</td>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>Hoarseness of voice</td>
<td>1</td>
<td>(3.6)</td>
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<tr>
<td>Breathing complications</td>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>Pain relief</td>
<td>23</td>
<td>(85.2)</td>
</tr>
<tr>
<td>Improvement in numbness</td>
<td>22</td>
<td>(81.5)</td>
</tr>
<tr>
<td>Improvement in spasticity</td>
<td>14</td>
<td>(51.8)</td>
</tr>
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DISCUSSION

A stand-alone PEEK cervical cage was used for 26 ACDF patients. All patients were followed up for two years. After a careful assessment of these patients, Odom’s criteria indicated that 10 had great clinical outcomes, 15 had good, 1 had average, and none had negative. All patients solidified at 4.5 months. This surgery may restore intervertebral height, simplify radiologic follow-up, reduce discomfort, and provide good results. Two-level Anterior cervical discectomy and fusion (ACDF) in patients with cervical spondylotic radiculopathy, radiculomyelopathy, or myelopathy had a good immediate and long-term surgical outcome, as shown by pre- and post-operative VAS and Nurick grade scores. This study shows that two-level ACDF with anterior plating for radiculopathy is safe, effective, and has a faster recovery period than standard ACCF surgery. Patients resumed unrestricted work sooner, lowering short-term impairment. Rigid internal fixation may save patients and disability insurers money. ACDF demonstrated reduced postoperative cervical instability but greater graft subsidence than ACCF. Another research revealed that ACDF improved neck, and arm mobility and quality of life ratings with little problems and reoperations. This research has many limitations as we did not include cases of degenerative disc disease in short-necked patients, patients with lordosis, compression of more than three levels, and posterior longitudinal ligament ossification. ACDF has been linked to greater rates of adjacent-level degeneration, which may need further surgery. ACDF reduces neck and arm discomfort, improves spinal stability, and restores nerve
function. Fusion rate: most patients have a firm fusion within 6 to 12 months following ACDF. ACDF is typically safe, however, some studies have shown a higher risk of infection, nerve damage, and dysphagia. Most patients show long-term improvement in pain and function after ACDF. Alternative treatments: ACDF has been compared to physical therapy, non-surgical approaches, and minimally invasive procedures. These studies suggest that ACDF may work better for certain patients based on their symptoms and medical history. It is vital to highlight here that surgery results differ from patient to patient and that ACDF’s long-term outcomes require further long-term follow-ups. This research compares ACDF with ACCF for cervical disc disease. This study also evaluates pain alleviation, neurological improvement, and immediate post-op complications. This study comprehensively evaluates anterior cervical disectomy and fusion (ACDF) for symptomatic two-level cervical disc disease. It may assist healthcare policymakers choose the right procedures. This may assist doctors choose the best technique for each patient based on symptoms and medical history. This study will improve cervical disc disease therapy and patient care. In conclusion, anterior cervical disectomy and fusion (ACDF) is a common surgery as compared to ACCF for cervical herniated discs, spinal stenosis, and degenerative disc disease and based on our study, can be used as an alternate procedure for two-level cervical disc disease. Our study suggests that ACDF reduces neck and arm discomfort, improves spinal stability, and restores nerve function. It also shows that ACDF for two-level cervical discs excludes the need for an Iliac Crest graft in ACCF surgery which itself is a painful procedure. However, ACDF may cause infection, nerve damage, and dysphagia, and further studies are required to understand its long-term consequences. Overall, our study gives essential insights into the comparative efficacy of this surgery and has substantial implications for improving cervical disc disease therapy and patient care.

CONCLUSION

This retrospective study assessed the short- and long-term effects of two-level ACDF surgery in patients with two-level cervical spondylotic myelopathy and radiculopathy. The risk of dysphagia, pain, numbness, and stiffness was shown to be lower than ACCF. This study provides evidence that ACDF is safe and effective for treating cervical spondylotic myelopathy symptoms for two-level disc degeneration compared to ACCF where Iliac crest graft is in itself a painful procedure.

REFERENCES


Additional Information

Disclosures: Authors report no conflict of interest.

Ethical Review Board Approval: The study was conformed to the ethical review board requirements.

Human Subjects: Consent was obtained by all patients/participants in this study.

Conflicts of Interest:

In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Financial Relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other Relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

Financial Relationships: None.
## AUTHORS CONTRIBUTIONS

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<th>Sr.#</th>
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<th>Intellectual Contribution to Paper in Terms of:</th>
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<td>5.</td>
<td>Bakht Jehan</td>
<td>5. Literature review and referencing.</td>
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