# ANTERIOR CERVICAL DISCECTOMY AND FUSION SURGERY: RESULTS WITH ZERO-PROFILE SPACER/CAGE

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***ABSTRACT***

***OBJECTIVES***

*This study aimed to evaluate the clinical outcomes of Anterior Cervical Discectomy and Fusion (ACDF) treatments for cervical disc degenerative disease (CDDD) using a Zero Profile cage.*

***METHODOLOGY***

*A retrospective study of 26 patients with cervical disc disease treated with a zero-profile cage was designed and followed up for an average of 12 months in descriptive research. For arm and neck pain, the Neck Disability Index (NDI) and Visual Analogue Scale (VAS) scores were used to assess function. Nurick's myelopathy classification scheme based on gait impairments was also documented.*

***RESULTS***

*The average age of the 26 patients was 48.96 13.13 years (mean SD), with 44 percent falling into the 40-60-year age bracket. The male/female gender distribution was 21 (84%) and 04 (16%) male/female. Radiculomyelopathic symptoms were detected in 11 (28%) of the patients, with radicular pain occurring bilaterally in seven (28%) of the patients and on the left side in four (16%). A radiological examination of fusion was performed at six months and one year. The fusion had a success rate of 95 percent at six months (19 patients) and 100 percent at one year.*

***CONCLUSION***

*A zero-profile device provides biomechanical stability and fusion rates with excellent outcomes for one- and two-level ACDFs. Advantages include low rates of dysphagia, decreased operative time, restoration of cervical lordosis and disc height, and lack of cage subsidence or screw back out.*

***KEYWORDS:*** *Anterior Cervical Discectomy and Fusion (ACDF), Zero-Profile Cages, Cervical Spondylotic Myelopathy*

## INTRODUCTION

Smith and Robinson first introduced anterior cervical discectomy and fusion (ACDF), and it has been used since then as the main surgical treatment for single- to multilevel cervical degenerative disc disease (CDDD).[1] CDDD and cervical spondylotic myelopathy are major causes of arm pain with or without neurologic deficits.[2,3] Surgery may be considered if nonoperative treatment fails. In patients with cervical disc degenerative disorders, anterior cervical discectomy and fusion (ACDF) have been frequently used since the 1950s.[4] The treatment involves decompression of neural tissue, accomplished by removing disc material and then rebuilding and stabilizing the spinal column at one or more cervical vertebral levels.[5,6] The anchoring cage or stand-alone cage is another name for the zero-profile implant.[7] A cage and an internal implant with a pair of locking screws make up the device.[8,9] It enables the internal implant to be put directly into intervertebral disc tissue, with the screws for fixation being introduced into the surrounding vertebral body. Anterior cervical plates and intervertebral cages were also used during this time. Many surgeons use an anterior plate during fusion surgeries to improve stabilization since multiple studies have shown that it results in higher fusion and reduced failure rates.[10] Plate-related complications, such as postoperative dysphagia, tracheoesophageal lesions, and plate displacement, have, however, become a growing source of worry. Compared to the plate and cage system, the zero-profile implant (Zero-P) was recently invented and widely used for one or two segmental ACDF surgeries.[11] It was discovered that the Zero-P implant could achieve similar clinical results and significantly reduce the incidence of dysphagia and adjacent segment degeneration.[12,13] Thus, this study's purpose was to retrospectively evaluate the clinical and radiological

outcomes of ACDF treatments for cervical disc degenerative disease (CDDD) using a Zero Profile cage. Also, note the complication rate associated with this type of surgery.

## METHODOLOGY

The research was conducted at the Hayatabad Medical Complex in Peshawar, Pakistan, from February 2018 to March 2021. The sample size was calculated using the WHO sample size calculator, and the non-probability convenience sample technique was used. A retrospective study of 26 patients with cervical disc disease treated with a zero-profile cage was designed and followed up for an average of 12 months in descriptive research. For arm and neck pain, the Neck Disability Index (NDI) and Visual Analogue Scale (VAS) scores were used to assess function. Nurick's myelopathy classification scheme based on gait impairments was also documented. Plain X-rays and, when indicated, a CT scan were used to confirm radiological fusion at 12 months. All male and female patients between the ages of 18 and 70 who underwent ACDF Procedure for single level with a zero-profile spacer/cage were included in this study. All those subjects having previous cervical surgeries, severe cervical kyphosis, ossified posterior longitudinal ligaments, and acute spinal cord injury were excluded from the study.

## RESULTS

The average age of the 26 patients was 48.96 13.13 years (mean SD), with 44 percent falling into the 40-60-year age bracket. The male/female gender distribution was 21 (84%) and 4 (16%) male/female. There were 20 (80%) single-level affections and five (20%) double-level affections, with disc C5/6 and disc C6/7 being. They were implicated ten times (33.33%) each. The average operational time was 110 minutes (42 minutes), with an average blood loss of 89 (45 cc). The most common interbody cage size implanted was 6 mm, with 15 mm screws being the most common screw length. In 11 (44%) of the patients, the neuropathology was found at both the cord and the root (radiculomyelopathy), while in 14 (56%) of the patients, the neuropathology was found just at the root level. Radiculomyelopathic symptoms were detected in 11 (28%) of the patients, with radicular pain occurring bilaterally in seven (28%) of the patients and on the left side in four (16%). A radiological examination of fusion was performed at six months and one year. The fusion had a success rate of 95 percent at six months (19 patients) and 100 percent at one year.

**Table 1: Demographic Profile of the Patient (n=26)**

| | | |
|---|---|---|
| Age | | 48.96 ± 7 |
| Gender | Male | 84% |
| | Female | 16% |
| Operating time | | 110 minutes |
| Intraoperative blood loss | | 89 cc |
| Length of stay | | 3.5 days |
| Level of the treated segment | | |
| C3-C4 | | 14.5% |
| C4-C5 | | 33.3% |
| C5-C6 | | 38.3% |
| C6-C7 | | 14.5% |

When the pre-operative and postoperative VAS pain levels for the neck and upper limb were compared after 12 months, there was a statistically significant improvement (p 0.001). When comparing pre-operative and postoperative scores at 12 months, the Nurick Score indicated a statistically significant improvement (p 0.002).

**Table 2: Stratification of Effectiveness w.r.t Age Distribution (n=60)**

| Pre-operative | Frequency | %age | P-Value |
|---|---|---|---|
| One year follow up | | | |
| VAS Neck score | | | |
| Pre-operative | 17.3± 2.7 | | 0.02 |
| Postoperative | 11.3 1.4 | | |
| VAS Arm score | | | |
| Pre-operative | 6.3 ± 1.5 | | 0.03 |
| Postoperative | 2.2 ± 0.7 | | |
| Postoperative Complication | | | |
| Dysphagia | 04 | 15.3% | 0.107 |
| Adjustment segment disease | 02 | 7.6% | 0.999 |
| Sinking cage | 00 | 0% | 0.000 |
| Wound dehiscence | 01 | 3.84% | 0.010 |
| Axial neck pain | 03 | 11.53 | 0.1001 |

In our study, the most common complication was dysphagia 4(15.3%), followed by adjacent level ossification development 2(7.6%). No case of sinking cage or screw loosening was observed in our study.

## DISCUSSION

ACDF has been frequently used to treat cervical degenerative disc degeneration since Smith Robinson and Cloward first developed it in 1958.[14] To achieve intervertebral fusion, autologous bone transplant was initially used. However, using a bone graft may cause difficulties at the donor site, such as hematoma formation, neurological damage, infection, and discomfort. Later, various implants and devices to aid intervertebral fusion were created. Out of all the devices, the plate and cage system can provide robust stability and enhance cervical sagittal alignment. It is still extensively used today because of these benefits. However, it has been observed that this method has a

higher risk of problems such as dysphagia and adjacent segment degeneration (ASD), which are not insignificant. Thus, a zero-profile implant system (Zero-P, for example) was created to reduce the occurrence of dysphagia and ASDs.[15,16] Our study compared the pre-operative and postoperative VAS pain levels for the neck and upper limbs after 12 months. There was a statistically significant improvement (p 0.001). When comparing pre-operative and postoperative scores at 12 months, the Nurick Score indicated a statistically significant improvement (p 0.002). EA El-Baz et al. show the similar results.[13] In our study, the most common complication was dysphagia, followed by adjacent level ossification development. Adjacent segment disease was observed. No case of sinking cage or screw loosening was observed in our study. Similarly, Barbagallo GMV, Romano D, Certo F, Milone P, Albanese V (2013) Zero-P: A new zero-profile cage-plate device for single and multilevel ACDF. A single Institution series with four years maximum follow-up and review of the literature on zero-profile devices.[17] In this study, five patients (20%) reported dysphagia postoperatively, three cases (12%) of mild transient dysphagia resolved in two weeks, and two cases (8%) of moderate dysphagia resolved in five weeks. Both were two-level ACDFs.[18]

## LIMITATIONS

Larger and longer multi-centric studies are needed to detect adjacent-level degeneration and compare it to other established devices.

## CONCLUSIONS

A zero-profile device provides biomechanical stability and fusion rates with excellent outcomes for one- and two-level ACDFs. Advantages include low rates of dysphagia, decreased operative time, restoration of cervical lordosis and disc height, and lack of cage subsidence or screw back out.

**CONFLICT OF INTEREST:** None

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