

Surgical Outcome of Anterior Cervical Discectomy and Fusion Using Peek Cage for Cervical Disc Herniation in Terms of Pain Relief

Outcome of anterior cervical discectomy and fusion (ACDF) using a PEEK Cage

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ABSTRACT

Objective: The purpose of this study was to evaluate the outcome of anterior cervical discectomy and fusion (ACDF) using a PEEK cage.

Study Design: Prospective study

Place and Duration of Study: This study was conducted at the Neurosurgery Department, Bacha Khan Medical College, Mardan Medical Complex, Peshawar from December 2017 until December 2020.

Materials and Methods: The study excluded patients who required multiple level ACDF or corpectomy with plating and redo instances. A proforma was completed that covered the patient's age, gender, address, level of prolapsed disc, signs and symptoms, pain score, and MRI findings. All patients were evaluated on the day of discharge and during a one-month follow-up visit. SPSS version 22 was used to analyze the data.

Results: A total of 53 patients were included, including 62.26% males and 37.73% females. Patients ranged in age from 27 to 64 years, with a mean of 50.4 years. (61%) patients had radicular pain on the right side. Radiculomyelopathy was present in patients with 5.26 percent. C5–C6 was the most often operated level (35 patients). Using Odom's criteria, excellent results were obtained in 81 percent individuals and adequate results in the remaining patients. At six months, 92 percent of patients had a fusion of the bones.

Conclusion: ACDF with PEEK cage fixation is a safe and beneficial treatment for cervical prolapse disc disease at one level.

Key Words: Surgical Outcome, Anterior Cervical Discectomy, Fusion Using Peek Cage, Cervical Disc Herniation

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INTRODUCTION

Cervical radiculopathy is a prevalent disorder with a frequency of 3.5 per 1,000 and an annual incidence of 83 per 100,000. Radiculopathy is a disorder that can be caused by a variety of clinical conditions, including prolapsed intervertebral discs, stenosis, and trauma, as well as malignancies and even spinal instability¹. Cervical spondylosis, on the other hand, is the most common cause, followed by disc herniation.

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Prolapsed discs are more prevalent in the 30- to 50-year-old population. The most frequently impacted level of disc herniation is C5-C6. The majority of prolapsed cervical discs can be treated conservatively. However, certain circumstances necessitate surgery, which can be accomplished in a variety of methods from anteriorly and posteriorly².

Anywhere along the spine, from the neck (cervical) to the low back, a discectomy can be performed (lumbar). The surgeon accesses the injured disc through the throat area from the front (anterior) of the spine. The disc and bone vertebrae are exposed by repositioning the neck muscles, trachea, and oesophagus. Frontal neck surgery is more accessible than posterior neck surgery because the disc can be reached without disrupting the spinal cord, spinal nerves, or the powerful neck muscles. Depending on the severity of your symptoms, one or more discs (single-level) or multiple discs (multi-level) may be removed³.

The gap between the bony vertebrae is left empty after the disc is removed. Previously the bone graft was put into the disc space and fixation was applied with plating. But then it was then transformed with PEEK cage between the two vertebral bodies to accommodate the space and zero profile screws are applied in the

vertebrae above and below. The PEEK cage acts as a connector between the two vertebrae, resulting in spinal fusion. Following surgery, the body's natural healing process begins, with the formation of new bone cells around the graft. After three to six months, the PEEK cage and zero profile screws were followed for fusion. Instrumentation and fusion function in concert, just like reinforced concrete does⁴.

We present our investigation and illustrate the surgical outcomes of anterior cervical disectomy and PEEK cage fixation and the patients with cervical disc herniation⁵.

MATERIALS AND METHODS

Cervical disc herniation (CDH) was indicated surgically when the following criteria were met: progressive myelopathy; persistence or worsening of radiculopathy despite 12 weeks of medical treatment; and motor impairment or intractable pain. Our inclusion criteria were single CDH and post-operative follow-up of greater than 12 months. Cases were excluded if they had coexisting spine diseases, a history of previous spine surgery, or a postoperative follow-up of less than 12 months⁶.

This series includes 53 CDH cases that were handled with ACDF using PEEK cage. The result instruments were as per the following: an investigation planned survey that evaluated remaining and additionally new objections, just as abstract fulfillment with the activity; a new (multi week before the meeting) postoperative VAS for neck and furthest point radicular torment; Evaluation Questionnaire; and follow-up visits⁷.

The senior author entered preoperative medical information at the time of surgery, including preoperative symptoms, duration of pain (from commencement to surgery), physical examination, and pain severity as measured by the Visual Analogue Scale (VAS). Intraoperative problems were reviewed in the surgery notes. The postoperative course was read from the follow-up notes. Our study population was contacted via phone to educate them about the research and to invite them to a follow-up visit. The follow-up visits were conducted by a physician who specializes in spine research⁸.

This prospective study was undertaken at the Hospital's Department of Neurosurgery from December 2017 until December 2020. All patients provided written consent prior to enrollment in the trial, which was approved by the hospital's ethical review committee⁹.

Criteria for Inclusion	Criteria for Exclusion
Only individuals with a single level of prolapsed intervertebral cervical discs who had failed conservative therapy were enrolled in the trial.	Multiple levels of involvement, trauma, fracture, and previously operated patients with any cervical disease were excluded.

Before surgery, each patient's full pre-operative history, clinical examination findings, X-ray cervical spine, and MRI cervical spine were performed and documented in the database¹⁰. To optimize fusion in all patients, PEEK cage was placed in the disc space and zero profile screws were applied. All patients underwent surgery supine and under general anesthetic. An image intensifier was used to check the surgical level. The cervical collar was worn postoperatively. According to Odom's criteria, various outcome questionnaires were completed preoperatively and at postoperative intervals. Additionally, outcomes were analyzed and quantified utilizing a neck and arm pain visual analogue scale. Fusion was determined using dynamic cervical x-rays, and at the third month follow-up visit, Imm movement at the necessary spot was declared fused¹¹.

Statistical Analysis: SPSS version 16.0 was used to analyse the data (SPSS, Inc., Chicago, IL, USA). The level of statistical significance was fixed at 0.05. The central and dispersion trends were calculated for descriptive statistics. The nonparametric test (chi-square) was used to compare qualitative variables. The nonparametric test was used to compare qualitative and quantitative data (Mann-Whitney test)¹².

RESULTS

The gender distribution among ACDF patients using PEEK cage is shown below:

Table No.1: Gender distribution

Gender	No. of patients	%
Males	33	62.26%
Females	20	37.73%
total	53	100%

C5–C6 was the most frequently fused site, whereas C6–C7, C3–C4, and C4–C5 were the least frequently fused sites, as illustrated:

Table No.2: Disc involvement.

Disc Involvement	No. of Patients	%
C3-C4	5	9.43%
C4-C5	3	5.66%
C5-C6	35	66.03%
C6-C7	9	16.98%
C7-C11	1	1.88%

The procedure's outcome was determined using Odom's criteria. 81 percent of individuals had excellent scores.

Table No.3: Procedural Outcome

Outcome	No. of patients	%
Excellent	43	81.13%
Good	7	13.2%
Fair	2	3.77%
Poor	1	1.88%

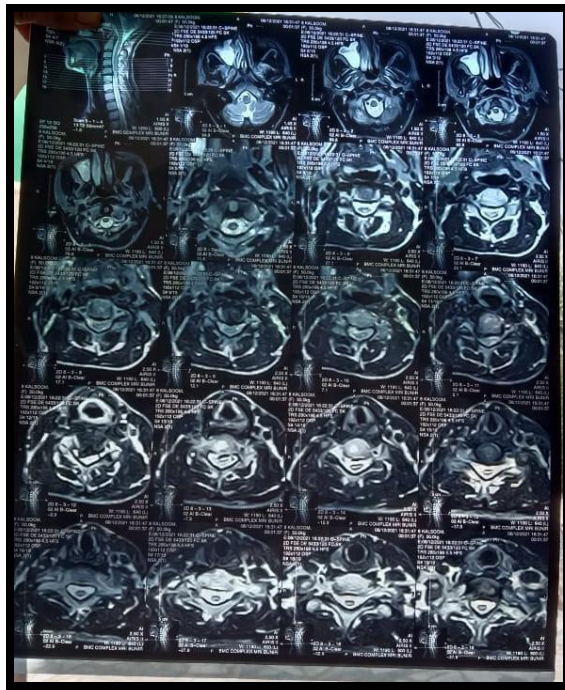


Figure No.1:

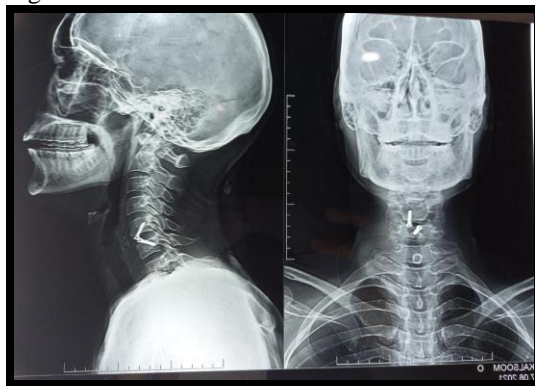


Figure No.2:



Figure No.3:

DISCUSSION

The purpose of inserting PEEK cage into the disc gap is to fill the space and maintain the cervical alignment. The use of a cage reduces the requirement for external orthosis and facilitating early mobilization¹³. Only single level ACDF was performed using Peek cage and discussed in this study. Wanget al conducted a study on ACDF with multiple levels. They achieved 91.7 percent fusion rates inpatients without plating and 95.5 percent with plating. Additionally, they demonstrated in his study that results were outstanding in 91 percent of cases with caging, compared to 88 percent of cases without caging¹⁴. Kaiser et al compared the results of 157 cases of single level anterior cervical discectomy and fusion with a cohort of 242 non-plated individuals in another investigation. He discovered a fusion rate of 90% in non-instrumented individuals and 96% in plated patients. Khan et al. reported a fusion rate of 96.93 percent for one level anterior cervical discectomy and fusion in a local trial. The fusion rate of 96.38 percent observed in this study is consistent with Wang et al work's and other local and international studies¹⁵. Thus, the above results demonstrate that the use of micro plates during one level cervical discectomy improves fusion rates. The results of the current research indicate that 82 percent of patients had great outcomes, while 12.05 percent had satisfactory outcomes. Khan et al findings are similar, implying that ACDF is the preferred treatment for radicular discomfort. Numerous studies demonstrate that complication rates vary significantly around the globe¹⁶. Infection is a rather common problem in our region. This study demonstrates a 3.61 percent infection rate. However, comparable results were also observed in the Khan et al study, indicating that this is a perfectly acceptable range. After examining the research populations, overall outcome in terms of clinical outcome and complication rate. We feel that ACDF with titanium miniplates is the most appropriate treatment choice due to its high efficacy and minimal surgical time prolongation. However, our study is limited by a lack of long-term follow-up. Proving these findings will require larger prospective RCT studies¹³.

The prevalence of subsidence in our investigation was 19%, which is greater than the 14.3 percent reported by Cabraja et al. in their series of PEEK cage sinking at a mean follow-up of 28.4 months. Galhom reported three incidences of subsidence (7.5 percent) during a two-year follow-up period. Ha et al. identified a rate of PEEK cage associated subsidence of 8.1 percent at a mean follow-up time of 18.9 months. Furthermore, Park et al. observed that 22.6 percent of their subjects exhibited subsidence after an average follow-up of 12

months. Subsidence was reported at a rate of 32.3 percent in a research done by Song et al¹⁴.

Kao et al. found a solid relationship among subsidence and sexual orientation, the quantity of treatment levels, and treatment at C5–7. Age and sexual orientation had no impact on subsidence in Kast et al arrangement. There was no connection between age, sexual orientation, the quantity of treatment levels, and subsidence; nonetheless, the greater part (75%) of cases related to subsidence had gotten single-level ACDF (C5-C6, C6-C7)¹⁵.

At a half year, Kulkarni et al. discovered a combination pace of 93.33 percent for PEEK confines. At a mean development of ten months, Cho et al. noticed a 100% combination rate. Kulkarni et al study populace combination was kept up following a normal of year and a half of follow-up. Cabraja et al. announced a 88.1 percent combination rate for PEEK confines after a mean development of 28.4 months. Liu et al. noticed a 72 percent combination rate after a mean development of 25.6 months. Tune et al. detailed a combination pace of 78.9 percent. Niu et al. tracked down that the PEEK confine bunch had a 100% combination rate at year follow-up. Ha et al. accomplished 94.5 percent combination after a normal subsequent length of 18.9 months. At a mean development of almost 53 months, we acquired a 100% combination rate¹⁶.

Another study conducted by Akramullah in Pakistan, excellent results were obtained in 75 patients (79 percent) using Odom's criteria, while adequate results were obtained in the other patients. At six months, 92 percent of patients had a fusion of the bones. While the current study shows 81 percent excellent results and adequate results in the remaining patients¹⁸.

CONCLUSION

Cervical disc disease management has evolved over time. Even now, several surgical procedures and bone fusion materials are used. Anterior cervical discectomy with PEEK cage fixation is a successful and safe therapeutic option for single level cervical disc disease with a favourable outcome in terms of pain and neurological function¹⁷.

Author's Contribution:

Concept & Design of Study: Naeem ul Haq
 Drafting: Musawer Khan
 Data Analysis: Adnan Ahmed,
 Aziz ul Haq
 Revisiting Critically: Naeem ul Haq,
 Musawer Khan
 Final Approval of version: Naeem ul Haq

Conflict of Interest: The study has no conflict of interest to declare by any author.

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