Original Article

Experience of Pain Relief in Patients Operated for Cervical Disc and P-Cage Fusion

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ABSTRACT

Objective: The purpose of this case series, retrospective study was to assess the effectiveness and results of single-level ACDF using PEEK cage fusion in patients with cervical radiculopathy or myelopathy.

Study Design: Retrospective study

Place and Duration of Study: This study was conducted at the Hayatabad Medical Complex (HMC) in Peshawar. The study spanned a duration of one year, from July 7, 2019, to July 7, 2020.

Methods: The present study is a cross-sectional study of 43 patients who had single-level ACDF with PEEK cage fusion during one year at Hayatabad Medical Complex, Peshawar. Patients' characteristics, the surgery details, and the results were considered. Patients' pain intensity was assessed using the Visual Analog Scale (VAS) before the operation and one week after the operation. Other aspects measured included the complications that arose and the satisfaction level of the patients.

Results: The average age of the surveyed patients was 45 years, of which 79. 09% were men. Postoperative pain management was satisfactory; 90% of the patients experienced a decrease in pain severity. The mean reduction in VAS scores from baseline to one week after surgery was, therefore, -5. 07. No significant differences in pain relief outcomes were observed when performing subgroup analyses according to the patients' age, gender, and preoperative pain severity. The patients were generally satisfied with the treatment they received and none of the patients experienced any serious side effects in the one-week follow up. The cervical discs that were operated upon were spread out over different levels with the most common level being C5-C6.

Conclusion: Single-level ACDF with PEEK cage fusion has shown good results in patients' satisfaction and mean pain relief. The current work contributes to the existing body of knowledge on the outcomes and complications associated with ACDF with PEEK cage implantation as a management strategy for cervical disc disease. Therefore, longer-term follow-up studies are needed to confirm these findings and evaluate the sustainability of the results.

Key Words: Pain Relief, Cervical Disc, P-Cage Fusion.

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INTRODUCTION

Cervical disc prolapse, a prevalent condition in neurosurgical practice, often manifests with radiculopathy at an incidence of 1.79 per 1000 persons per year (Schoenfeld et al., 2012)[1]. While conservative management suffices for many cases, severe symptoms or prolonged duration necessitate surgical intervention. Among the various approaches, anterior cervical discectomy (ACDF) has emerged as a focal point, although controversies persist regarding fusion (Kang et al., 2020)[2].

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Traditional techniques using autologous bone grafts have been associated with complications like graft collapse and morbidity at the donor site. To address these challenges, cervical cage implantation has gained traction over the last decade (Chung et al., 2016)[3].

Spinal cages play a pivotal role in cervical disc disease fusion, offering the potential to increase cervical foramina height and correct curvature. However, they pose challenges such as postoperative neck pain and complications like subsidence and migration (Veronesi et al., 2022)[4]. While titanium and carbon fiber cages have been utilized, they come with their own set of issues, including vertebral collapse and synovitis (Liao et al., 2008)[5]. In response to these limitations, the emergence of polyetheretherketone (PEEK) cages has sparked interest. PEEK, a semi-crystal polyaromatic linear polymer, boasts better elasticity and radiolucency, potentially offering a solution to the drawbacks associated with traditional cages (Peng et al., 2023)[6].

While both cage types find extensive use, PEEK cages stand out for their high fusion rates and ability to maintain cervical disc height (Li et al., 2016)[7].

Moreover, the incorporation of cervical plates has demonstrated increased fusion rates, further stimulating the debate on the optimal surgical approach in the region (Huang et al., 2021)[8]. Cervical disc disease surgeries have evolved significantly, from traditional techniques to the adoption of innovative materials like PEEK cages in Peshawar city of Pakistan. The transformative journey of patients undergoing ACDF with PEEK cages in Peshawar sheds light on the multidimensional aspects of their recovery.

METHODS

This retrospective study was conducted at Hayatabad Medical Complex (HMC) in Peshawar. The study spanned a duration of one year, from July 7, 2019, to July 7, 2020. Data was gathered about the post-operative problems that occurred in patients with cervical disc disease who had anterior cervical discectomy experienced.

A total of 43 patients who underwent single-level cervical discectomy and fusion with Peek cage were included in the study. The selection of participants was based on retrospective analysis of medical records during the specified time frame.

Inclusion and Exclusion Criteria: During the designated period of the current research study, we obtained complete data of only 43 patients out of 61 patients (70.49%). Only the 43 patients were included in the study with relevant information. The inclusion criteria of the study included:

1. Patients aged 18 years or older
2. Willingness and ability to provide informed consent for participation in the study.
3. Diagnosis of cervical radiculopathy or myelopathy attributed to degenerative changes of the cervical spine.

Exclusion criteria included:

1. Patients with active systemic infection or active local infection at the surgical site.
2. History of previous cervical spine surgery at the level of interest.
3. Presence of significant comorbidities that may affect surgical outcomes or compliance with study procedures.
4. Pregnancy or intent to become pregnant during the study period
5. Patients with severe osteoporosis or other bone metabolic disorders affecting bone quality.

Ethical Considerations: This study was conducted in accordance with ethical standards. Approval was obtained from the ethics committee at Hayatabad Medical Complex (HMC), and patient confidentiality was strictly maintained. Informed consent was obtained from patients for the use of their medical records in the study.

Statistical Analysis: Statistical analysis was performed using SPSS version 29. Descriptive statistics were used to summarize patient demographics and surgical outcomes. Pain scores were analyzed to assess the effectiveness of single-level cervical discectomy and fusion with Peek cage.

RESULTS

Thus, the current study involved forty-three patients. The ages of the patients ranging from 35 to 60 years while the mean age was calculated to be 45 years were considered in the study. The population of the present study comprised of 34 male subjects which constituted 79. 09 percent of the total subject sample while the females were 9 forming 20. 93 percent. The follow-up period chosen for the study was one week after the surgery.

Table No. 1: Distribution of Surgical Interventions Across Cervical Disc Levels

Gender	Age	Operated Discs	Preoperative VAS	Postoperative VAS	Improvement (%)
Male	45	C5-C6	8	2	75
Male	50	C4-C5	7	1	85
Male	55	C4-C5	9	3	67
Male	38	C5-C6	6	1	83
Male	42	C6-C7	7	2	71
Female	48	C5-C6	9	4	68
Male	60	C6-C7	8	3	63
Male	43	C1-C2	5	1	80
Male	39	C5-C6	6	2	67
Female	44	C6-C7	8	3	62
Male	37	C1-C2	7	1	85
Male	46	C5-C6	8	2	75
Male	53	C6-C7	9	3	67
Male	40	C5-C6	6	1	83
Male	35	C4-C5	7	2	71
Male	49	C3-C4	9	5	58
Male	54	C6-C7	8	3	63

Female	41	C4-C5	5	1	80
Male	38	C5-C6	6	2	67
Male	47	C3-C4	8	3	62
Male	36	C3-C4	7	1	85
Female	45	C5-C6	9	2	75
Male	50	C6-C7	9	3	67
Male	39	C6-C7	6	1	83
Male	42	C4-C5	7	2	71
Female	48	C3-C4	9	2	78
Male	58	C6-C7	8	3	63
Male	43	C4-C5	5	1	80
Male	39	C5-C6	6	2	67
Female	44	C6-C7	8	3	62
Female	37	C4-C5	7	1	85
Female	46	C1-C2	8	2	75
Male	53	C6-C7	9	3	67
Male	40	C5-C6	6	1	83
Male	35	C2-C3	7	2	71
Female	49	C5-C6	9	2	78
Male	54	C3-C4	8	3	63
Male	41	C4-C5	5	1	80
Male	38	C2-C3	6	2	67
Male	47	C6-C7	8	3	62
Male	36	C4-C5	7	1	85
Male	45	C5-C6	7	2	75
Male	50	C2-C3	9	3	67

Table No. 2: Distribution of Surgical Interventions Across Cervical Disc Ranges by Gender

Cervical discs range	Male	(%)	Female	(%)
C1-C2	02	5.88%	01	11.11%
C2-C3	03	8.82%	0	0
C3-C4	04	11.76%	01	11.11%
C4-C5	07	20.58%	02	22.22%
C5-C6	09	26.47%	03	33.33%
C6-C7	09	26.47%	02	22.22%
Total	34	100	09	100%

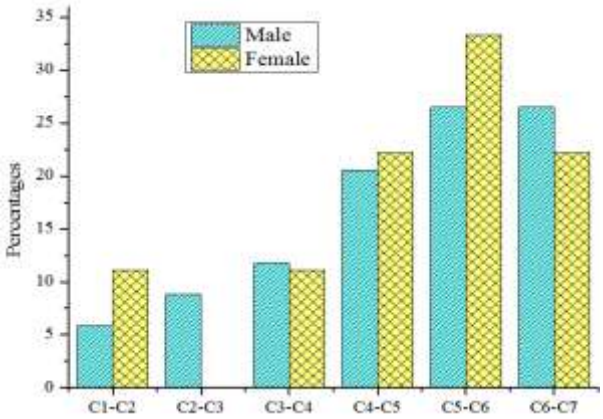

Figure No. 1: Graphical representation of prevalence of single level microdiscectomy in both male and females

It was also evident from the age distribution that the most affected age group in the male category, 34 in total, was the 35-45 years age group, with 20 patients (58. 82%). This was then succeeded by the age group of 46-55 years which comprised of 12 patients (35. 29%). Five patients were between 56-60 years accounting for 5. 88% of the patients. On the other hand, with regards to the gender, the distribution of the female patients was as follows. In the category of 35-45 years age group, 5 patients were found, which was 5. 55% of total patients. The 46-55 years age group was slightly under represented with only 4 patients (4. 44 %). Table No. 1 is the display of the data as follows:

DISCUSSION

The present study investigated the experience of pain relief in patients who underwent cervical disc and PEEK Cage fusion surgery in a tertiary care hospital,

Peshawar, Pakistan. The findings reveal significant improvements in pain relief postoperatively, with 90% of patients reporting a reduction in pain intensity one week after surgery. This substantial decrease in pain severity is evidenced by the mean change in Visual Analog Scale (VAS) scores, which showed an average reduction of approximately 5.07 points from baseline to one-week post-surgery. These results underscore the effectiveness of cervical disc and PEEK cage fusion surgery in alleviating pain symptoms in patients with cervical disc disorders.

While our study observed a mean age of 45 years among patients undergoing cervical disc and PEEK cage fusion surgery, Wadd et al. (2022)[9] reported a slightly higher mean age of 47.60 years for the PEEK cage group and 46.74 years for the Autologous bone graft group. Additionally, while our study comprised 79.09% male and 20.93% female patients, Wadd et al. (2022)[9] showed a lower proportion of male patients at 28.8% and a similar representation of female patients at 21.2% in the PEEK cage group. These variations highlight potential differences in patient demographics across different cohorts undergoing similar surgical interventions (Wadd et al., 2022)[9].

In contrast to our study, Junaid et al. (2018)[10] reported a larger cohort of 149 patients undergoing cervical fusion surgery, with a higher proportion of males (65.77%) compared to females (34.22%). While our study primarily focused on pain relief outcomes post-surgery, Junaid et al. (2018)[10] investigated a wider range of signs and symptoms, including axial neckache, brachialgia, myelopathy, and poor hand grip/numbness. They found brachialgia to be the most common complaint in both PEEK cage (60%) and titanium cage (48.8%) groups, followed by myelopathy. These findings suggest a broader spectrum of patient outcomes and surgical considerations compared to our study (Junaid et al., 2018)[10].

In comparison to the study by Faldini et al[11], our study included 43 patients undergoing anterior cervical discectomy and fusion (ACDF) using PEEK anatomical cages filled with allograft bone. Faldini et al[11] reported a higher proportion of male patients (88%) compared to females (12%), with a similar mean age of 42 years which is much similar to our findings. In terms of operative levels, our study found a distribution of 20% at C4–C5, 48% at C5–C6, and 32% at C6–C7, which aligns with the distribution reported by Faldini et al[11]. Regarding preoperative symptoms, radiculopathy was the predominant complaint in both studies, with the majority of patients experiencing relief postoperatively. The Visual Analog Scale (VAS) score improved significantly in both studies, indicating successful pain relief and functional improvement post-surgery. Furthermore, both studies reported no serious complications or adverse events during the follow-up period, with patients returning to light work within 4 weeks and resuming heavier work and sports within 2–3 months post-surgery. These similarities underscore the efficacy and safety of ACDF using PEEK anatomical cages filled with allograft bone as a treatment option for cervical disc herniation and spondylosis (Faldini et al., 2011)[11].

Some authors have included a larger number of subjects in their studies. For instance, In contrast to our study, Suess et al. (2017)[12], included 292 patients with complete data for final statistical analysis, while our study enrolled a only 43 patients. The distribution of male and female patients in our study was also in contrast to Suess et al[12], with slightly more men (55%) than women (45%). Regarding operative levels, both studies showed a higher prevalence of surgeries at C5/C6, followed by C4/C5 and C6/C7, although the specific percentages varied slightly between the two studies. Pain levels also showed improvement in both studies, with moderate to substantial pain preoperatively decreasing to mild to moderate levels by the 6-month follow-up and settling into the mild range at later follow-ups (Suess et al., 2017)[12].

The observed reduction in pain intensity is consistent with previous research demonstrating the efficacy of cervical disc fusion procedures in providing symptomatic relief for patients with cervical disc herniation or degenerative disc disease (Junaid et al., 2018; Suess et al., 2017)[10,12]. The fusion of cervical discs using P-CAGE implants has been shown to stabilize the spine, decompress neural structures, and restore disc height, thereby alleviating pressure on surrounding nerves and reducing pain. The significant improvement in pain relief observed in the current study aligns with these established benefits of cervical fusion surgery and further supports its clinical utility as a treatment option for cervical disc disorders.

While the results of this study are promising, several limitations should be acknowledged. Firstly, the study had a relatively small sample size, which may limit the generalizability of the findings. Future studies with larger sample sizes are warranted to confirm the observed results. Additionally, the follow-up period of one week may not capture the long-term outcomes of cervical fusion surgery. Longer-term follow-up studies are needed to assess the durability of pain relief and functional outcomes beyond the immediate postoperative period.

CONCLUSION

In conclusion, the findings of this study demonstrate significant improvements in pain relief following cervical disc and P-CAGE fusion surgery. These results underscore the effectiveness of cervical fusion procedures in alleviating pain symptoms in patients with cervical disc disorders. Further research with larger sample sizes and longer follow-up periods is needed to validate these findings and provide more

comprehensive insights into the long-term outcomes of cervical fusion surgery.

Author's Contribution:

Concept & Design of Study:	Sajid Ali
Drafting:	Arif Hussain
Data Analysis:	Arif Hussain
Revisiting Critically:	Sajid Ali,
Final Approval of version:	Sajid Ali

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