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# Patient-Centered outcomes and complication profiles of anterior versus posterior fixation in subaxial cervical facet dislocation: A comparative study.

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**ABSTRACT… Objective:** To compare anterior cervical discectomy and fusion (ACDF) and lateral mass screw (LMS) fixation for subaxial cervical facet dislocation such as complications, patient satisfaction, and recovery time. **Study Design:** Prospective Comparative study. **Setting:** Ghurki Trust Teaching Hospital. **Period:** March 2023 to December 2024. **Methods:** We prospectively analyzed 60 patients diagnosed with traumatic subaxial cervical facet dislocation and treated surgically. Based on the surgical approach, patients were divided into two groups: 32 underwent anterior cervical discectomy and fusion (ACDF) and 28 underwent lateral mass screw (LMS) fixation. Outcomes assessed included surgical complications, operative duration, hospital stay, time to return to work, postoperative pain (VAS), and patient satisfaction (Likert scale). **Results:** ACDF patients had significantly shorter operative times than LMS (88.20 ± 10.29 minutes vs. 102.14 ± 13.33 minutes, $p < 0.01$), a faster return to work (6.1 ± 1.4 weeks vs. 8.2 ± 1.9 weeks, $p < 0.01$).. Dysphagia was observed in 16% of patients in the ACDF group (5 out of 32), while hardware-related complications occurred in 7.1% of LMS cases (2 out of 28). **Conclusion:** ACDF shows superior outcomes in operative efficiency, early functional recovery, and patient-reported satisfaction, though with a higher risk of transient dysphagia. LMS remains a viable alternative when posterior stabilization is prioritized. These findings support a patient-centered approach in surgical decision-making.

**Key words:** Anterior Cervical Discectomy and Fusion, Cervical Trauma, Complication Profile, Lateral Mass Screw, Patient Satisfaction, Recovery Outcomes.

## INTRODUCTION

Subaxial cervical facet dislocations are serious injuries that are associated with spinal instability and neurological compromise, demanding rapid and efficient surgical intervention. The debate on whether to perform surgery from the anterior, posterior, or combined approach continues today, as each presents unique advantages and complications.[1-3] Due to its effective reduction and fusion, its less invasive approach with reduced blood loss and wound complication rates, and especially in cases with minimal posterior ligamentous injury or unilateral dislocation, anterior fixation has gained wide acceptance. However, it may be biomechanically and clinically insufficient in most bilateral facet injuries, posterior ligamentous disruption, or fractures, where construct failure and recurrent instability may reach a significantly high level, requiring additional posterior stabilization.[4-5]

However, posterior methods entail heavy blood loss and may predispose to wound complications.[6,7] The anterior-posterior strategies had been mostly combined for complex or old dislocations or when the initial reduction failed, considering the increased complication of surgery, but improved the stability of the construct. The systematic reviews and meta-analyses showed that satisfactory neurological and radiological outcomes can be obtained with anterior and posterior approaches without any specific preference regarding inferior neurologic recovery with one approach over the other. Patient and injury type selection was vital in guiding approach decisions.[7-9]

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This comparative study aims to clarify patient-centered outcome and complication profiles regarding anterior versus posterior fixation in subaxial cervical facet dislocation to make the best surgical decision possible with individualized care. These gaps will be filled by this comparative between ACDF and LMS fixation, focusing on outcomes entirely patient-centric. Evidence would then be brought to clinicians about complication profiles, efficacy of recovery, and experience regarding patient outcomes to help make informed surgical decisions.

## METHODS

This prospective comparative study was conducted at Ghurki Trust Teaching Hospital, Lahore, After Taking Ethical Approval FROM Hospital Ethical Committee (Ref. No.2023/03/R-15 Dated: 01 -03-2023) and included 60 patients through non-probability consecutive sampling technique who undergoing surgical management for traumatic subaxial cervical facet dislocation between March 2023 to December 2024. Informed consent was taken from each patients before conducting the study. Based on the surgical approach used, patients were divided into two groups: the anterior cervical discectomy and fusion (ACDF) group (n = 32) and the lateral mass screw (LMS) fixation group (n = 28). All patients were enrolled prospectively and followed for at least three months postoperatively.

Inclusion criteria were: patients aged 18 to 70 years with traumatic subaxial cervical facet dislocation involving levels C3–C7, presentation within 24 hours of injury, and availability for postoperative follow-up. Exclusion criteria included multilevel instability requiring a combined surgical approach, cervical facet fractures, previous cervical spine surgery, active infections, malignancy, or incomplete follow-up data.

### Surgical Intervention

In the ACDF group, patients were placed in a supine position under general anesthesia on a radiolucent table with the neck extended. A standard right-sided transverse incision was made using the Smith-Robinson anterior approach to the cervical spine. After dissecting and identifying the involved level under fluoroscopic guidance, complete discectomy was performed at the injured level. The posterior longitudinal ligament was incised as needed, and any disc fragments or loose bone pieces were removed to decompress the spinal canal. Reduction of facet dislocation was achieved by controlled distraction using Caspar pins and retraction, often with gentle traction. After confirming reduction, a tricortical iliac crest autograft (harvested from the same patient) was inserted into the disc space to promote fusion. Finally, an anterior cervical plate was secured with unicortical screws above and below the graft. Hemostasis was achieved, a drain was placed, and the wound was closed in layers. A Philadelphia collar was applied postoperatively and maintained for six weeks.

In the LMS group, patients were positioned prone on a radiolucent spinal table under general anesthesia. A midline posterior cervical incision was made, and subperiosteal dissection was performed to expose the lateral masses of the affected levels. After confirming the level with intraoperative fluoroscopy, the Margerl technique was used to insert lateral mass screws bilaterally into the appropriate vertebrae. The dislocated facets were reduced using a combination of manual manipulation and rod-based compression techniques. Rigid fixation was completed by connecting the screws with contoured rods and tightening the locking caps. Hemostasis was ensured, and the surgical site was irrigated. A drain was placed, and the wound was closed in layers. Postoperative immobilization with a cervical collar was recommended for 4–6 weeks based on individual patient factors. Outcomes were categorized into three domains: (1) complications, including dysphagia, wound infection, hardware failure, and screw malposition; (2) recovery, assessed by operative duration (in minutes), length of hospital stay (in days), and time to return to work (in weeks); and (3) patient experience, evaluated using the Visual Analog Scale (VAS) for pain 12 weeks week after surgery and a 5-point Likert scale for patient satisfaction.

All data were analyzed using SPSS version 27.

Continuous variables were expressed as means ± standard deviations, and categorical variables as frequencies and percentages. Independent t-tests were used for comparing continuous variables, and chi-square tests were applied for categorical data. A p-value of less than 0.05 was considered statistically significant.

## RESULTS

The study included a total of 60 patients, with 32 patients in the anterior cervical discectomy and fusion (ACDF) group and 28 patients in the lateral mass screw (LMS) fixation group. The mean age in the LMS group was 39 ± 17.0 years, while in the ACDF group, it was 34.8 ± 11.5 years. Male patients predominated in both groups, accounting for 75% in the LMS group and 79% in the ACDF group.

Dysphagia was reported in 16% of patients in the ACDF group, while none was observed in the LMS group, showing a statistically significant difference ($p < 0.05$). Hardware-related complications occurred in 7.1% of the LMS group but were absent in the ACDF group ($p < 0.05$). The operative time was significantly longer in the LMS group (102.14 ± 13.33 minutes) compared to the ACDF group (88.20 ± 10.29 minutes), with a p-value of $< 0.01$. Hospital stay duration was comparable between the groups (4.5 ± 1.1 days for LMS vs. 4.2 ± 1.3 days for ACDF; $p = 0.3424$). Patients in the ACDF group returned to work earlier (6.1 ± 1.4 weeks) than those in the LMS group (8.2 ± 1.9 weeks), and this difference was statistically significant ($p < 0.01$). Pain scores measured by VAS at one week postoperatively were not significantly different between groups ($p = 0.295$). However, patient satisfaction was higher in the ACDF group (4.3 ± 0.6) compared to the LMS group (3.6 ± 0.8), which was statistically significant ($p < 0.01$).

## DISCUSSION

This study sheds light on the comparative effectiveness and complication profiles of anterior (ACDF) versus posterior (LMS) fixation in subaxial cervical facet dislocation. The findings align with recent systematic reviews and cohort studies, suggesting that both anterior and posterior approaches can achieve satisfactory neurological and radiological outcomes, with no clear superiority in neurological recovery, but with distinct complication patterns and patient experiences.[11-12] The anterior approach demonstrated shorter operative times, faster return to work, higher patient satisfaction, and a lower risk of hardware complications. Still, it was associated with a higher incidence of transient dysphagia.[13] In contrast, posterior fixation had a higher rate of hardware-related complications and longer recovery times, consistent with literature noting increased blood loss and wound complications in posterior surgeries.[14] Notably, anterior-alone fixation may be insufficient in cases of bilateral facet dislocation or significant posterior ligamentous injury, where construct failure risk is elevated and a combined approach may be warranted.[15,16] Patient selection based on injury pattern and comorbidities remains crucial, as anterior approaches are particularly suitable for unilateral dislocations or cases with minimal posterior ligamentous disruption. In contrast, posterior or combined approaches are preferable for complex or bilateral injuries.[16,17]

| Parameter | ACDF Group (n=32) | LMS Group (n=28) | P-Value |
|---|---|---|---|
| Dysphagia | 16% | 0% | < 0.05 |
| Hardware Complications | 0% | 7.1% | < 0.05 |
| Operative Time (min) | 88.20 ± 10.29 | 102.14 ± 13.33 | < 0.01 |
| Hospital Stay (days) | 4.2 ± 1.3 | 4.5 ± 1.1 | 0.3424 |
| Return to Work (weeks) | 6.1 ± 1.4 | 8.2 ± 1.9 | < 0.01 |
| VAS Pain at 1 Week | 3.8 ± 1.0 | 4.1 ± 1.2 | 0.295 |
| Satisfaction Score (1–5) | 4.3 ± 0.6 | 3.6 ± 0.8 | < 0.01 |

**Table-I. Comparison of postoperative outcomes between ACDF and LMS groups**

Our findings are consistent with previously published data comparing anterior and posterior approaches in subaxial cervical spine surgery. In a similar surgical risk analysis, anterior procedures demonstrated significantly shorter operative times (147.2 vs. 210 minutes, $p < 0.001$), lower estimated blood loss (79.7 vs. 200 ml, $p < 0.001$), and fewer instrumented segments (mean 1 vs. 2.9, $p < 0.001$) than posterior surgeries. In our cohort, operative duration was also significantly shorter in the anterior cervical discectomy and fusion (ACDF) group compared to the lateral mass screw (LMS) group (88 ± 10 vs. 102 ± 13 minutes, $p < 0.01$), reinforcing the trend toward greater procedural efficiency with anterior fixation. The previous study also reported a more extended hospital stay and time from surgery to discharge in posterior cases. This mirrors our findings wherein LMS patients had delayed functional recovery (8.2 vs. 6.1 weeks, $p < 0.01$) and lower satisfaction scores.[18]

Regarding operative time, our study demonstrated that ACDF procedures were significantly shorter, averaging 88 ± 10 minutes compared to 102 ± 13 minutes in the LMS group. This trend aligns with the findings of Lee and Wong (2021) that nonunion was not observed. A malpositioned plate was removed after fusion in 0.86% of unilateral facet dislocations (1 out of 116) with insufficient reduction because of facet fragments between the facet joints. There were no new neurological deficits found. Failures requiring additional posterior reduction surgery were not observed in cases that received anterior open reduction. One study ($N = 52$) on elderly dislocation limited the anterior-alone technique to cases with persisting instability and included partial corpectomy in their method.[19]

A notable complication observed in our study was dysphagia in the ACDF group, affecting 16% of patients. This transient postoperative symptom is well documented in the literature, with Lee and Wong (2021) reporting a dysphagia incidence of 15–25% following anterior cervical surgeries.[19] Yoshihara et al. (2013) similarly reported dysphagia in up to 22% of ACDF patients, attributing it to soft tissue retraction during anterior exposure. Conversely, no patients in the LMS group experienced dysphagia, which reinforces the idea that posterior approaches may be better tolerated in terms of soft tissue complications involving the esophagus or trachea.[20]

Regarding postoperative recovery, patients treated with ACDF in our cohort returned to work notably earlier than those who underwent LMS fixation (6.1 ± 1.4 weeks vs. 8.2 ± 1.9 weeks, $p < 0.01$). This observation echoes the findings of Botelho et al. (2022), who highlighted quicker recovery and earlier return to daily activities following anterior approaches. Although pain scores on the Visual Analog Scale (VAS) at one week postoperatively were not significantly different between the two groups (3.8 in ACDF vs. 4.1 in LMS), patient-reported satisfaction was considerably higher in the ACDF group (4.3 vs. 3.6 on a 5-point Likert scale, $p < 0.01$). This suggests that patient-perceived recovery may not correlate strictly with pain scores alone but is influenced by broader parameters, including mobility, return to function, and aesthetic or psychosocial factors.[21]

Another study's findings indicate the incidence of complications as 4.14% among patients undergoing ACDF and 15.35% among patients undergoing other procedures, respectively.

On the other hand, hardware-related complications were exclusive to the LMS group in our series, with 7.1% of patients experiencing issues such as screw loosening or misplacement. These rates are comparable to those reported by Park et al. (2015), who found hardware complications in up to 6% of patients undergoing posterior fixation. Such complications are likely related to deeper muscular dissection, complex visualization of lateral mass anatomy, and variability in screw angulation. Although posterior constructs offer excellent mechanical stability—especially in complex or bilateral dislocations—they may also carry a greater risk of instrumentation-related morbidity.[22]

## LIMITATIONS

This study is limited by its single-center design, which may reduce the generalizability of findings

across diverse clinical settings. The sample size of 60 patients, while adequate for initial comparisons, may lack power to detect rare complications. The three month follow-up period may miss long-term outcomes like fusion failure or adjacent segment disease. Subjective measures, such as pain and satisfaction, are prone to bias from individual expectations. Non-randomized group allocation risks selection bias, and the lack of standardized quality-of-life metrics limits comprehensive outcome assessment. Variations in injury patterns were not fully stratified, potentially affecting results. Future research should address these issues with larger, multicenter, randomized studies and extended follow-up.

## CONCLUSION

ACDF and LMS both remain valid techniques for managing subaxial cervical facet dislocation. However, ACDF offers advantages in operative efficiency, quicker return to function, and greater patient satisfaction—albeit with a higher risk of transient dysphagia. A patient-specific surgical plan, prioritizing individual recovery goals and complication risks, is essential for optimal outcomes.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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