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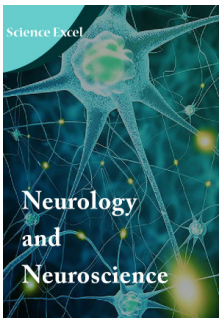

Return to Work and Functional Outcomes After Cervical Spine Surgery: A Retrospective Analysis of 76 Patients

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Cervical spine surgery; Return to work; Functional outcome; Anterior cervical arthrodesis; Posterior cervical arthrodesis; Postoperative complications.

Abstract

Introduction: *Cervical spine diseases such as radiculopathy and myelopathy are common and may cause neurological deficits and functional limitation. Surgery is indicated when conservative treatment fails, with various techniques depending on the severity and extent of compression. Although return to work is a relevant clinical outcome, it is underreported in the literature, especially in mixed populations. Objective: To evaluate the functional outcomes of patients undergoing cervical arthrodesis, with emphasis on return to work. Clinical, surgical, and postoperative factors related to recovery were analyzed.* ***Methods:*** *Retrospective study with 76 patients operated between January 2023 and December 2024. Demographic, clinical, surgical, and follow-up data were collected. Outcomes included return to work, opioid use, neurological complications, dysphagia, and pain (VAS). Statistical analysis included multivariate logistic regression.* ***Results:*** *The mean age was 55 years; 57% returned to work and 43% did not. Factors associated with failure to return included preoperative myelopathy (p=0.0013), opioid use (p=0.015), number of operated levels (p=0.0063), and multiple surgeries (p=0.0073). Dysphagia occurred in 7.8% and reversible neurological deficits in 5.26%.* ***Discussion:*** *The findings confirm that factors such as myelopathy, multilevel surgeries, and prolonged opioid use negatively influence functional outcomes. Return-to-work rates are consistent with the literature but tend to be lower in complex cases. Dysphagia was more frequent in surgeries involving anterior plating or combined approaches. Despite the absence of standardized preoperative functional scores, the data reinforce the importance of surgical planning and strict postoperative management.* ***Conclusion:*** *Return to work was observed in just over half of the patients. Factors such as prior myelopathy, surgical complexity, and opioid use negatively influenced recovery. Careful preoperative assessment and structured rehabilitation strategies are essential to optimize outcomes.*

Introduction

Cervical spine disorders, including radiculopathy and myelopathy, are prevalent and can cause significant neurological deficits and functional impairment. When conservative treatment fails and there is severe spinal cord or nerve root compression, surgical intervention becomes necessary. The choice of approach—anterior, posterior, or combined 360-degree—depends on anatomical and clinical factors [1–3].

Although the technical goals of surgery are well established, clinical outcomes must be assessed using objective and reproducible parameters. Return to work is a practical and measurable marker of functional recovery and independence [4]. However, this outcome remains underreported, especially in series that include both myelopathy and radiculopathy [5].

Moreover, the relationship between return to work and variables such as surgical approach, number of operated levels, reoperations, and postoperative opioid use has not been fully defined [6–8]. This study aims to analyze a cohort of 76 patients undergoing cervical arthrodesis, assessing complications, functional recovery, and factors associated with return to work.

Objective

To evaluate the functional outcomes after cervical spine surgery, with emphasis on return to work as the primary outcome. We aimed to investigate the influence of clinical diagnosis, type of surgical approach, and perioperative events on real-world functional recovery.

Methods

This retrospective study included 76 consecutive patients who underwent cervical spine surgery between January 2023 and

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December 2024, operated on by a single team in a tertiary hospital. Indications included radiculopathy, myelopathy, or both. Exclusion criteria were trauma, infection, or spinal tumors.

Collected variables included demographics, sex, smoking status, diagnosis, surgical approach (anterior, posterior, or 360°), number of operated levels, implant type (cage, plate/screw), corpectomy, reoperations, and outcomes (return to work/daily activities, opioid use, new neurological deficit, dysphagia, and postoperative pain - VAS). Chi-square test, Fisher's exact test, and multivariate logistic regression were used. Statistical significance was set at $p<0.05$.

Results

A total of 76 patients undergoing cervical arthrodesis were evaluated between January 2023 and December 2024. Most patients were female (49 women and 27 men), with a mean age of 55 years. Only 6.57% of patients were active smokers at the time of surgery.

Regarding clinical presentation, isolated radiculopathy was the most common diagnosis, present in 64.4% of cases. Isolated myelopathy was observed in 18.42% of patients, while 16.3% presented with mixed symptoms of radiculopathy and myelopathy (Table 1).

The predominant surgical approach was anterior, performed in 73.8% of cases (Figure 1). The posterior approach was used in 13.15% of patients, while the 360-degree combined approach was indicated in 9.2% (Figure 2). Regarding the number of operated levels, 35.5% of patients underwent single-level arthrodesis, 52.6% two levels, 6.5% three levels, and 5.2% four or more levels. Reoperations were necessary in 11.8% of cases, with one patient (1.3%) undergoing three distinct surgeries at the same segment (Table 2).

Table 1. *Demographics And Clinical Presentation*

	Variable	Number of Patients	Percentage (%)
1	Female sex	49	64,5%
2	Male sex	27	35,5%
3	Active smokers	5	6,57%
4	Radiculopathy	49	64,4%
5	Myelopathy	14	18,42%
6	Radiculopathy + Myelopathy	13	16,3%

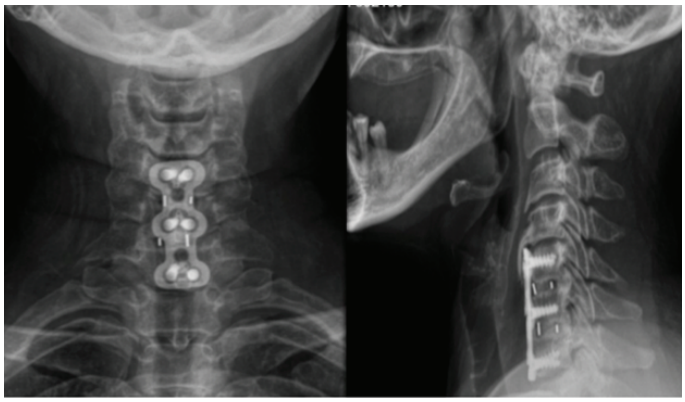

Figure 1. *Cervical spine X-rays in anteroposterior (left) and lateral (right) views showing anterior cervical arthrodesis with plate and screws.*

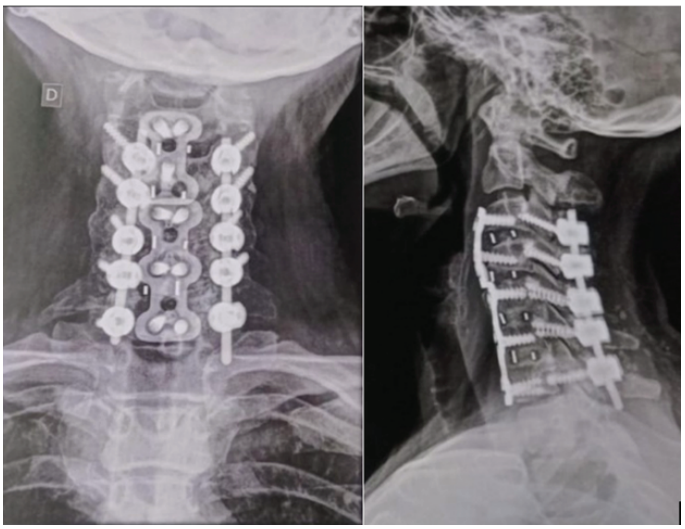

Figure 2. *Cervical spine X-rays in anteroposterior (left) and lateral (right) views showing combined anterior and posterior instrumentation, characteristic of a 360-degree approach.*

Table 2. *Surgical Characteristics*

	Variable	Number of Patients	Percentage (%)
1	Anterior approach	59	73,8%
2	Posterior approach	10	13,15%
3	360-degree approach	7	9,2%
4	1 level operated	27	35,5%
5	2 levels operated	40	52,6%
6	3 levels operated	5	6,5%
7	z4 levels operated	4	5,2%
8	Reoperations	9	11,8%
9	Three surgeries	1	1,3%

Table 3. *Surgical Characteristics*

	Category	Number of Patients	Percentage (%)
1	Returned to work	44	57%
2	Did not return to work	32	43%
3	With myelopathy among non-returners	17	53% dos nao retornaram
4	With multiple surgeries among non-returners	8	25% dos nao retornaram

During follow-up, 57% of patients returned to work or routine activities. Among the 43% who did not return, 17 had preoperative myelopathy and 8 had undergone multiple surgeries (Table 3).

Statistical analysis revealed a significant association between failure to return to work and the following variables:

Table 4. *Associations With Non-Return*

	Associated Factor	p-value
1	Postoperative opioid use	0.015
2	Preoperative myelopathy	0.0013
3	Number of operated levels	0.0063
4	Multiple surgeries	0.0073

Table 5. *Complications And Pain*

	Complication	Number of Patients	Percentage (%)
1	Transient neurological deficit	4	5.26%
2	Dysphagia	6	7.8%
3	Persistent dysphagia	1	1.3%
4	Median VAS score (pain)	-	3

postoperative opioid use (p = 0.015), presence of preoperative myelopathy (p = 0.0013), number of operated levels (p = 0.0063), and reoperations (p = 0.0073) (Table 4).

Postoperative complications included transient neurological deficits in 5.26% of patients, all of which resolved completely. Dysphagia was observed in 7.8% of patients, with only one case of persistent symptoms at follow-up. Postoperative pain assessed by the Visual Analog Scale (VAS) had a median score of 3, indicating moderate clinical improvement in most cases (Table 5).

Discussion

The results of this study confirm that return to work after cervical spine surgery is influenced by multiple factors, particularly the presence of myelopathy and surgical complexity. Previous studies reported return-to-work rates ranging from 60% to 75% after anterior cervical discectomy with fusion (ACDF), especially among economically active patients [1,2,11]. Skolasky et al. observed a 67% return-to-work rate one year after ACDF, with lower rates among patients with myelopathy [1]. Similarly, our study found that 43% of patients who did not return to work had preoperative myelopathy.

Surgical complexity also negatively impacts outcomes. Patients who underwent three or more level surgeries had greater likelihood of functional limitations, with a statistical trend observed (p=0.0866). This finding aligns with Shamji et al., who showed that extensive surgery, longer operative time, and tissue manipulation increase complications and delay recovery [3]. Similar results were described by Joaquim et al. (2020), who reported greater morbidity in multilevel cervical surgeries [12].

Postoperative opioid use was significantly associated with failure to return to function. Devin et al. demonstrated that preoperative opioid use correlates with worse self-reported outcomes after spine surgery [4,10]. More recent studies, such as Cancienne et al. (2018), reinforce that prolonged opioid use is linked to lower return-to-work rates and greater dissatisfaction with surgical results [13].

Neurological complications were rare and reversible (5.26%), consistent with the literature. Smith et al. observed higher risk of neurological complications in 360° fusions due to surgical extent and exposure time [5]. Recent studies such as Badhiwala et al. (2020) highlight the importance of intraoperative neurophysiological monitoring (IONM) in complex cases, though its direct impact on outcomes remains debated [14].

Dysphagia occurred in 7.8% of cases, generally transient. Studies indicate that anterior plates may increase dysphagia risk, especially in multilevel approaches [6,9,15]. Only one patient in this study had persistent dysphagia. Recently, Anderson et al. (2021) reported that zero-profile spacers significantly reduce dysphagia rates, underscoring the importance of implant selection [16].

The absence of standardized preoperative functional scores is a limitation common in retrospective studies. Selective use of IONM in 19 patients also limits analysis of its efficacy, though its application followed consistent clinical criteria and current guidelines [7,8,14].

Conclusion

In this study, 57% of patients returned to activities following cervical arthrodesis. Postoperative opioid use, preoperative myelopathy, multiple operated levels, and reoperations had a negative impact on functional recovery. These findings reinforce the importance of preoperative assessment and personalized rehabilitation strategies. Prospective studies are needed to validate and refine the evidence presented here.

Conflict of Interests

The authors have no conflict of interests to declare

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