



Rehabilitation Outcomes in Patients with Cervical Spondylosis Receiving Intermittent versus Continuous Cervical Traction: A Prospective Observational Study

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ABSTRACT

Background: Cervical spondylosis is a prevalent degenerative spinal condition characterized by chronic neck pain, limited mobility, and functional disability. Cervical traction, administered either intermittently or continuously, is commonly employed in conservative management. However, evidence comparing these two modalities remains limited.

Aim: To compare the rehabilitation outcomes of intermittent versus continuous cervical traction in patients with cervical spondylosis.

Methodology: A prospective observational study was conducted on 50 patients diagnosed with cervical spondylosis. Participants were divided into two groups based on the traction method: intermittent (Group A, n=25) and continuous (Group B, n=25). All participants received standard physiotherapy alongside traction therapy for 2 weeks. Outcomes assessed included pain (Visual Analog Scale), functional disability (Neck Disability Index), cervical range of motion (goniometric measurement), and patient satisfaction (Patient Global Impression of Change). Assessments were performed at baseline (T0), post-treatment (T1), and 4-week follow-up (T2). Statistical analysis was conducted using SPSS v26, with significance set at $p < 0.05$.

Results: Both groups showed significant improvements over time in pain, disability, and range of motion ($p < 0.001$). However, Group A (intermittent traction) demonstrated significantly greater improvements in VAS and NDI scores at T1 and T2 ($p < 0.05$). Cervical ROM and PGIC scores were also significantly better in Group A at follow-up.

Conclusion: Intermittent cervical traction resulted in superior short-term rehabilitation outcomes compared to continuous traction in patients with cervical spondylosis. It should be considered the preferred modality in clinical rehabilitation protocols.

Keywords: Cervical vertebrae, Spondylosis, Traction, Physical therapy modalities, Rehabilitation.

INTRODUCTION

Cervical spondylosis, a degenerative condition of the cervical spine, commonly manifests as neck pain, reduced range of motion (ROM), and neurological symptoms from nerve compression. A widely used nonoperative intervention is cervical traction, which aims to decompress neural structures, stretch soft tissues, and alleviate pain (1,2). Traction can be delivered in two primary modes: continuous (sustained) or intermittent, each offering distinct physiological effects.

Continuous traction provides sustained spinal distraction, potentially reducing muscle guarding and decompressing facet joints (3). Intermittent traction, on the other hand, delivers rhythmic cycles of traction and release, which is believed to enhance blood flow, reduce spasm, and create a “massage-like” effect (3, 4).

Evidence comparing these modes is mixed. In one randomized controlled trial among patients with cervical radiculopathy, both manual and mechanical intermittent traction combined with conventional rehabilitation yielded greater reductions in neck and radicular pain and improved disability compared to rehabilitation

alone—effects persisted through six months (5). Similarly, a prospective study of mechanical intermittent cervical traction in radiculopathy reported that over half the patients achieved complete pain resolution when symptoms were recent (< 12 weeks) (6).

A meta-analysis of randomized controlled trials found that intermittent cervical traction provided significant short-term pain relief immediately after treatment (standardized mean difference ≈ -0.26 ; 95% CI, -0.46 to -0.07), though the longer-term benefits and impacts on disability were less conclusive (7). These findings were echoed in broader reviews, which concluded that while some evidence suggests moderate benefit for intermittent traction, the overall quality of evidence across both modes remains low, and continuous traction has even weaker support (8, 9).

In patients with chronic mechanical neck pain, a comparative study found that both continuous and intermittent traction led to improvements in pain, disability, and cervical mobility—but intermittent traction demonstrated superior reductions in pain severity and better coronal mobility improvements (10).

Conversely, isolated single-session studies looking at immediate ROM changes in cervical spondylosis found that sustained traction improved flexion and extension more than intermittent traction, though effects were short-lived and limited to immediate post-treatment measurements (11).

Clinical practice guidelines remain cautious. A recent review states that mechanical traction, whether intermittent or continuous, shows insufficient high-quality evidence for long-term effectiveness in reducing pain or improving function, underscoring the need for rigorous trials (12).

There is also suggestive evidence that the dosage and positioning of traction (e.g., supine vs seated, traction load) influence outcomes. One RCT demonstrated that supine application of intermittent traction resulted in significantly better disability outcomes than sitting position in chronic radiculopathy (13). Moreover, higher traction loads (e.g., 8, 12 kg) in multimodal rehabilitation approaches produced greater improvements in pain and quality of life in cervicogenic headache and radiculopathy populations (14).

Despite this, clinical consensus prioritizes multimodal rehabilitation, combining traction with exercises, manual therapy, and modalities to optimize outcomes (15). Repetitive mobilizing forces—such as those delivered by intermittent traction—appear to complement exercise-based strategies, especially in restoring ROM and reducing disability (16).

Still, many studies are limited by small sample sizes, heterogeneity of protocols, and short follow-up. High-quality prospective comparisons between continuous and intermittent traction in cervical spondylosis populations remain sparse.

Therefore, we designed this prospective observational study to evaluate rehabilitation outcomes in patients with cervical spondylosis receiving intermittent versus continuous cervical traction. We aim to assess pain intensity, functional disability, and cervical ROM across treatment trajectories. This study will contribute valuable comparative data to guide optimal traction modality selection in rehabilitation protocols for cervical spondylosis.

MATERIALS AND METHODS

This was a prospective observational study conducted in the Department of Physical Medicine and Rehabilitation at Nalanda Medical College and Hospital, Bihar, over a period of six months from Oct 2024 to March 2025. The study was approved by the Institutional Ethics Committee and conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants prior to inclusion.

A total of 50 patients diagnosed with cervical spondylosis were enrolled using purposive sampling. Patients were allocated into two groups based on the type of cervical traction administered as part of their routine rehabilitation program

Group A (n=25): Intermittent cervical traction

Group B (n=25): Continuous cervical traction

The traction method was selected by the treating clinician, and the study remained observational in nature, without intervention by the investigators in the allocation process.

Inclusion Criteria

Age between 50 and 65 years. Clinical and radiographic diagnosis of cervical spondylosis. Presence of neck pain, with or without radiculopathy. Symptom duration of ≥ 4 weeks. Willingness to comply with the treatment protocol and follow-up assessments

Exclusion Criteria

History of cervical spine surgery. Presence of red flag signs (e.g., infection, tumor, fracture, myelopathy). Severe osteoporosis, inflammatory arthritis, or other systemic disease affecting the spine. Pregnancy. Known hypersensitivity or intolerance to traction therapy. Involvement in other clinical trials during the study period.

Intervention and Rehabilitation Protocol

All patients underwent a standardized physiotherapy program consisting of

- Hot moist packs (15 minutes/session)
- Cervical isometric and active ROM exercises
- Postural correction and ergonomic advice

In addition, the patients received either intermittent or continuous cervical traction using a calibrated mechanical traction unit in a supine position with the neck in approximately 25° flexion

Intermittent Traction

Cycle time of 15 sec on / 10 sec off, for 15 minutes, with a force of 10–15% of body weight

Continuous Traction

Sustained force at 10–15% of body weight for 15 minutes
Both groups received traction therapy 5 sessions per week for 2 weeks (total 10 sessions).

Data were collected at three time points

- Baseline (T0): Prior to the first session
- Post-treatment (T1): After completion of 10 sessions
- Follow-up (T2): 4 weeks after treatment completion

The following outcome measures were used

Neck pain intensity – Measured using a 10-point Visual Analog Scale (VAS)

Neck disability index (NDI) – Validated self-reported questionnaire assessing functional impairment

Cervical range of motion (ROM) – Measured using a goniometer (flexion, extension, lateral flexion, and rotation)

Patient global impression of change (PGIC) – Assessed at T1 and T2

All assessments were performed by a trained physiotherapist blinded to the type of traction administered.

Statistical Analysis: Data were analyzed using SPSS Statistics for Windows, Version 20.0. Continuous variables were presented as mean \pm standard deviation (SD), and categorical variables as frequency and percentage. Within-group comparisons were performed using the paired t-test. Between-group comparisons were analyzed using the independent t-test. A *p*-value < 0.05 was considered statistically significant.

Table 1: Baseline demographic and clinical characteristics

Variable	Group A (Intermittent)	Group B (Continuous)	p-value
Age (years), mean \pm SD	58.4 \pm 8.4	59.6 \pm 9.1	0.76
Gender (M/F)	12 / 13	11 / 14	0.78
Symptom duration (weeks)	10.3 \pm 3.2	9.8 \pm 3.7	0.55
Baseline VAS (0–10)	7.2 \pm 1.1	7.0 \pm 1.3	0.60
Baseline NDI (%)	44.6 \pm 8.9	45.3 \pm 9.2	0.74
Baseline ROM – Flexion ($^{\circ}$)	38.5 \pm 6.2	39.1 \pm 6.6	0.68

Table 2: Changes in VAS and NDI over time within and between groups

Outcome	Timepoint	Group A (Mean \pm SD)	Group B (Mean \pm SD)	p-value (Between groups)
VAS	T0	7.2 \pm 1.1	7.0 \pm 1.3	0.60
	T1	3.6 \pm 1.0	4.5 \pm 1.2	0.02*
	T2	2.8 \pm 0.9	3.9 \pm 1.1	0.01*
NDI (%)	T0	44.6 \pm 8.9	45.3 \pm 9.2	0.74
	T1	27.1 \pm 7.5	31.3 \pm 7.9	0.04*
	T2	22.5 \pm 6.8	28.6 \pm 7.4	0.01*

*Significant at $p < 0.05$

Table 3: Cervical Range of Motion (ROM) Improvements Over Time

Movement	Timepoint	Group A (Mean \pm SD)	Group B (Mean \pm SD)	p-value
Flexion ($^{\circ}$)	T0	38.5 \pm 6.2	39.1 \pm 6.6	0.68
	T2	51.2 \pm 5.8	46.3 \pm 6.1	0.01*
Extension ($^{\circ}$)	T0	33.2 \pm 5.9	32.8 \pm 5.6	0.77
	T2	43.6 \pm 6.3	39.9 \pm 6.0	0.02*
Lateral Flexion ($^{\circ}$)	T0	28.5 \pm 4.4	28.2 \pm 4.7	0.81
	T2	36.9 \pm 4.8	34.0 \pm 5.1	0.03*

*Significant at $p < 0.05$

Table 4: Patient global impression of change (PGIC) at Follow-up (T2)

PGIC category	Group A (n=25)	Group B (n=25)	p-value
Very much improved	14 (56%)	8 (32%)	0.04*
Much improved	7 (28%)	9 (36%)	
Minimally improved	3 (12%)	5 (20%)	
No change or worse	1 (4%)	3 (12%)	
Total improved (top 2)	21 (84%)	17 (68%)	

*Significant at $p < 0.05$

RESULTS

A total of 50 patients were enrolled and completed the study: 25 in the Intermittent Traction group (Group A) and 25 in the Continuous Traction group (Group B). The groups were comparable in demographic and baseline clinical characteristics.

Table 1 shows no statistically significant difference between the two groups in terms of age, gender distribution, symptom duration, or baseline outcome measures, confirming the groups were comparable at the start of the study ($p > 0.05$ for all variables).

Both groups showed statistically significant improvements in pain (VAS) and disability (NDI) over time (within-group $p < 0.001$). However, Group A (intermittent traction) demonstrated significantly greater reductions in both VAS and NDI scores compared to Group B at T1 and T2 ($p < 0.05$), indicating superior early and sustained pain relief and functional improvement.

Table 3 illustrates improvements in cervical ROM for both groups, with statistically greater improvements in Group A (intermittent traction) across all movements, especially in flexion

and extension at T2. This suggests intermittent traction may facilitate superior mechanical decompression and joint mobilization.

At follow-up, 84% of Group A patients rated themselves as “very much” or “much improved,” compared to 68% in Group B. This difference was statistically significant ($p = 0.04$), further supporting the effectiveness of intermittent traction in producing better patient-perceived recovery.

DISCUSSION

This prospective observational study aimed to compare the effects of intermittent and continuous cervical traction on rehabilitation outcomes in patients with cervical spondylosis. Key outcomes included pain reduction (VAS), functional disability (NDI), cervical range of motion (ROM), and patient satisfaction (PGIC). The findings demonstrate that both traction modalities significantly improved symptoms; however, **intermittent traction produced superior outcomes** across most clinical measures.

Pain Relief and Functional Improvement

Pain reduction is a primary goal in managing cervical spondylosis. Both groups in this study experienced significant reductions in VAS scores from baseline to post-treatment and follow-up, which is consistent with earlier studies emphasizing the analgesic benefits of cervical traction (1,2). However, patients receiving intermittent traction showed greater reductions in pain at both post-treatment and follow-up time points, with a statistically significant difference between the two groups. This supports findings from Jellad *et al.*, who reported that intermittent traction, when combined with conventional therapy, leads to significant pain reduction in patients with cervical radiculopathy (5).

The mechanism for this superiority may lie in the dynamic mechanical decompression and cyclic stretching of soft tissues provided by intermittent traction, which promotes vascular flow and reduces nociceptive stimuli (3,4). Continuous traction, while beneficial, may lead to sustained muscle guarding and less adaptive tissue response, potentially limiting its efficacy over time (6).

The NDI scores mirrored the pain outcomes, with greater functional improvement in the intermittent group. This aligns with prior research that shows better disability outcomes with intermittent over continuous traction, particularly in patients with chronic mechanical neck pain (10). The enhanced functional gains likely reflect improved pain modulation and increased mobility, enabling greater participation in rehabilitation activities.

Cervical ROM is frequently impaired in spondylosis due to facet joint degeneration, muscle stiffness, and neural tension (1). Our study found significant improvements in ROM in both groups, but flexion, extension, and lateral flexion improved more in the intermittent traction group by the end of follow-up. This may be attributed to the rhythmic loading and unloading pattern of intermittent traction, which may reduce joint adhesions and enhance flexibility (3,4).

These results are supported by Paungmali *et al.*, who found that intermittent traction significantly improved cervical ROM in symptomatic patients, even after a single session (11). In contrast, continuous traction—while potentially effective in decompressing spinal structures—may not provide the same degree of dynamic stretch to peri-articular tissues and muscles, leading to relatively lesser gains in motion (12).

Subjective improvement, as measured by the **PGIC scale**, was also higher in the intermittent traction group. A greater proportion of patients reported being “very much improved” or “much improved” at the 4-week follow-up, which was statistically significant. This is clinically relevant, as patient-reported outcomes often guide real-world treatment decisions and reflect overall satisfaction (15). The PGIC results strengthen the clinical utility of intermittent traction in enhancing not only measurable outcomes but also perceived quality of recovery.

Multiple studies have attempted to evaluate the relative efficacy of different cervical traction modalities. A Cochrane review by Graham *et al.* concluded that evidence supporting mechanical traction (either form) was limited and inconsistent due to methodological heterogeneity and short-term follow-up (7). However, our study adds to a growing body of literature that suggests intermittent traction may provide more consistent short-term benefits, especially in patients with mechanical symptoms and no severe neurological deficits (6,8,10).

Further, Rezasoltani *et al.* demonstrated that patient positioning during intermittent traction (e.g., supine vs. seated) significantly affects outcomes, with supine traction yielding better results due to greater muscle relaxation and improved alignment (13). Our study followed the supine protocol for both groups, thereby controlling for positional variability and strengthening the validity of the comparison.

In terms of traction intensity and duration, our protocol was standardized at 10–15% of body weight over 15 minutes per session for 10 sessions, aligning with previous trials showing efficacy with similar parameters (14). This dosage appears both clinically effective and well-tolerated, as no adverse effects or dropouts were reported.

Physiological Rationale for Intermittent Traction Superiority

The physiological benefits of intermittent traction may be explained by its cyclic loading pattern, which mimics natural movement and encourages muscle relaxation, increased circulation, and joint distraction without prolonged tension. This pattern likely reduces neural sensitivity and promotes synovial fluid distribution, thus improving function and mobility (4,6). Continuous traction, while maintaining spinal alignment and reducing nerve compression, may contribute to static muscle loading and potential discomfort over time (3,9).

Additionally, the neuromuscular adaptations to intermittent forces may include improved proprioception and spinal segmental mobility, enhancing long-term therapeutic gains when integrated with exercise and manual therapy (15,16).

The findings have practical implications for physiotherapists and rehabilitation professionals managing cervical spondylosis. Intermittent cervical traction should be preferred when the goal is early symptom relief, faster functional recovery, and improved patient satisfaction. Moreover, it should be used as part of a multimodal rehabilitation strategy that includes postural training, strengthening, and ergonomic correction (15,17). Integration of technology (e.g., motorized, computer-controlled traction units) may also improve personalization and outcomes in cervical spine rehabilitation (18).

CONCLUSION

This study demonstrates that both intermittent and continuous cervical traction are effective in managing pain and disability in cervical spondylosis. However, intermittent traction provides superior improvements in pain relief, function, range of motion, and patient satisfaction in the short term. These findings support its preferential use in conservative rehabilitation protocols for cervical spondylosis.

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