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Effect of Cervical Traction and Exercise Therapy in the Management of Cervical Radiculopathy: A Case Study

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Abstract

Background: Cervical radiculopathy is a clinical condition in which irritation or compression of a cervical nerve root produces neck pain with radiating arm pain, paraesthesia, sensory alteration, reflex change, or weakness in a myotomal pattern. It commonly arises from intervertebral disc protrusion, foraminal narrowing, spondylotic degeneration, or combined mechanical and inflammatory factors. Conservative physiotherapy is widely used when there is no progressive neurological deficit or red-flag pathology. Cervical traction is intended to reduce foraminal compression and nerve-root irritation, while exercise therapy aims to restore mobility, improve deep cervical and scapular muscle control, correct posture, and promote self-management. Clinical guidelines support a multimodal approach in chronic neck pain with radiating pain, including intermittent mechanical traction combined with stretching, strengthening, and mobilization-based exercise when clinically indicated.[4]

Presentation of Case: This case study describes a 38-year-old male office worker who presented with right-sided neck pain radiating to the lateral forearm and thumb for six weeks. Symptoms increased during prolonged computer work, mobile phone use, overhead activity, and sustained neck extension. The patient reported disturbed sleep, reduced work tolerance, difficulty driving for long periods, and fear of arm weakness. Examination suggested C6 nerve root involvement with restricted cervical range of motion, positive Spurling test, positive upper limb tension test, relief with cervical distraction, reduced biceps reflex, and mild weakness of wrist extensors. Magnetic resonance imaging showed posterolateral disc protrusion at C5-C6 with right foraminal narrowing. The patient was medically stable and suitable for conservative physiotherapy.

Intervention: The patient received a six-week physiotherapy programme consisting of intermittent mechanical cervical traction and progressive exercise therapy. Traction was administered in supine with cervical flexion of approximately 15 to 20 degrees, beginning with low to moderate pull and progressing according to symptom response. Exercise therapy included pain-free cervical mobility, chin tuck and deep cervical flexor activation, scapular setting, pectoral and upper trapezius stretching, thoracic extension mobility, median nerve sliding, isometric strengthening, resisted scapulothoracic training, postural correction, ergonomic education, and a structured home exercise schedule.

Outcome Measures: Outcome assessment included Numeric Pain Rating Scale, Neck Disability Index, cervical range of motion by goniometric estimation, upper limb tension test response, Spurling and distraction test response, grip strength, sleep disturbance, work

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tolerance, and Patient-Specific Functional Scale. The same measures were recorded at baseline, week three, and week six.

Results: The patient completed the treatment programme without adverse response. Neck pain reduced from 7/10 to 2/10, arm pain reduced from 8/10 to 1/10, and Neck Disability Index improved from 42% to 14%. Cervical rotation, lateral flexion, and extension improved, paraesthesia became occasional and mild, upper limb tension test irritability reduced, and functional tolerance for computer work, driving, and sleep improved. Grip strength and confidence in arm use also improved.

Conclusion: Cervical traction combined with exercise therapy produced clinically meaningful improvement in pain, disability, neural irritability, posture, and functional tolerance in this patient with cervical radiculopathy. The case supports individualized multimodal physiotherapy when red flags and progressive neurological deficit are absent.

Keywords: Cervical radiculopathy, cervical traction, exercise therapy, neck disability, neural mobilization, deep cervical flexors, scapular stabilization, physiotherapy case study.

Background

Cervical radiculopathy is a common neuromusculoskeletal disorder characterized by pain and neurological symptoms arising from dysfunction of a cervical spinal nerve root. The condition usually presents as neck pain associated with radiating pain into the shoulder, arm, forearm, or hand. Depending on the affected nerve root, the patient may also report numbness, tingling, heaviness, weakness, reduced grip, or altered reflexes. The most frequently involved levels are C5-C6 and C6-C7 because these segments are highly mobile and are commonly affected by degenerative disc and foraminal changes.[1,3]

The pathophysiology of cervical radiculopathy is not purely mechanical. Although disc protrusion, osteophyte formation, uncovertebral joint enlargement, and foraminal narrowing may compress the nerve root, inflammation and chemical irritation can also sensitize neural tissue. This explains why symptom intensity may not always match the size of disc protrusion on imaging. A patient may have severe radiating pain with modest imaging changes, while another person with marked degenerative change may remain almost asymptomatic. Therefore, physiotherapy assessment must combine patient history, clinical examination, neurological testing, functional analysis, and appropriate interpretation of imaging rather than depending only on radiology.

Typical symptoms include sharp or burning arm pain, neck stiffness, paraesthesia, pain aggravated by extension or ipsilateral rotation, relief with placing the hand on the head, and reduction of symptoms during manual distraction. Neurological examination may reveal dermatomal sensory deficit, myotomal weakness, or depressed reflex. The clinical test cluster described by Wainner and colleagues highlighted the diagnostic value of upper limb tension testing, Spurling test, distraction test, and limitation of cervical rotation toward the involved side.[2] These findings are clinically useful because they help the therapist differentiate nerve-root symptoms from shoulder pathology, peripheral nerve entrapment, thoracic outlet symptoms, or nonspecific neck pain.

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Conservative management is usually the first line of treatment for patients without myelopathy, fracture, infection, malignancy, severe unremitting pain, or progressive motor deficit. Many patients improve with time, education, medication, activity modification, and physical therapy. Physiotherapy has a central role because it addresses pain, mobility restriction, neural irritability, muscle imbalance, poor postural habits, scapular dysfunction, and fear of movement. The goal is not merely temporary symptom relief but return to functional activity with a sustainable home programme.

Cervical traction is one of the traditional interventions used in cervical radiculopathy. It applies a longitudinal force to the cervical spine with the intention of separating joint surfaces, increasing intervertebral and foraminal space, reducing nerve-root compression, decreasing disc pressure, relaxing muscle spasm, and promoting symptom centralization. Traction may be manual or mechanical, continuous or intermittent, clinic based or home based. Intermittent mechanical traction allows the therapist to control pull, hold time, rest time, angle, and duration more consistently than manual traction. However, traction should never be applied as an isolated routine procedure. It should be guided by irritability, neurological status, response during the session, symptom behaviour after treatment, and contraindications such as instability, malignancy, infection, fracture, severe osteoporosis, vertebrobasilar insufficiency, uncontrolled hypertension, or spinal cord signs.[6]

Exercise therapy complements traction by correcting the impairments that continue to load the cervical spine and upper limb. Deep cervical flexor training improves segmental control and reduces overactivity of superficial muscles. Scapular stabilization improves the mechanical relationship between the neck, shoulder girdle, and upper limb. Thoracic extension mobility decreases the tendency for forward-head posture and rounded shoulders. Stretching of shortened pectoral, levator scapulae, scalene, and upper trapezius muscles reduces mechanical stress. Neural mobilization can improve tolerance to limb movement by sliding the neural interface without aggressive stretching. Progressive strengthening and endurance training build resilience for work and daily activity.

Evidence regarding traction has varied across studies. Earlier systematic reviews did not clearly support or refute traction when studied broadly in neck disorders, especially when traction was used without careful subgrouping.[6] Later randomized clinical evidence suggested that adding mechanical traction to exercise may improve pain and disability in selected patients with cervical radiculopathy, particularly at longer follow-up.[5] Current neck pain clinical practice guidance recommends mechanical intermittent cervical traction combined with other interventions such as stretching, strengthening, and cervical or thoracic mobilization/manipulation for chronic neck pain with radiating pain.[4] These findings support clinical reasoning rather than routine application. The therapist should identify whether the patient's symptoms centralize with distraction, whether arm symptoms are dominant, and whether traction can be combined safely with active rehabilitation.

The present case study focuses on the effect of cervical traction and exercise therapy on a patient with clinical and imaging features consistent with cervical radiculopathy. The report follows a structured clinical sequence including patient presentation, examination findings,

intervention progression, outcome measures, results, discussion, limitations, conclusion, future scope, and references. The clinical emphasis is on practical physiotherapy decision-making and measurable change over six weeks.

Epidemiology and Clinical Relevance: Cervical radiculopathy affects adults in active working age as well as older adults with degenerative spinal changes. Epidemiological literature has reported cervical radiculopathy as a relatively common cause of neck and arm symptoms, and its impact is clinically important because it can disturb sleep, reduce work productivity, limit driving, impair self-care, and create anxiety about permanent nerve damage.[1] Even mild weakness or paraesthesia can become disabling for people whose daily activities involve writing, computer work, lifting, reaching, or sustained postures. In physiotherapy practice, the condition is relevant because symptoms often improve when the treatment programme is specific, progressive, and linked to the patient's functional demands.

Scope of the Study: This case study focuses on conservative physiotherapy management of unilateral cervical radiculopathy over six weeks. It examines pain, disability, cervical mobility, neurological irritability, grip strength, posture, sleep quality, and work tolerance. The intervention is limited to cervical traction and exercise therapy, with education and ergonomic advice used to support treatment adherence. The study does not evaluate medication response, injection therapy, or surgical management.

Clinical Presentation

Patient Data

The patient was a 38-year-old male office worker who reported right-sided neck pain radiating to the right shoulder, lateral forearm, and thumb for approximately six weeks. The symptoms began gradually after a period of increased computer work and prolonged mobile phone use. There was no history of road traffic accident, fall, fever, unexplained weight loss, malignancy, tuberculosis, inflammatory arthritis, or previous cervical spine surgery. The pain was initially intermittent but later became persistent during working hours. Arm pain was more disturbing than local neck pain and was described as burning and tingling.

The patient complained of difficulty sitting at the computer for more than thirty minutes, difficulty driving beyond fifteen to twenty minutes, disturbed sleep while lying on the right side, and discomfort while lifting a backpack or reaching above shoulder level. Symptoms increased with cervical extension, right rotation, coughing, and sustained forward-head posture. The patient noticed partial relief when supporting the right arm on a pillow or placing the hand over the head. He was concerned about weakness in the right wrist during typing and gripping a water bottle.

The patient had consulted an orthopaedic physician and was advised conservative management because there was no progressive neurological deficit or sign of myelopathy. Analgesic medication was used for a short duration before physiotherapy. At the time of physiotherapy assessment, the patient was medically stable, cooperative, and motivated to return to full work activity. He understood the treatment plan and agreed to attend supervised sessions and perform home exercises.

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Inclusion Criteria Applied to the Case: adult patient with unilateral neck and arm pain consistent with cervical radiculopathy; symptom duration of more than four weeks; positive clinical signs of nerve-root involvement; stable medical condition; ability to follow physiotherapy instructions; absence of red-flag pathology; willingness to participate in supervised and home-based rehabilitation.

Exclusion Criteria Considered: cervical myelopathy, traumatic fracture, spinal infection, malignancy, inflammatory spinal disease, vertebrobasilar insufficiency, uncontrolled hypertension, severe osteoporosis, recent cervical surgery, progressive motor deficit, severe bilateral neurological symptoms, and inability to tolerate supine positioning or traction.

Clinical Examination and Findings

The examination was performed in a structured manner. Observation revealed forward-head posture, mild rounded shoulders, right shoulder protective elevation, and reduced spontaneous neck movement during conversation. The patient avoided right rotation and extension. Palpation showed tenderness over right cervical paraspinal muscles, upper trapezius, levator scapulae, and scalene region. Muscle guarding was present but reduced after gentle supported positioning. No swelling, deformity, skin temperature change, or trophic alteration was noted in the upper limb.

Active cervical range of motion was restricted and painful, especially extension and right rotation. Right lateral flexion reproduced radiating pain toward the forearm. Flexion produced mild local stretch but did not worsen arm pain. Repeated retraction in sitting initially increased local neck discomfort but reduced distal tingling when performed gently within range. Shoulder range was full, though overhead activity increased neck and arm symptoms, suggesting that the shoulder was not the primary pain generator.

Neurological examination showed mild sensory reduction over the lateral forearm and thumb, consistent with C6 dermatome involvement. The biceps reflex was slightly diminished on the right compared with the left. Manual muscle testing revealed mild weakness of wrist extension and elbow flexion due to pain inhibition and neural involvement. Grip strength was reduced on the right. Upper limb tension test for the median nerve was positive and reproduced familiar symptoms. Spurling test was positive on the right, while cervical distraction reduced arm symptoms. These findings supported a diagnosis of right cervical radiculopathy, likely involving the C6 nerve root.

The baseline functional assessment showed moderate disability. The patient scored 42% on the Neck Disability Index, indicating clinically important limitation. The Patient-Specific Functional Scale identified three main problem activities: sustained computer work, driving, and sleeping without arm pain. Pain severity and functional irritability justified a treatment approach that began with decompression, education, and gentle mobility before progressing to strengthening and endurance training.

Table 1: Baseline Demographic and Clinical Profile

Variable	Case Details
Age / Sex	38 years / Male
Occupation	Office worker with prolonged computer use

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Dominant hand	Right
Duration of symptoms	6 weeks
Main complaint	Right-sided neck pain radiating to lateral forearm and thumb
Aggravating factors	Computer work, mobile use, driving, cervical extension and right rotation
Relieving factors	Arm support, cervical unloading, supine rest, hand-on-head position
Medical stability	Stable; no red flags or progressive neurological deficit

Table 2: Baseline Cervical and Upper Limb Assessment

Movement / Component	Expected Functional Range	Baseline Finding
Cervical flexion	Pain-free chin to chest movement	Mild pulling pain, no arm symptom increase
Cervical extension	Functional upward gaze	Restricted; reproduced right arm pain
Right rotation	Approximately 70-80° functional rotation	0-42°, painful and limited
Left rotation	Approximately 70-80° functional rotation	0-62°, mild neck tightness
Right lateral flexion	Approximately 35-45°	0-22°, radiating symptoms
Left lateral flexion	Approximately 35-45°	0-31°, local stretch
Shoulder elevation	Full functional elevation	Full range; end-range provoked neck discomfort
Grip activity	Equal and painless grip	Reduced right grip confidence

Table 3: Neurological and Provocation Test Findings

Test / Finding	Baseline Result	Clinical Meaning
Spurling test	Positive on right	Foraminal compression reproduced familiar arm pain
Cervical distraction test	Positive relief response	Symptoms reduced with unloading
Upper limb tension test A	Positive on right	Median nerve mechanosensitivity present
Cervical rotation toward painful side	Less than 60°	Consistent with diagnostic test cluster
Sensation	Reduced over lateral forearm and thumb	C6 dermatome involvement suspected
Reflex	Right biceps reflex slightly diminished	Possible C5-C6 root involvement

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Motor testing	Mild weakness of wrist extension	C6 myotomal weakness/pain inhibition
Myelopathy screen	Negative	No cord signs identified

Table 4: Baseline Functional Measures

Outcome Measure	Baseline Score	Clinical Meaning
Neck Disability Index	42%	Moderate disability affecting daily function
Neck pain NPRS	7/10	High local pain intensity
Arm pain NPRS	8/10	Dominant radicular symptom
Patient-Specific Functional Scale	Computer work 3/10; driving 4/10; sleep 3/10	Marked activity limitation
Grip strength	Right 22 kg; left 34 kg	Functional grip reduction on affected side
Sleep disturbance	Wakes 3-4 times/night	Poor pain control at night
Work tolerance	30 minutes before pain increase	Reduced occupational endurance

UNIQUE FEATURES OF THE STUDY

This case study is distinctive because it combines cervical traction with a clearly progressed exercise therapy programme rather than presenting traction as a stand-alone passive treatment. The treatment sequence was based on symptom irritability and functional needs. Early sessions emphasized pain control, neural unloading, gentle movement, and reassurance. Middle sessions emphasized deep cervical flexor activation, scapular setting, mobility, and neural sliding. Later sessions emphasized strengthening, endurance, ergonomic carryover, and return to work tolerance.

Another unique feature is the use of multiple outcome indicators. Pain reduction alone was not considered sufficient. Disability, range of motion, neurological irritability, grip strength, sleep, driving, and computer tolerance were monitored. This gave a broader view of recovery and helped to decide when to progress traction force, exercise load, and home activity. The report also highlights clinical reasoning regarding safety, contraindications, centralization of symptoms, and patient education.

Investigations and Findings

The patient brought a recent magnetic resonance imaging report of the cervical spine. The report described mild straightening of cervical lordosis, posterolateral disc protrusion at C5-C6, and right foraminal narrowing with possible irritation of the exiting nerve root. There was no evidence of spinal cord compression, myelomalacia, fracture, infection, tumour, or severe canal stenosis. Plain radiograph did not show instability or acute bony injury. Routine medical examination was unremarkable.

The investigation findings were interpreted in relation to clinical signs. Imaging alone was not used to decide treatment because degenerative changes may be seen in asymptomatic adults. In this case, the location of imaging abnormality was consistent with the patient's right-sided

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arm pain, sensory symptoms, diminished biceps reflex, positive Spurling test, positive median nerve tension response, and relief with distraction. Therefore, physiotherapy management was planned as a conservative decompression and active rehabilitation programme.

Table 5: Summary of Relevant Medical and Functional Findings

Investigation / Finding	Observation	Clinical Interpretation
MRI cervical spine	C5-C6 posterolateral disc protrusion with right foraminal narrowing	Consistent with right C6 radicular symptoms
Spinal cord status	No cord compression or myelomalacia reported	Conservative physiotherapy suitable
Plain radiograph	No acute fracture or instability noted	Traction not contraindicated by imaging
Neurological screen	No myelopathic signs	No urgent surgical referral sign during assessment
Pain behaviour	Arm pain reduced with distraction	Traction trial clinically justified
Functional irritability	Symptoms increased with sustained posture	Exercise and ergonomic correction required
Cardiorespiratory tolerance	Adequate for supervised therapy	Safe for progressive exercise

Physiotherapy Management

The physiotherapy programme was planned for six weeks with five supervised sessions per week, each lasting approximately forty-five minutes. The patient was also given a daily home exercise programme. Treatment was individualized according to symptom response, neurological status, and functional progress. Pain behaviour was checked before, during, and after traction. The patient was instructed to report dizziness, nausea, visual disturbance, headache, increased arm numbness, increased weakness, or any unusual symptom immediately. None of these adverse responses occurred during the treatment period.

The general treatment principles were decompression, symptom centralization, restoration of mobility, improvement of muscular control, neural mobility, postural correction, and functional reintegration. The therapist avoided aggressive end-range movements in the initial phase because the patient was irritable. As pain and arm symptoms reduced, exercise volume and resistance were increased. Education focused on avoiding prolonged static posture, using micro-breaks, supporting the forearm during computer work, keeping the screen at eye level, avoiding sleeping with excessive cervical rotation, and gradually resuming normal activity.

Phase I: Pain Reduction, Decompression, and Protection (Week 1-2). The early phase aimed to reduce radicular pain and fear of movement. Intermittent mechanical cervical traction was applied in supine lying with the neck supported in slight flexion. Initial traction intensity was kept comfortable and below the level that provoked symptoms. A typical session included hold and rest cycles with continuous monitoring of arm symptoms. Gentle active cervical flexion, rotation within pain-free range, shoulder rolls, scapular retraction, breathing relaxation, and

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supported chin tuck were practiced. The patient was taught to identify centralization, meaning reduction of distal arm symptoms even if mild local neck discomfort remained. Home advice included limiting continuous computer work to short intervals, using a pillow to support the arm, avoiding heavy lifting, and performing gentle mobility every two hours.

Phase II: Mobility, Neural Sliding, and Stabilization (Week 2-4). Once arm pain reduced and sleep improved, exercise therapy was progressed. Traction force and duration were increased gradually only when the previous session produced relief without delayed symptom aggravation. Deep cervical flexor activation was trained using low-load chin tuck in crook lying and later in sitting. Scapular setting emphasized depression, retraction, and controlled upward rotation without upper trapezius overactivity. Thoracic extension over a towel roll, pectoral stretching, levator scapulae stretching, and upper trapezius stretching were added. Median nerve sliding was introduced gently, avoiding sustained end-range tension. Isometric cervical flexion, extension, side flexion, and rotation were performed at submaximal intensity. Workstation correction was reviewed using the patient's usual sitting posture.

Phase III: Strengthening, Endurance, and Functional Return (Week 4-6). The final phase emphasized active control and endurance needed for work and daily activity. Traction was continued but was no longer the dominant component. Strengthening progressed to resisted scapular rows with elastic band, wall slides, chin tuck with arm movement, low-load cervical endurance holds, thoracic mobility drills, and graded lifting practice. The patient practiced sitting tolerance with postural correction, keyboard and mouse use with forearm support, controlled driving posture, and sleep positioning. Neural mobilization was progressed by increasing range rather than force. By week six, the home exercise programme focused on maintenance: daily mobility, deep neck flexor endurance, scapular strengthening, stretching, and ergonomic breaks.

Table 6: Summary of Intervention Content and Progression

Rehabilitation Element	Week 1-2	Week 2-4	Week 4-6
Main emphasis	Pain reduction and decompression	Mobility and stabilization	Endurance and functional return
Traction	Low to moderate intermittent traction with close monitoring	Progressive traction if symptoms centralized	Used as adjunct while active exercise increased
Cervical exercise	Pain-free ROM and supported chin tuck	Deep cervical flexor activation and isometrics	Endurance holds and control during activity
Scapular training	Basic setting and shoulder rolls	Scapular retraction/depression drills	Elastic band rows and wall slides

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Neural component	Symptom monitoring and unloading positions	Gentle median nerve sliding	Progressive nerve sliders within tolerance
Posture and ergonomics	Education and micro-breaks	Workstation modification	Return-to-work endurance plan
Home programme	Gentle mobility and supported rest	Mobility, stretches, chin tuck, nerve sliders	Strengthening, endurance, and self-management

Goals

Short-Term Goals

1. To reduce neck and radiating arm pain during rest and functional activity.
2. To decrease neural irritability and promote centralization of symptoms.
3. To improve pain-free cervical range of motion, especially rotation and lateral flexion.
4. To improve sleep quality and reduce night waking due to arm symptoms.
5. To teach safe posture, ergonomic correction, and activity modification for work.
6. To initiate deep cervical flexor activation, scapular setting, gentle mobility, and home exercise adherence.

Long-Term Goals

7. To reduce disability and improve independence in work, driving, and daily tasks.
8. To restore functional cervical mobility without reproduction of distal arm pain.
9. To improve cervical and scapulothoracic muscle endurance for prolonged sitting.
10. To improve grip strength and confidence in right upper limb use.
11. To prevent recurrence by correcting posture, movement habits, and work-station stress.
12. To establish a sustainable self-management programme after supervised physiotherapy completion.

Results

The patient attended twenty-eight of the planned thirty sessions and completed the home programme on most days. No adverse event occurred during traction or exercise. During the first week, the main change was reduction in arm pain after traction and improved confidence with safe movement. By week three, the patient reported fewer episodes of tingling, improved sleep, and better tolerance for computer work when micro-breaks were used. By week six, pain had become mild, arm symptoms were occasional, and the patient was able to perform work activity with better posture and self-management.

Objective and functional measures showed improvement from baseline to week six. The Neck Disability Index reduced from 42% to 14%, which represented a meaningful functional improvement. Neck pain reduced from 7/10 to 2/10 and arm pain reduced from 8/10 to 1/10. Cervical rotation and lateral flexion improved in the symptomatic direction. The upper limb tension test remained mildly sensitive at end range but no longer reproduced severe familiar arm pain. Grip strength improved from 22 kg to 31 kg on the right side. The patient-specific functional score improved in computer work, driving, and sleep.

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Table 7: Pain and Disability Changes

Time Point	Neck Pain NPRS	Arm Pain NPRS	Neck Disability Index
Baseline	7/10	8/10	42%
Week 3	4/10	3/10	26%
Week 6	2/10	1/10	14%
Total Change	5-point reduction	7-point reduction	28% improvement

Table 8: Cervical Range of Motion Changes

Movement	Baseline	Week 3	Week 6	Clinical Interpretation
Flexion	Mildly painful	Pain-free with stretch	Functional and pain-free	Improved mobility
Extension	Painful, arm symptoms	Local discomfort only	Functional with mild tightness	Radicular irritability reduced
Right rotation	0-42°	0-58°	0-70°	Driving tolerance improved
Left rotation	0-62°	0-70°	0-76°	Near functional range
Right lateral flexion	0-22°	0-30°	0-38°	Less nerve-root irritation
Left lateral flexion	0-31°	0-38°	0-42°	Improved flexibility

Table 9: Neurological and Functional Changes

Variable	Baseline	Week 6	Meaning
Upper limb tension test A	Positive, high irritability	Mild end-range sensitivity	Neural mechanosensitivity reduced
Spurling test	Positive	Mild local discomfort only	Compression irritability reduced
Distraction test	Clear arm pain relief	Minimal symptom change needed	Dependence on unloading reduced
Sensation	Reduced lateral forearm/thumb	Almost normal subjective sensation	Sensory symptoms improved
Biceps reflex	Slightly diminished	Symmetrical/slightly improved	Neurological status stable
Wrist extension strength	Mild weakness	Functional strength	Upper limb use improved
Right grip strength	22 kg	31 kg	Grip performance improved

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Table 10: Patient-Specific Functional Improvement

Activity	Baseline Score /10	Week 3 Score /10	Week 6 Score /10	Functional Interpretation
Computer work for 2 hours	3	6	8	Able with posture correction and micro-breaks
Driving for 45 minutes	4	6	8	Improved rotation and reduced arm pain
Sleeping without arm pain	3	7	9	Night waking markedly reduced
Lifting light backpack	4	6	8	Improved scapular control and confidence
Typing and mouse use	5	7	9	Improved endurance and reduced tingling

Outcome Measures

Pain was recorded using the Numeric Pain Rating Scale for separate neck pain and arm pain scores.

Disability was measured using the Neck Disability Index, expressed as percentage disability.

Cervical range of motion was assessed by clinical goniometric estimation for flexion, extension, rotation, and lateral flexion.

Neural irritability was screened using the upper limb tension test A and symptom response during cervical distraction.

Provocation was assessed using Spurling test and symptom behaviour during extension and ipsilateral rotation.

Grip strength was measured using a hand dynamometer and compared with the unaffected side.

Functional change was documented using the Patient-Specific Functional Scale for computer work, driving, sleep, lifting, and typing tolerance.

Clinical monitoring also included sleep disturbance, medication dependence, home exercise adherence, and any adverse response to traction or exercise.

Discussion

This case study showed that a combined programme of intermittent cervical traction and exercise therapy produced meaningful improvement in a patient with cervical radiculopathy. The early reduction in arm pain after traction suggested a favourable unloading response, and this helped the patient tolerate active rehabilitation. Exercise therapy was essential because traction alone would not correct forward-head posture, poor scapular control, reduced deep cervical flexor endurance, or occupational loading habits. Improvement in Neck Disability Index, cervical rotation, sleep, driving, and computer tolerance indicates that the programme influenced both symptoms and functional participation. The clinical course also supports the importance of graded progression. In the first phase, treatment remained protective and symptom guided. In the middle and final phases, strengthening, neural sliding, thoracic

mobility, and ergonomic practice became more important. The findings are consistent with evidence recommending multimodal care for neck pain with radiating symptoms and with studies suggesting that selected patients may benefit when mechanical traction is added to exercise.[4,5] The outcome cannot be generalized to all patients, but it demonstrates practical clinical reasoning for conservative physiotherapy management. Careful monitoring also ensured that traction force and exercise load were progressed without symptom exacerbation.

Limitations of the Study

- Only one patient was included, so the findings cannot be generalized to all cases of cervical radiculopathy.
- The treatment response may have been influenced by natural recovery, medication use, ergonomic modification, and improved activity awareness.
- Long-term follow-up after six weeks was not included, so recurrence prevention could not be fully evaluated.
- The case did not include advanced electrodiagnostic testing to confirm the exact nerve root level.
- Range of motion was estimated clinically rather than measured with a digital inclinometer.
- Psychological factors such as fear avoidance and work stress were observed clinically but not measured with standardized scales.
- The programme combined traction, exercise, and education, so the independent effect of each component cannot be separated.

Conclusion

Cervical traction combined with progressive exercise therapy reduced pain, disability, neural irritability, and functional limitation in this patient with cervical radiculopathy. Improvement in posture, cervical mobility, grip confidence, sleep, driving, and work tolerance suggests that multimodal physiotherapy can be useful when treatment is individualized and carefully progressed.

Future Scope of the Study

Future studies should include larger samples of patients with cervical radiculopathy and compare exercise therapy alone with exercise therapy plus mechanical traction. Stratification according to symptom duration, nerve-root level, imaging findings, baseline disability, and response to distraction may help identify which patients benefit most from traction. Follow-up at three months, six months, and one year would clarify whether early improvements are maintained and whether recurrence is reduced.

Further research may also compare different traction parameters such as force, angle, hold-rest ratio, frequency, and duration. Digital measurement of cervical motion, hand-held dynamometry, nerve conduction studies, and validated psychosocial measures could make outcome analysis more precise. Workplace-based ergonomic intervention should be studied because many patients with cervical radiculopathy return to prolonged sitting, laptop use, mobile phone use, and repetitive upper limb tasks. Future protocols may also explore tele-rehabilitation support for home exercise adherence after supervised physiotherapy.

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