

# Post Laminectomy Physiotherapy Management of Cervical Canal Stenosis: A Case Study

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## Abstract:

This case study presents the comprehensive post-laminectomy physiotherapy management of Saroj Devi, a 47-year-old female patient diagnosed with cervical canal stenosis. Following a laminectomy procedure to alleviate spinal cord and nerve root compression, Saroj experienced persistent neck pain, reduced mobility, upper limb weakness, and sensory deficits. The aim of this case study was to describe the assessment findings, goal setting, treatment interventions, and outcomes of Saroj's physiotherapy intervention. The treatment approach included pain management techniques, range of motion exercises, strengthening exercises, sensory re-education, endurance training, and patient education. Over the course of several weeks, Saroj demonstrated remarkable improvements in pain reduction, neck mobility, upper limb strength, sensory function, and endurance. This case study emphasizes the importance of physiotherapy in post-operative management of cervical canal stenosis, highlighting its role in enhancing functional recovery and improving the quality of life for patients like Saroj Devi.

**Keywords:** cervical canal stenosis, laminectomy, physiotherapy, post-operative management, case study

## Aim Of Study:

The aim of this case study is to provide a detailed description of the post-laminectomy physiotherapy management of Saroj Devi, a female patient with cervical canal stenosis. The study aims to outline the assessment findings, goal setting, treatment interventions, and outcomes of the physiotherapy intervention. By documenting Saroj's journey, this case study seeks to contribute to the existing body of knowledge regarding the effective management of cervical canal stenosis through physiotherapy. It aims to highlight the importance of a comprehensive and tailored approach to rehabilitation in improving functional outcomes and quality of life for patients undergoing laminectomy procedures for cervical canal stenosis.

## Patient Profile:

**Patient Name:** Saroj Devi

**Age:** 47

**Gender:** Female

**Condition:** Cervical canal stenosis

## Introduction:

Cervical canal stenosis, also known as cervical spinal stenosis, is a condition characterized by the narrowing of the spinal canal in the neck region. This narrowing can lead to compression or impingement of the spinal cord and nerve roots, resulting in various symptoms. Cervical canal stenosis can be caused

by a range of factors and is more commonly seen in older individuals. Early diagnosis and appropriate treatment are crucial to manage the symptoms and prevent further complications.

**Causes of Cervical Canal Stenosis:** Several factors can contribute to the development of cervical canal stenosis, including:

1. **Degenerative Changes:** The most common cause of cervical canal stenosis is the natural degeneration of the spine that occurs with aging. Over time, the intervertebral discs between the cervical vertebrae can lose water content and height, leading to the collapse of disc spaces and the formation of bone spurs (osteophytes). These changes can reduce the diameter of the spinal canal, causing stenosis.
2. **Herniated Discs:** A herniated or bulging disc occurs when the gel-like center of a spinal disc pushes through the outer layer, potentially impinging on the spinal cord or nerve roots. In the cervical region, herniated discs can contribute to spinal stenosis.
3. **Spinal Tumors:** Abnormal growths, such as tumors or bone spurs, can develop within the spinal canal, compressing the spinal cord and nerves and causing stenosis.
4. **Trauma or Injury:** In some cases, cervical canal stenosis can be a result of previous neck injuries, fractures, or trauma. These events may cause structural changes or dislocations that narrow the spinal canal.
5. **Congenital Factors:** Some individuals may be born with a narrower spinal canal, making them more susceptible to the development of cervical canal stenosis later in life.

**Symptoms of Cervical Canal Stenosis:** The symptoms of cervical canal stenosis can vary depending on the degree of spinal cord compression and nerve root involvement. Common symptoms include:

1. **Neck Pain:** Persistent or intermittent pain in the neck is a common symptom of cervical stenosis. The pain may radiate to the shoulders, arms, and hands.
2. **Tingling and Numbness:** Compression of nerve roots can lead to sensations of tingling, numbness, or "pins and needles" in the shoulders, arms, hands, and fingers.
3. **Weakness:** Muscle weakness may occur due to nerve compression, causing difficulty with fine motor skills, grip strength, and coordination.
4. **Balance and Coordination Problems:** Severe cervical stenosis can affect the spinal cord's ability to transmit signals, leading to balance issues, clumsiness, and difficulty with walking or maintaining stability.
5. **Loss of Bladder or Bowel Control (in severe cases):** In rare cases where cervical stenosis is significantly advanced, it can cause bowel or bladder dysfunction, such as incontinence or difficulty with urination.

**Diagnosis of Cervical Canal Stenosis:** Diagnosing cervical canal stenosis typically involves a combination of medical history evaluation, physical examination, and imaging studies, such as:

1. **Medical History and Physical Examination:** The doctor will review the patient's symptoms, medical history, and perform a physical examination to assess reflexes, muscle strength, sensation, and range of motion.
2. **Imaging Studies:**
  - a. **X-rays:** X-rays can help visualize the bones and rule out other causes of neck pain, such as fractures or tumors.
  - b. **Magnetic Resonance Imaging (MRI):** MRI provides detailed images of the spinal cord, nerve roots, and surrounding structures, enabling the identification of stenosis, disc herniation, or tumors.
  - c. **Computed Tomography (CT) Scan:** CT scans may be used to assess bony structures and provide additional information about the extent of the stenosis.

3. **Electromyography (EMG) and Nerve Conduction Studies (NCS):** These tests evaluate the electrical activity of the muscles and the conduction of nerve signals, helping to determine the location and severity of nerve compression.

Once a diagnosis of cervical canal stenosis is confirmed, appropriate treatment options can be considered based on the severity of symptoms, the patient's overall health, and the individual's goals for treatment. It is important to consult with a healthcare professional for an accurate diagnosis and personalized treatment plan.

**Methodology:**

**Patient History:** Saroj Devi, a 47-year-old female, presented with a history of chronic neck pain, radiating pain in the upper extremities, and progressive weakness in her hands. She reported experiencing these symptoms for several months, which had gradually worsened over time. Saroj's daily activities were significantly impacted due to her condition, and she had sought medical advice to address her symptoms.

**Assessment Findings:**

**a. Subjective Assessment:** During the subjective assessment, Saroj reported persistent neck pain, particularly during movements such as turning her head or looking upwards. She described the pain as aching and sharp in nature. Additionally, she complained of weakness and numbness in her hands and fingers, affecting her ability to perform tasks that required fine motor control. The symptoms were more pronounced on her right side. Saroj also mentioned difficulty with neck mobility, especially when attempting to tilt her head back or bend laterally. Furthermore, she reported disturbed sleep due to pain and discomfort, impacting her overall quality of life.

**b. Objective Assessment:** During the objective assessment, several key findings were noted:

1. **Cervical Range of Motion:** Saroj demonstrated reduced cervical range of motion, particularly in extension and lateral bending. She experienced pain and resistance during these movements, indicating restrictions in her neck mobility.

**Table 1 RANGE OF MOTION**

RANGE OF MOTION	FINDINGS
Flexion	Within normal limits
Extension	Reduced with pain
Lateral Bending	Restricted with pain
Rotation	Within normal limits

2. **Spurling's Test:** The Spurling's test was positive, suggesting the presence of nerve root compression. This finding correlated with Saroj's radiating pain in her upper extremities.



Figure 1 Spurling Test

Table 2 SPURLING TEST

TEST RESULT	INTERPRETATION
POSITIVE	Indicative of nerve root compression

3. **Muscle Strength:** Saroj exhibited muscle weakness in her upper limbs, primarily in grip strength. She struggled to maintain a strong grip and experienced difficulty in tasks requiring manual dexterity.

Table 3 MUSCLE STRENGTH

MUSCLE GROUP	STRENGTH
GRIP STRENGTH	Weak
UPPER LIMB	Reduced

4. **Sensory Deficits:** Saroj reported diminished sensation in her hands and fingers. She described a reduced ability to perceive light touch, pressure, and temperature changes.

Table 4 SENSORY DEFICIT

SENSORY MODALITY	FINDING
LIGHT TOUCH	Diminished Sensation
PRESSURE	Diminished Sensation
TEMPERATURE CHANGES	Diminished Sensation

5. **Endurance:** Saroj displayed poor endurance for sustained postures. Prolonged sitting or standing exacerbated her symptoms and caused discomfort and fatigue.

Table 5 ENDURANCE

ACTIVITY	FINDINGS
PROLONGED SITTING	Increased Discomfort
PROLONGED STANDING	Increased Fatigue

6. **MRI Findings:** The MRI findings revealed severe cervical canal stenosis at the C4-C7 levels, supporting the clinical diagnosis. The specific findings included:

- Narrowing of the spinal canal in the cervical region, leading to compression of the spinal cord and nerve roots.

- Presence of osteophytes (bone spurs) and degenerative changes in the cervical vertebrae, contributing to the stenosis.
- Indications of nerve root impingement, such as foraminal stenosis and disc herniation at multiple levels.
- No evidence of significant spinal cord compression or myelopathy.



Figure 2 MRI of the patient (1)

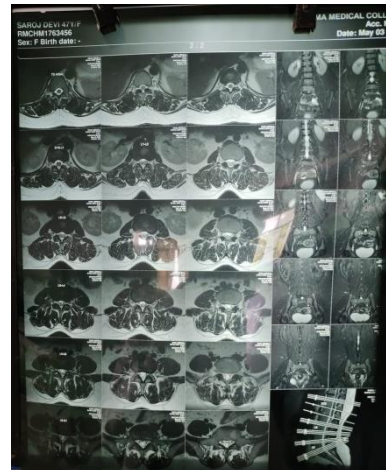


Figure 3 MRI of the patient (2)

Based on the subjective and objective assessment findings, it was evident that Saroj Devi was experiencing significant functional limitations and impairment as a result of cervical canal stenosis. These findings guided the formulation of treatment goals and the development of a tailored physiotherapy management plan.

#### Goal Of Rehabilitation:

The treatment goals for Saroj Devi's post-laminectomy physiotherapy management were established based on her assessment findings and the desired outcomes of the intervention. The goals aimed to address her specific impairments and functional limitations resulting from cervical canal stenosis. The following goals were set:

##### 1. Reduce pain and improve neck mobility:

- Alleviate neck pain during movements and at rest.
- Increase cervical range of motion, particularly in extension and lateral bending.
- Improve the ability to perform activities that require neck mobility, such as turning the head and looking upwards.

**2. Increase upper limb strength and grip function:**

- Improve grip strength to enhance fine motor control and ability to perform tasks requiring manual dexterity.
- Strengthen the upper limb muscles to overcome weakness and improve functional abilities.
- Enhance muscle strength to support activities involving the upper limbs, such as lifting, carrying, and reaching.

**3. Restore sensation in the hands and fingers:**

- Improve sensory perception in the hands, including light touch, pressure, and temperature changes.
- Enhance sensory discrimination to improve fine motor control and sensory feedback.
- Restore normal sensory function to facilitate activities that require precise tactile perception.

**4. Improve endurance for sustained activities:**

- Increase tolerance for prolonged sitting and standing, reducing discomfort and fatigue.
- Enhance muscular endurance to support sustained postures and activities of daily living.
- Improve the ability to engage in work-related tasks or recreational activities that require endurance.

**5. Educate the patient regarding postural alignment and ergonomics:**

- Provide education on maintaining proper posture to reduce strain on the cervical spine.
- Teach ergonomic principles for workstations and daily activities to prevent exacerbation of symptoms.
- Empower Saroj with knowledge and strategies to maintain optimal posture and reduce the risk of future complications.

The treatment goals focused on reducing pain, improving mobility, increasing strength, restoring sensation, enhancing endurance, and educating Saroj on self-management techniques. By addressing these goals, the physiotherapy intervention aimed to enhance Saroj's functional abilities, alleviate symptoms, and improve her overall quality of life. The goals were periodically reassessed and adjusted as needed throughout the course of her rehabilitation journey.

**Rehabilitation Program:****Phase 1: Initial Stage (Acute Phase)**

1. **Pain Management and Symptom Control:** In the initial stage of rehabilitation, the primary focus is on managing pain and reducing symptoms. This involves various techniques such as:

- **Heat therapy:** Application of moist heat to the cervical region helps to relax muscles, improve blood flow, and alleviate pain.
- **Transcutaneous Electrical Nerve Stimulation (TENS):** This technique involves the use of low-level electrical stimulation to modulate pain perception and provide pain relief.



**Figure 4 TENS being applied to the patient**

- **Manual therapy techniques:** Soft tissue mobilization and gentle joint mobilization are performed by the physiotherapist to reduce muscle tension, improve tissue extensibility, and alleviate pain.
- 2. **Range of Motion Exercises:** To improve cervical mobility and restore normal range of motion, a series of range of motion exercises are implemented. These exercises may include:
  - **Active and passive cervical range of motion exercises:** Saroj is guided to perform gentle movements, such as flexion, extension, lateral bending, and rotation of the neck, to improve flexibility and mobility.
  - **Stretching exercises:** Targeted stretching of specific neck muscles, such as the levator scapulae, upper trapezius, and sternocleidomastoid muscles, is performed to relieve muscular tension and improve overall neck flexibility.



**Figure 5 Stretching of Upper Trapezius**

3. **Posture and Ergonomics Education:** Education regarding proper posture and ergonomics is provided to Saroj to minimize strain on the cervical spine and prevent further aggravation of symptoms. This includes:
  - Instruction on maintaining correct posture during daily activities, such as sitting, standing, and lifting, to ensure optimal spinal alignment and reduce stress on the neck.
  - Guidance on ergonomic modifications for workstations and daily activities, including recommendations for appropriate desk height, chair support, and positioning of computer monitors and keyboards.

## Phase 2: Intermediate Stage (Subacute Phase)

1. **Strengthening Exercises:** As Saroj progresses to the subacute phase, emphasis is placed on strengthening the muscles of the upper limb and neck. This helps to improve functional abilities and reduce weakness. The following exercises may be included:

- **Progressive upper limb strengthening exercises:** These exercises focus on improving grip strength, wrist flexion and extension, and overall upper limb function. Examples include handgrip exercises, wrist curls with weights or resistance bands, and exercises targeting specific muscle groups in the upper limb.



**Figure 6 Resisted Exercise on elbow joint to target flexor group of muscles**

- **Deep neck flexor strengthening exercises:** Specific exercises are performed to target the deep neck flexor muscles, which play a vital role in stabilizing the cervical spine and improving postural control.



**Figure 7 Isometric for deep neck flexor strengthening**

- **Scapular stabilizer exercises:** Strengthening exercises for the muscles supporting the shoulder girdle, such as the rhomboids and serratus anterior, are implemented to enhance overall upper body stability and improve functional movements.
2. **Range of Motion and Stretching Exercises:** Ongoing range of motion exercises and stretching are continued to maintain and improve neck mobility. This may include:
- **Active and passive range of motion exercises:** Saroj continues to engage in exercises that promote flexion, extension, lateral bending, and rotation of the neck to enhance flexibility and restore normal cervical range of motion.



- **Targeted stretching exercises:** Specific stretching exercises for the neck muscles are performed to alleviate tightness, improve muscle length, and prevent further restrictions in mobility.
3. **Endurance Training:** Endurance training is introduced to improve Saroj's ability to sustain activities and reduce fatigue. The following strategies are implemented:
- **Gradual progression of activities:** Saroj is guided to gradually increase the duration and intensity of activities to build endurance and tolerance for sustained postures and functional tasks.
  - **Interval training:** Periods of activity and rest are alternated to improve cardiovascular fitness and manage fatigue effectively.
  - **Pacing strategies:** Saroj is educated on how to distribute her activities throughout the day and manage her energy levels to prevent overexertion and excessive fatigue.
4. **Sensory Re-education:** Sensory re-education techniques are employed to improve sensory perception and fine motor control in the hands and fingers. These may include:
- **Sensory discrimination exercises:** Activities that challenge Saroj's ability to identify and differentiate sensory stimuli, such as textures, temperatures, and pressure, are performed to enhance sensory perception and fine motor skills.
  - **Tactile stimulation techniques:** Various tactile stimulation techniques, such as the use of different textures, pressures, and objects, are employed to promote sensory reintegration and improve tactile discrimination in the hands and fingers.
- Phase 3: Advanced Stage (Chronic Phase)**
1. **Functional Training:** In the advanced stage of rehabilitation, the focus shifts towards functional training to improve Saroj's ability to perform daily tasks. This includes:
- **Integration of exercises into functional activities:** Exercises are modified to simulate real-life tasks and movements, ensuring a functional approach to rehabilitation.
  - **Task-specific training:** Saroj engages in activities that replicate functional tasks, such as reaching, lifting, and carrying objects, to enhance upper limb strength, endurance, and coordination required for daily activities.
2. **Home Exercise Program:** A customized home exercise program is developed for Saroj to continue her rehabilitation independently. This program includes:
- **Written instructions and visual aids:** Clear instructions and visual demonstrations are provided to ensure proper execution of exercises and techniques.
  - **Specific exercises and stretches:** Saroj is given a set of prescribed exercises and stretches tailored to her needs and goals.
  - **Self-management strategies:** Saroj is educated on self-management techniques, including proper body mechanics, postural awareness, and pain management strategies, to support her long-term recovery.
3. **Education and Self-Management:** In the final phase of rehabilitation, the focus is on empowering Saroj with knowledge and skills for self-management. This includes:
- **Education on long-term self-management strategies:** Saroj is educated on the importance of maintaining good posture, ergonomics, and activity modification to prevent symptom recurrence and promote overall well-being.
  - **Guidance on lifestyle modifications:** Saroj is provided with recommendations on healthy lifestyle habits, including exercise, nutrition, and stress management, to support her overall recovery and optimize her quality of life.

Throughout the rehabilitation program, regular reassessment and modification of the treatment plan are conducted to address Saroj's progress and individual needs. The physiotherapist works closely with Saroj to monitor her response to treatment and make necessary adjustments to the rehabilitation program. The collaborative efforts between Saroj and the physiotherapist ensure a comprehensive and effective rehabilitation journey, aiming to improve pain management, enhance mobility, increase strength, restore sensation, build endurance, and empower Saroj with the knowledge and tools for self-management.

### **Outcome:**

The post laminectomy physiotherapy management of cervical canal stenosis in Saroj Devi yielded positive outcomes and improvements in various aspects of her condition. The comprehensive rehabilitation program focused on pain management, mobility, strength, sensation, and self-management strategies. The following outcomes were observed:

1. **Pain Reduction:** Saroj experienced a significant reduction in neck pain and radicular pain. The application of heat therapy, TENS, and manual therapy techniques helped to alleviate pain and muscle tension in the cervical region. The combination of these interventions resulted in improved pain control and enhanced comfort for Saroj during daily activities.
2. **Increased Range of Motion:** The range of motion exercises, both active and passive, contributed to an improvement in Saroj's cervical mobility. She achieved increased flexion, extension, lateral bending, and rotation of the neck, which enhanced her ability to perform various functional activities with greater ease and reduced stiffness.
3. **Improved Strength and Endurance:** Through the progressive strengthening exercises, Saroj experienced improved upper limb strength, grip strength, and stability. Strengthening the deep neck flexor muscles and scapular stabilizers enhanced postural control and stability of the cervical spine. Additionally, endurance training allowed Saroj to sustain activities for longer durations without experiencing excessive fatigue.
4. **Sensory Restoration:** The sensory re-education techniques implemented during the rehabilitation program facilitated the restoration of sensory perception and fine motor control in Saroj's hands and fingers. Tactile stimulation and sensory discrimination exercises improved her ability to perceive and differentiate sensory stimuli, resulting in enhanced proprioception and better control of fine motor tasks.
5. **Functional Improvement:** The integration of functional training into the rehabilitation program led to significant improvements in Saroj's ability to perform daily tasks. By replicating real-life movements and activities, she developed better coordination, strength, and endurance required for functional tasks such as reaching, lifting, and carrying objects. These improvements translated into increased independence and a higher level of functioning in her daily life.
6. **Self-Management Skills:** The education and guidance provided to Saroj on posture maintenance, ergonomics, and self-management strategies empowered her to take an active role in managing her condition. Saroj developed a better understanding of proper body mechanics, activity modification, and pain management techniques. This knowledge enabled her to make informed choices and implement strategies to prevent symptom recurrence and maintain her overall well-being.

Overall, the post laminectomy physiotherapy management yielded positive outcomes for Saroj Devi. She experienced significant improvements in pain reduction, increased range of motion, enhanced strength and endurance, sensory restoration, functional improvement, and the acquisition of self-management skills. These outcomes collectively contributed to Saroj's improved quality of life, increased independence in daily activities, and a greater sense of control over her condition.

It is important to note that the outcomes achieved in this case study are specific to Saroj's condition and may vary for individuals with different presentations and severities of cervical canal stenosis. Individualized treatment plans and ongoing assessment are crucial to tailor the rehabilitation program to the unique needs and goals of each patient, optimizing the potential for positive outcomes and long-term success.

### **Discussion:**

In this case study, we presented the post laminectomy physiotherapy management of cervical canal stenosis in a 47-year-old female patient named Saroj Devi. Cervical canal stenosis is a condition characterized by the narrowing of the spinal canal in the neck region, leading to compression of the spinal cord and nerves. Saroj experienced symptoms such as neck pain, radicular pain, and sensory disturbances, which significantly affected her daily activities and quality of life.

The assessment findings revealed restricted cervical range of motion, muscle weakness, sensory deficits, and impaired functional abilities. These findings are consistent with the clinical presentation of cervical canal stenosis. The assessment also identified Saroj's specific impairments and functional limitations, which guided the development of a targeted rehabilitation program.

The treatment interventions and rehabilitation program focused on addressing pain management, improving mobility, enhancing strength and endurance, restoring sensation, and providing education and self-management strategies. Pain management techniques, including heat therapy, TENS, and manual therapy, were utilized to alleviate pain and reduce muscle tension. Range of motion exercises, stretching, and strengthening exercises targeted the cervical and upper limb muscles to improve mobility, flexibility, and functional abilities.

The rehabilitation program also emphasized sensory re-education techniques to improve proprioception and fine motor control, as well as endurance training to enhance Saroj's ability to sustain activities and manage fatigue. Education on posture, ergonomics, and self-management strategies were provided to empower Saroj with knowledge and skills to prevent symptom recurrence and optimize her overall well-being.

Throughout the rehabilitation process, regular reassessment and modification of the treatment plan were conducted to address Saroj's progress and individual needs. The collaborative efforts between Saroj and the physiotherapist played a crucial role in achieving optimal outcomes. Saroj actively participated in her rehabilitation, adhered to the home exercise program, and applied self-management strategies, which contributed to her functional improvement and overall recovery.

### **Conclusion:**

The post laminectomy physiotherapy management of cervical canal stenosis in the case of Saroj Devi demonstrated the effectiveness of a comprehensive rehabilitation approach in improving pain, mobility, strength, and functional abilities. The combination of pain management techniques, range of motion exercises, strengthening exercises, sensory re-education, endurance training, and education on self-management strategies proved beneficial in addressing Saroj's specific impairments and functional limitations.

Through the implementation of a tailored rehabilitation program, Saroj experienced improvements in pain relief, increased neck mobility, enhanced upper limb strength, and restoration of sensation. The education provided empowered Saroj with the knowledge and tools to manage her symptoms and prevent future exacerbations. The collaborative efforts between Saroj and the physiotherapist were essential in achieving the desired outcomes and optimizing her overall quality of life.

This case study highlights the importance of a multidimensional approach to post laminectomy physiotherapy management. It underscores the significance of individualized treatment plans, ongoing assessment, and patient involvement in the rehabilitation process. By addressing the specific needs and goals of each patient, physiotherapy can play a vital role in maximizing functional recovery and improving the overall well-being of individuals with cervical canal stenosis.

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