



EFFECT OF THORACIC MOBILIZATION AND SACRAL COUNTERNUTATION MOBILIZATION WITH FLEXION BASED EXERCISE AND RETRO WALKING IN A PATIENT WITH LUMBAR CANAL STENOSIS: A CASE REPORT

Physiotherapy

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ABSTRACT

Background: Low back pain is the most common musculoskeletal problem in the adult population with a worldwide prevalence is 50% to 84%. Lumbar canal stenosis is a chronic condition of low back pain characterized by narrowing of the spinal canal and neurogenic claudication is the most apparent symptom. This condition can improve with manual therapy using mobilization and exercise therapy. **Case presentation:** The patient is a 57-year-old male with a chief complaint of neurogenic claudication after five minutes of standing and walking since 3 months. The patient had developed a stooped posture to avoid pain and heaviness in the right leg. During first week, the mobility of thoracic spine was improved by mobilization, and posture was corrected. Flexion based exercise also was started. During second week, strengthening exercise of hip musculature was initiated. On the third week backward walking started with strengthening exercise. Complete recovery was achieved using manual therapy and exercise therapy after three weeks. **Conclusion:** This case report indicates the importance of thoracic and sacral mobilization with flexion based exercise and backward walking in a patient with lumbar canal stenosis to improve symptoms of neurogenic claudication.

KEYWORDS

Lumbar canal stenosis, Low back pain, Manual therapy, Exercise therapy, Mobilization, Gait training.

BACKGROUND

Low back pain is the most common musculoskeletal problem related to the lumbar region affecting the adult population. The estimated worldwide lifetime prevalence of low back pain varies from 50% to 84%. In developing countries like India, the prevalence rate is 60% during their lifespan¹.

There are various clinical entities of low back pain like mechanical, postural, traumatic radicular, discogenic, and referred pain². Pain generator of Non-traumatic LBP can arise from many potential anatomical structures such as Muscles, Bones, Fascia, Intervertebral discs, Spinal canal. Moreover, neural involvement of LBP gives radicular symptoms from the lumbar region to legs and foot and it can be unilateral or bilateral³.

Lumbar canal stenosis is a chronic condition characterized by narrowing of the spinal canal most commonly involve L4-L5, L5-S1 level. LCS is categorized into congenital and acquired form. The acquired form of spinal stenosis usually occurs from degenerative arthritis of the spine. The degenerative spinal stenosis is brought on by changes in the three-joint complex, the disc, superior and inferior vertebral bodies, and facet joint. Degeneration of this complex will lead to the formation of osteophytes and facet joint which is a diarthrodial joint begins to develop synovitis. There will be associated changes of loosening of the capsules, intervertebral disc degeneration, and osteophytes enlargement and hypertrophy of the ligamentum flavum. As a result, there will be reduced joint space and narrowing of the spinal canal.^{1,4}

Based on the lesion, the LCS can be central, lateral, or foraminal. The central stenosis is mainly present with axial back pain and neurogenic claudication. Motor and sensory radicular symptoms also associated. The pain associated with this type is usually bilateral. The lateral or foraminal stenosis is usually unilateral causing impingement of traversing and exiting nerve roots at subarticular recesses and the foramen respectively⁵.

The most common clinical presentation of the degenerative spinal stenosis is back pain with neurogenic claudication. The distribution of the pain in the lower extremity depends on the area of stenosis. It improves with trunk flexion, sitting, stooping, and lying and aggravates with prolonged standing and lumbar extension⁴.

Imaging studies proven that MRI findings of spinal stenosis patients had degenerative disc disease, loss of lumbar lordosis, decrease sacral slope, and increased pelvic tilt when compared to control population⁴.

This case report describes that patient diagnosed with Lumbar lateral canal recesses based on a thorough history and examination and diagnosis confirmed with MRI findings. The treatment focuses mainly

on spinal mobility, particular flexion based exercise, and retro walking to improve the patient's symptoms and make the patient independent in his activities.

Case description

Patient information and history

The patient was a 57-year-old male with a primary complaint of back pain with heaviness and numbness in the right leg up to great toe during walking and standing more than 5 min. Also, the patient has difficulty during prolonged sitting and getting up from the chair. The symptoms started 3 months ago and heaviness in the right leg was more severe.

The patient had developed symptoms 3 months ago when he tried to lift his grandchildren during function and climbed the stairs. The next morning he was having severe back pain and had to rest for the whole day. He then applied hot fomentation 2 to 3 times and continue his daily activities like jogging, meeting relatives, watching TV. Then after a week, his pain started and he felt heaviness and numbness in his right leg laterally and could not stand and walk. He had to bend forward while standing and walking and was unable to walk more than 5 to 7 min. So he saw his family physician and was prescribed medication. His pain did not subside so he saw an orthopedic surgeon and radiological examination was done in the form of MRI and he was diagnosed as Lumbar canal stenosis and L4-L5, L5-S1 disc bulge. The patient was advised for surgical intervention, but he did not want to undergo surgery so he looks for physiotherapy treatment.

Physical examination

Subjective and objective measure

The patient completed subjective measures for pain and disability. A body chart was used to mark the location of pain (Image 1). NPRS scale was used to measure the intensity of pain and the magnitude of disability was assessed with the self-reporting Oswestry Disability Index Gujarati version (ODI-G, Sweni shah et al. 2017), where 0% indicates no disability and 100% indicates the greatest disability.

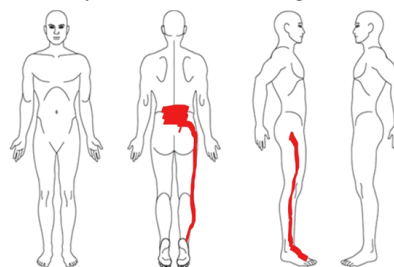


Image 1. Body chart of symptoms for the current episode

On observation, the patient developed a stooped posture to avoid

neurogenic claudication in lumbar extension. Muscle wasting of gluteus maximus, gluteus medius, gastrocnemius, and soleus were present.

On examination (Table 1), There were reduced thoracic spine mobility and increased lumbar spine mobility. The length of hamstring muscle was normal. During manual muscle testing, strength of gluteus maximus, gluteus medius, and calf muscles were reduced. Trendelenburg test was positive, suggesting reduced strength of hip abductors.

Table 1. Positive findings from physical examination

Physical examination	Positive findings
Pain	Symptoms of neurogenic claudication on right leg
Posture	Stoop standing
Muscle wasting	Gluteus maximus, medius, gastrocnemius, soleus
Manual muscle testing	Gluteus maximus, medius, calf muscle- Grade 3
ROM - PAIVM & PPIVM	Reduced thoracic mobility Increased lumbar mobility
Trendelenburg test	Positive on both side
Sensation	Diminished superficial sensation on right lower leg below knee.

Diagnosis

Based on the physical examination findings, the provisional diagnosis was lumbar canal stenosis and it was then confirmed with radiological imaging. MRI finding confirmed that the patient had lumbar lateral canal recesses.

Intervention

Patient had received physiotherapy treatment for 3 weeks and after 2 weeks of complete treatment follow up was taken. Manual therapy in the form of spinal mobilization, exercise therapy, and backward walking was given.

First week

During the first week, the focus was to improve spinal mobility. On physical examination, we found that patient had reduced passive accessory intervertebral movement (PAIVM) of the thoracic spine. We also have focus on sacral mobilization. Counternutation mobilization of sacrum was given. There was hyper mobility of lumbar spine so we did not give mobilization to lumbar spine. Along with mobilization, the patient was encouraged to perform flexion based exercise. The patient was strictly advised not to perform extension of lumbar spine.

Second week

The patient reported a reduction in symptoms of neurogenic claudication from lower leg to great toe. His posture was now erect standing from stoop standing and there was reduced intensity of back pain on NPRS scale. So patient was then encouraged to do jogging for 10 min. We also gradually added exercise to improve the strength of hip extensor and abductors.

Third week

After two weeks of treatment, there was a gradual reduction in symptoms, and mobility of the spine was normal so we stopped mobilization. Along with the above exercise, we introduce backward walking approximately 100 meters as a part of jogging.

Table 2. Showing Duration and treatment are given for 3 weeks

Duration	Treatment
First week	Thoracic mobilization, sacral counternutation mobilization, lion's stretching (10 sec hold*5 rep., knee to chest (3 rep*30 sec hold), static abdominis, cycling in lying position.
Second week	Above mobilization + exercise, jogging 10 min, straight leg abduction(10 rep.), prone lying hip extension (10 rep)
Third week	Above all exercise with two sets of 10 rep. + Backward walking 100 meters.

DISCUSSION

This case report described a patient with lumbar lateral canal recesses with unilateral claudication being the most apparent complaint. Neurogenic claudication can occur during walking and prolonged standing. The most common postural adaptation in this condition is stoop posture. As a patient extends their lower back, there will be narrowing of the spinal canal, compressing exiting nerve roots. In this case report, physical findings including subjective and objective data gave a provisional diagnosis, and then it was confirmed with MRI finding.

In this case report, flexion based exercise was encouraged during the first week as these exercises modify the position of the lumbar spine, thereby reducing the spinal cord narrowing and nerve compression. It has proven that flexion base exercise places the lumbar spine in a flexed position which results in increased intervertebral cross-sectional area⁶.

Mobilization is the key treatment to improve the range of motion in the peripheral joint as well as the intervertebral joint. Besides, literature shows that an imbalance in vertebral movement results in abnormal coupling motions. A reduced intervertebral joint in one region will result in excessive mobility in adjacent region⁷. Moreover, association studies show that SI joint dysfunction is greatly associated with gluteal muscle weakness. In this case report, the patient had reduced strength of gluteal muscles. So it is necessary to consider the spine as a whole kinetic chain system⁸.

In this case report, we introduced backward walking during the third week when the patient was able to stand and walk without claudication symptoms. As per literature, the global extensors (i.e. lumbar multifidus and erector spinae) of the lumbar spine are responsible to provide intersegmental stability, and atrophy of these muscles are associated with chronic low back pain. Also, EMG studies have proven that there was increased activity of lumbar multifidus and erector spinae during backward walking then forward walking. Therefore, backward walking greatly increases the activity of paraspinal muscles in low back patients⁹.

After three weeks of treatment, the patient was advised to continue flexion based exercise and strengthening exercise for hip extensors and abductors. After two weeks of follow up, a physical assessment was taken. There was an improvement in pain intensity on the NPRS scale and disability on ODI-G and the patient was able to continue jogging for 20 minutes without developing symptoms.

CONCLUSION

This case report concluded manual therapy in the form of thoracic and sacral counternutation mobilization and flexion based exercise with backward walking shows improvement in symptoms of neurogenic claudication in a patient with lumbar lateral canal recesses.

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