

Physiotherapeutic Management of Neuromuscular Scoliosis in Post-Polio Syndrome: A Case Report

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ABSTRACT

Polio is a viral disease that, although controlled by immunization programs, still has a significant impact on individuals affected in the past, mainly due to permanent neuromuscular sequelae. Among these sequelae, asymmetric muscle weakness, lower limb dysmetria, orthopedic deformities, and progressive postural changes—such as neuromuscular scoliosis, often associated with PostPolio Syndrome—stand out. These conditions can progress to chronic pain and reduced functionality, leading to a decline in quality of life and making physical therapy necessary and fundamental in the rehabilitation process. The objective of this study was to report the effects of a conventional physical therapy protocol on pain control, functionality, and mobility in a patient with a history of Post-Polio Syndrome associated with scoliosis and chronic low back pain. This is a case report of a 50-year-old female patient with motor sequelae in the right lower limb dysmetria, pelvic obliquity, and C-shaped lumbar scoliosis, accompanied by severe low back pain and functional limitations. The physical therapy intervention consisted of 24 sessions over three months and was based on analgesic modalities, respiratory reeducation, myofascial release, joint mobilization, stretching, and progressive muscle strengthening of the core, gluteal, and paravertebral muscles. After treatment, there was a significant reduction in pain, improvement in functional capacity, and increased lumbar and hip range of motion, reflecting a positive impact on activities of daily living. The results indicate that conventional physical therapy, when applied on an individualized basis, is effective in reducing pain and improving function in patients with sequelae of poliomyelitis, reinforcing its essential role in the rehabilitation and management of late musculoskeletal complications associated with this condition.

Keywords

Neuromuscular scoliosis, Physical therapy, Chronic low back pain, Poliomyelitis.

Introduction

Poliomyelitis is a highly contagious viral disease caused by the poliovirus and is transmitted mainly through the fecal–oral route, particularly in environments with poor sanitation. Although 90–95% of cases are asymptomatic, a proportion of infected individuals develop severe neurological manifestations, including asymmetric and irreversible flaccid paralysis in approximately 1% of cases [1-3].

Even after the acute phase, many patients present permanent

sequelae, such as muscle atrophy, orthopedic deformities, limb shortening, scoliosis, and body asymmetries. In addition, some survivors may develop Post-Polio Syndrome (PPS), characterized by the reemergence of muscle weakness, fatigue, joint pain, and functional limitations decades after the initial infection. It is estimated that between 25% and 70% of individuals with paralytic poliomyelitis develop PPS, reinforcing the need for prolonged and multidisciplinary follow-up [4,5]

The context of poliomyelitis, scoliosis results from asymmetric atrophy and weakness of the trunk musculature, favoring muscle imbalances that lead to progressive structural deformities [6,7]. The diagnosis of scoliosis associated with poliomyelitis and PPS requires careful clinical evaluation, as asymmetric muscle

weakness and postural imbalance favor the onset and progression of vertebral deformities [8]. Therapeutic approaches may range from conservative strategies aimed at stabilizing spinal curvature and improving functionality to surgical procedures in more severe or progressive cases [9,10]. In this context, physical therapy stands out as the central axis of rehabilitation, particularly in mild and moderate cases, due to its role in preserving residual muscle strength, improving posture, and preventing orthopedic complications [11].

Case Report

Patient R.O.S. is a 50-year-old female with an occupational history of working as a domestic worker for 35 years, currently on leave from her professional activities due to chronic low back pain. During childhood, at approximately seven years of age, she presented symptoms suggestive of poliomyelitis, with no record of prior immunization, resulting in paralysis of the right lower limb. At that time, her condition was associated with an infection in the right thigh, characterized by a purulent process, followed by surgical drainage. After this surgical intervention, there was no follow-up regarding functional recovery of the limb or access to rehabilitation services.

Among the sequelae related to Post-Polio Syndrome (PPS), the patient presented lower limb dysmetria, muscle hypotrophy of the right lower limb, and pelvic imbalance on the right side secondary to lower limb length discrepancy. These alterations were associated with C-shaped lumbar scoliosis with right convexity, diagnosed approximately 25 years ago.

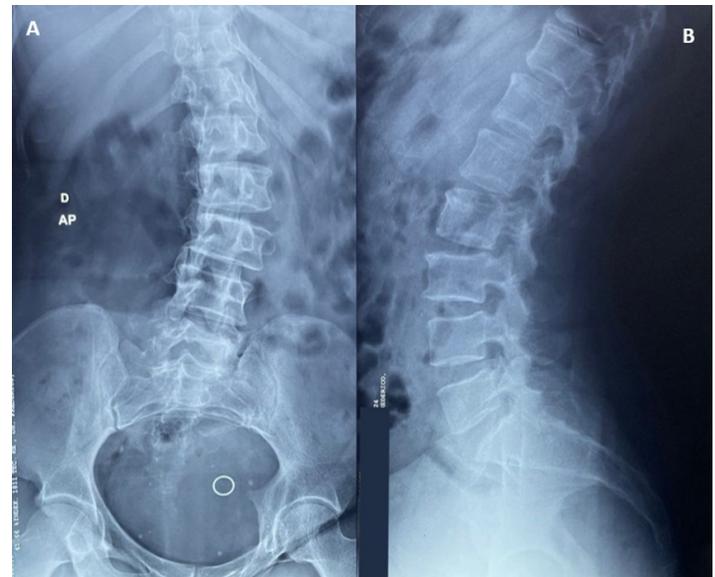
The patient reported a history of low back pain for approximately 20 years, with progressive worsening over the past year. On the day of evaluation, she reported intense pain accompanied by a continuous burning sensation, scoring 8/10 on the Visual Analog Scale (VAS) and 23 points on the Oswestry Disability Index (ODI). During physical examination, Lasegue and Patrick tests were positive, suggesting neural involvement and hip joint dysfunction. Imaging examinations confirmed the presence of a herniated disc at the L4 level, marginal osteophytes in the thoracic and lumbar spine, and, on postural assessment, pelvic anteversion and hip asymmetry were observed.

In addition, the patient presented relevant comorbidities, including systemic arterial hypertension, neuropathic pain, and a recent history of urinary tract infection. Her surgical history included right thigh drainage in childhood (associated with poliomyelitis), cholecystectomy, appendectomy, and cardiac catheterization.

Physical Therapy Intervention

The patient underwent a physical therapy protocol consisting of three weekly sessions, totalling 24 appointments over a three-month period. In the initial phase, priority was given to pain relief and the introduction of body awareness techniques. Diaphragmatic breathing was taught, as described by Das [14], since respiratory dysfunction can compromise lumbar stability due to the close anatomical relationship between the diaphragm and the spine [14].

Figure 1



A. Preoperative coronal radiograph with a demonstrating scoliosis.
B. Demonstrates the sagittal deformity in the patient with a thoracolumbar alterations.

Analgesic treatment included cryotherapy applied to the lumbar region for 15 minutes, therapeutic ultrasound with parameters of 3 MHz and 1.5 W/cm² in continuous mode for 12 minutes, and transcutaneous electrical nerve stimulation (TENS) with a frequency of 70 Hz, pulse duration of 150 μs, and total application time of 40 minutes, applied to the lumbar paravertebral muscles from L3 to S1. Additionally, myofascial release techniques were applied to the quadratus lumborum, latissimus dorsi, and trapezius muscles to promote muscle relaxation, optimize flexibility, and reduce pain symptoms [15].

After achieving initial pain control, joint mobilization of the spine and hips was introduced, including trunk dissociation exercises, mobilization in the quadruped position, and internal and external rotation movements of the lower limbs. Dynamic stretching exercises targeting the hamstrings, trapezius, and latissimus dorsi muscles were also performed, aiming to increase range of motion and improve functional capacity.

Therapeutic exercises focused on muscle strengthening and gains in range of motion (ROM) were progressively implemented according to the patient's clinical evolution. These exercises included joint mobilization and active movements with light external resistance. Muscle strengthening activities were associated with joint mobilization and myofascial release techniques, which were maintained at the end of each session to promote post-exercise muscle relaxation.

Results

After eight weeks of conventional physical therapy intervention, a significant reduction in pain was observed. Pain intensity, assessed using the Visual Analog Scale (VAS), decreased from

8 to 3 points. Concurrently, functional improvement was noted, with greater independence in activities of daily living (ADLs), including standing, walking, forward bending, and performing light household tasks.

The Oswestry Disability Index (ODI) score decreased from 23 to 11 points, indicating a reduction in disability. The patient demonstrated satisfactory adherence to the therapeutic protocol, with active participation in supervised sessions and compliance with the prescribed home exercise program, which contributed to the optimization of therapeutic outcomes. Objective reassessment revealed biomechanical and functional improvements. The Schober test [16] increased from 11 to 13 cm, indicating improved lumbar flexibility. Goniometric assessment demonstrated increases in range of motion (ROM), with trunk flexion improving from 40° to 60°, lumbar extension from 18° to 20°, lateral flexion from 19° to 27°, and hip flexion from 60° to 73°.

Discussion

Neuromuscular scoliosis, such as that observed in individuals with a history of poliomyelitis, represents a complex challenge for physical therapy rehabilitation due to the combination of muscle weakness, residual paralysis, postural asymmetries, and the potential for progressive deformity [8].

From a biomechanical perspective, scoliosis secondary to poliomyelitis primarily results from loss of muscle function and impaired postural control, leading to pelvic obliquity, asymmetric load distribution, and compensatory changes in the thoracolumbar spine. This condition alters muscle recruitment patterns and requires a specialized therapeutic approach in which physical therapy addresses both the strengthening of weakened muscle groups and postural re-education, as well as soft tissue mobilization [17].

The literature highlights that Post-Polio Syndrome (PPS), although relatively uncommon, is characterized by late-onset and progressive clinical manifestations that significantly affect quality of life and present diagnostic and therapeutic challenges [18]. Although the structural and functional impairments caused by poliomyelitis are largely irreversible, appropriate physical therapy interventions have demonstrated substantial potential for pain control, muscle strengthening, and prevention of symptom recurrence [19].

In this context, physical therapy interventions focusing on strengthening the deep core musculature, lumbar paravertebral muscles, gluteal muscles, and trunk stabilizers play a crucial role. Additionally, stretching of shortened muscle chains, joint mobilization, and postural control exercises complement the therapeutic strategy and have shown favorable outcomes in postural alignment and pain reduction [17]. These findings are consistent with the study by Almeida et al., [20] which emphasizes core strengthening as an effective approach for improving nonspecific low back pain [21].

Furthermore, techniques involving diaphragmatic breathing

and myofascial release have demonstrated positive effects in modulating low back pain and promoting postural rebalancing, as reported by Finta [21] and Galhardo [15]. Another relevant factor highlighted in the literature is the relationship between hamstring flexibility and postural balance. Hamstring shortening can negatively affect pelvic and spinal biomechanics, contributing to the onset or exacerbation of low back pain [21-24].

Conclusion

Individualized physical therapy intervention resulted in significant improvements in pain, functional capacity, and range of motion in a patient with chronic low back pain and a clinical history consistent with Post-Polio Syndrome. Although some dysfunctions are irreversible, appropriate therapeutic management proved effective in strengthening musculature, reducing pain, and preventing further musculoskeletal complications. Therefore, further studies are warranted to confirm and expand the understanding of the role of physical therapy in the rehabilitation of individuals affected by poliomyelitis and its secondary conditions.

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