

Physiotherapy to improve functional independence in post-traumatic syringomyelia (pts): Case report

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ABSTRACT

A 27-year-old male presented with paralysis and tingling sensations in bilateral lower limbs. History revealed a D4-D6 spinal fixation secondary to a road traffic accident. Magnetic Resonance Imaging (MRI) diagnosed the case as post-traumatic syringomyelia secondary to spinal cord injury. Following the surgeon's clearance, a targeted early rehabilitation intervention (TERI) for functional independence, bed mobility and transfers was initiated and continued for four weeks. Patient showed considerable improvements in Barthel index (40-85%) and Karnofsky Performance Status (20-70%). Physiotherapy Targeted early rehabilitation intervention can be a valuable adjunct to other management strategies in spinal cord lesions.

Keywords: Post-traumatic syringomyelia, patient-centered, functional independence, TERI

INTRODUCTION

Post-traumatic syringomyelia (PTS) is the formation and progression of a cyst filled with cerebrospinal fluid (CSF) within the spinal cord. PTS is a rare, but potentially devastating, consequence of traumatic spinal cord injury (SCI) [1]. The clinical incidence of post-traumatic syringomyelia in individuals with injury to the spinal cord has been estimated to be 0.3-3.2% [2]. The mechanisms underneath the development of post-traumatic syringomyelia are unknown. The following processes are thought to be involved: 'slosh and suck' at the site of damage, liquefaction, hematoma formation, a malacic alteration in the spinal cord, necrosis, enzymatic lysis, tissue loss, and arachnoiditis [3,4]. Several studies have been conducted in an attempt to identify clinical and radiological variables linked with post-traumatic syringomyelia. All factors are considered, including age at onset, gender, the source of the injury, the location of the damage, the severity of the injury, the type of vertebral fracture, the therapeutic method, and the degree of encroachment into the spinal canal [5]. Arachnoiditis and complete spinal cord

injury have been attributed to an increased incidence of post-traumatic syringomyelia, and increasing age, damage at the cervical and thoracic levels, dislocated spinal fractures, and use of spinal instrumentation without decompression have all been identified as risk factors for the early development of post-traumatic syringomyelia [6]. A typical aspect of motor symptoms is weakness that primarily affects the extensors of the arms and flexors of the legs (pyramidal distribution of weakness). Paresthesia ascending from the feet with or without back ache is a common indication of sensory complaints. Autonomic involvement is also common, resulting in bowel and bladder dysfunction, fluctuating body temperature, and even brief but severe episodes of hypertension [7]. Based on pathological findings, tubular enlargements of the spinal cord that are not caused by intramedullary malignancies have been categorized as follows: The three types of extracanalicular syringes are:

1. Central canal dilations that anatomically connect to the fourth ventricle (communicating syringomyelia).



FIGURE 1. Magnetic Resonance Imaging scan showed fluid-filled cyst extending from the C3-C6 spinal level

2. Central canal dilations that do not connect to the fourth ventricle (noncommunicating syringomyelia), and
3. Extracanalicular syringes that originate in the spinal cord parenchyma but do not connect to the central canal or fourth ventricle [8].

Syringomyelia causes muscle weakness and wasting (atrophy) in the back, shoulders, arms, and legs, as well as headaches, loss of sensitivity to pain and warmth, stiffness in the back, shoulders, arms, and legs, and discomfort in the neck, arms, and back [9]. Positive outcomes from conservative rehabilitation include stabilized or decreased symptom loads and enhanced quality of life (QoL) [10]. The study aims on targeted early rehabilitation intervention (TERI) and patient-centric goals which highlights the significance of physiotherapy in enhancing symptoms and preserving the quality of life for patients, while acknowledging its underutilization resulting from limited data, expertise, and resources.

CASE PRESENTATION

Patient Information

In this case report, a 27-year-old male presented with lower extremity weakness, spasticity, and numbness that had been progressing over the previous 12 months. He had met with a road traffic accident 8 years back before he came to AVBRH hospital, Wardha, Maharashtra, India. Magnetic resonance imaging (MRI) revealed burst compressive fracture of D5 for which he had undergone spinal fixation from D4-D6. In the subsequent 2 years, however, he experienced progressive weakness in the lower extremities and decreased sensation below the T12 dermatome. He underwent a second surgery at AVBRH hospital, foramen magnum decompression after which a spinal MRI showed a large syrinx extending from C3 to C6. Patient was referred to neuro-physiotherapy for further management.

Clinical Findings

The patient had an ectomorphic build, attentive, cooperative, and well oriented to time, location, and person. On baseline assessment according to American Spinal Cord Injury Association (ASIA), sensory level was D12 and motor level was D1. Hypertonicity was present in both lower limbs. Patient had weak abdominal strength. Hyperreflexia was elicited while

assessing deep tendon reflexes for lower limbs, whereas upper limbs reflexes were normal and on examining superficial reflexes, plantar response elicited extension of great toe bilaterally and abdominal reflexes were absent.

Timeline of events: Table 1 given below

Investigations: A magnetic resonance imaging (MRI) scan was carried out and is shown in the Figure 1.

TABLE 1. Summary of events

Date	Events
10-04-2023	Started experiencing weakness and tingling sensations.
11-04-2023	Shifted to a tertiary care hospital in the vicinity, two days of hospital stay and treated conservatively.
14-04-2023	Referred to AVBRH for radiological investigation (MRI scan)
15-04-2023	Patient underwent foramen magnum decompression
16-04-2023	Under observation in Neuro-ICU
17-04-2023	Referred to Neuro-physiotherapy
18-04-2023	Shifted to neuro-surgery ward and physiotherapy continued there.
8-05-2023	Patient was discharged

Clinical Diagnosis

MRI spinal cord showed fluid-filled cyst extending from the C3-C6 spinal cord and the clinical manifestations demonstrate that post-traumatic syringomyelia.

Intervention: All the rehabilitation program was given to patient twice daily for a period of 4 weeks mentioned below in Table 2.

Follow-up and Outcomes Measures

After four weeks of neuro-physiotherapy training program which included roods inhibition, passive stretching, bed mobility exercises, sensory re-education and strengthening of bilateral upper limb, the patient achieved good control. There was moderation in spasticity as the normal tone was achieved by the end of four weeks. There was colossal betterment in Barthel Index from 40% to 85%. Karnofsky Performance Status is a functional impairment assessment tool used to evaluate patients' prognostic value and compare the effectiveness of different treatments

TABLE 2. Early Physiotherapeutic rehabilitation intervention

Problem Identified	Probable Cause	Goal	Physiotherapy Intervention	Dosage
Spasticity of knee flexors and ankle plantar-flexors.	Spasticity	To reduce the increased muscular tone.	1. Passive Mobility exercises of Lower limbs then progressed to active-assisted mobility and afterwards active mobilities of knee and ankle joint 2. Sustained passive stretching of knee flexors and ankle plantar-flexors. 3. Inhibitory Techniques such as deep tendon pressures and prolonged icing	1. 10 RepetitionsX2sets 2. 30 seconds hold X5 Repetitions X 1set 3. For 5-10mins
Weakness of abdominals	Reduced strength of abdominals	To strengthen abdominal musculature	1. Isometric exercises for abdominals in crook-lying position, and abdominal hollowing in quadruped. 2. Progression to crunches	10seconds hold X 10 Reps X 3 sets
Difficulty performing bed transitional activities	Reduced strength and increased tone	Restore the bed mobility	MAT activities: Lying, rolling, prone on elbows, prone on hands, quadruped, kneeling and sitting and standing	Each of the MAT activities were trained and was maintained for 10 seconds X 10 Repetitions X2sets.
Reduced sensation below T12 level	D5-D6 spinal fixation	Re-educate the sensory pathways	Sensory retraining activities like: textures training (cotton, silk, rough sandpaper, velcro), temperature (soaked cold and hot towels)	Distal to Proximal 10 Repetitons X 7sets
Reduced strength of upper limbs	Nerve impingement from C3-C6	To strengthen upper limbs musculature.	Resisted muscle training manually, then progressed to 0.5kg,1kg,2kg weight cuffs	10 Repetitions X 2 sets

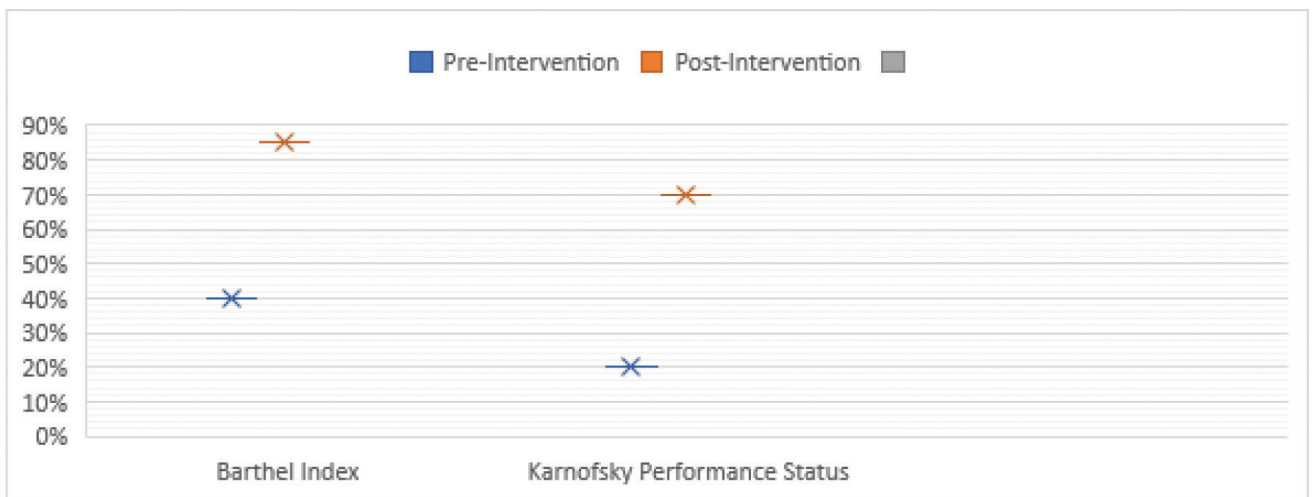


FIGURE 2. Pre and Post intervention improvement in the outcome measure

and showed massive improvement from 20% to 70% as shown in the Figure 2.

DISCUSSION

Syringomyelia is an uncommon illness that has the potential to significantly impair quality of life and cause considerable disability. The symptoms of syringomyelia are comparable to those of multiple sclerosis and spinal cord injury, several long-term neurological diseases. Physiotherapy is frequently used in these more common disorders and is efficient in maximizing physical, psychological, and social aspects. In order to assess the current uptake as well as

perceived efficacy of physiotherapy for patients with syringomyelia, Smith R. et al. conducted a study in 2014. Data on uptake and perceived physiotherapy effectiveness were obtained from specially created questionnaires and semi-structured interviews. A tertiary syringomyelia unit of the National Health unit asked 100 patients to take part. The majority of people reported positive impacts on quality of life and pain management. Hydrotherapy and stretching were found to be useful for reducing pain and stiffness [11]. Another study was conducted in 2017 on post-traumatic syringomyelia (PTS) which addressed the management of a patient receiving outpatient physical therapy after having surgery to treat PTS-re-

lated recurring spinal cysts. The patient underwent physical therapy three times each week for an hour for each visit. The patient also underwent OT two times a week for an hour each. The interventions were in line with the primary objective of fostering independence by improving the patient's mobility and general ambulation. The patient had advanced from being unable to walk to walking with the aid of a device and with some assistance from the physical therapist. She also required less support with transfers and standing. Additionally, the patient showed progress in functional ambulation outcome measures [12].

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CONCLUSION

This case report perorated that early neuro-physiotherapy with patient-centric goals helps to improve the patient's tone, strength, and other day to day activities. The patient showed improvement clinically as well as with outcome measures. The patient was able to walk with walker assistance within one month. As there a few literatures regarding rehabilitation of post-traumatic syringomyelia, so there is a need for high-quality study to be on targeted early rehabilitation interventions (TERI) which improve the quality of life.

Conflict of Interest: The authors declare no competing interest.

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