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Authors' Affiliation:

¹Ravi Nair physiotherapy college, Datta Meghe institute of medical sciences, Sawangi (M), Wardha, Maharashtra, India; Email: chitrakshichoubisa30@gmail.com

²Assistant Professor, Department of Neurophysiotherapy, Ravi Nair Physiotherapy College, Wardha, Maharashtra, India; Email: snehalsamal11@rediffmail.com

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Effectiveness of rehabilitative physiotherapeutic intervention in case of acute onset quadriparesis following transverse myelitis – A case report

Chitrakshi A Choubisa¹, Snehal Samal²

ABSTRACT

Transverse myelitis is considered as a rare inflammatory disorder of spinal cord, resulting in damage and destroy myeline covering of spinal cord and eventually leads to motor and sensory deficit producing impaired and altered sensations, paresis in limbs, also bowel and bladder malfunctioning. A 24 year old male came with the complaints of weakness in all four limbs from 7 days. He was admitted to hospital and it was found that he was having vit B12 deficiency whereas, MRI spine revealed Acute Transverse myelitis. Due to weakness, he was advised physiotherapy treatment. A well framed physiotherapy protocol has been used for significant improvement and functional recovery. By making use of various outcome measure such as Berg Balance Scale, Barthel Index of Activities of Daily Living, Hamilton Rating Scale of Depression, MMT and Fatigue Assessment Scale, pre-rehabilitation and post rehabilitation recovery in patient has been compared which has shown relatively significant improvement.

Keywords: transverse myelitis, quadriparesis, weakness, physiotherapy rehabilitation, case report.

1. INTRODUCTION

Transverse myelitis is considered as a rare inflammatory and pathobiologically diverse illness marked by acute or subacute spinal cord dysfunction (Cox and Russo, 2020; Krishnan et al., 2006). It affects white and grey matter of spinal cord extending upto one or more spinal segments bilaterally (Mehmood et al., 2019). The inflammation causes damage and destroy myeline covering of spinal cord and eventually leads to various neurological deficit and wide range of symptoms involving motor impairments, altered sensations, development of quickly progressive condition characterised by back pain, numbness, and tingling in the legs,

trunk, and occasionally the arms, also autonomic impairments such as bowel/bladder malfunctioning (Masson, 2005; Pandit, 2009a; Arroyo, 2013; Cree, 2014).

Transverse myelitis is believed to be caused following various infectious conditions such as mumps, rubella or post varicella (McCarthy and Amer, 1978), paraneoplastic, certain drugs or toxins and autoimmune disorders that are acquired. It is often associated to inflammatory autoimmune diseases including systemic lupus erythematosus and Sjogren's syndrome (Wang et al., 2021; Kaneko et al., 1998). Multiple sclerosis can manifest with TM as a symptom (Pandit, 2009b). Transverse myelitis can also be linked to immune-mediated conditions like Neuromyelitis Optica / Neuromyelitis Optica spectrum illness (Pandit, 2009b). Women suffering from Transverse Myelitis generally follow multiple sclerosis (Scott et al., 2011). The occurrence rate of Transverse Myelitis is 1.34/million people (Berman et al., 1981). Children account for roughly 20% of all instances of acute transverse myelitis (Wolf et al., 2012). Potential treatment of Transverse Myelitis includes Plasma exchange. It augments the neuronal recovery in case of acute attacks of transverse myelitis of unknown aetiology (Weinshenker et al., 1999). In patients with demyelinating disorder of unknown aetiology if there is failure of steroidal therapy, Plasma exchange is considered life saving (Weinshenker, 2001).

Numerous brain repair pathways are based on maintaining an ideal level of activity on the either side of damaged segment; hence, rehabilitation and exercise are beneficial for compensatory functional objectives as well as for neural system regeneration (Sadowsky et al., 2011). The rehabilitation of patients helps to improve the disease's outcome clinically and functionally (Calis et al., 2011). Physiotherapy intervention can prove beneficial in the improvement of patients with Transverse Myelitis (Han-Hung, 2018). By employing rehabilitative therapies, it is now conceivable to anticipate functional nervous system repair (Sadowsky and McDonald, 2009).

2. PATIENT INFORMATION

A 24-year-old male patient, labourer by occupation, having chief complaints of weakness of all four limbs from last 7 days which was acute in onset and progressive in nature along with difficulty in voiding. He had fever and chills from past 2 days, with these complaints patient went to private hospital and was admitted where he was managed conservatively, on 5th November 2021 he was transferred to AVBRH for further management. Patient underwent various tests which revealed that he was having vit B12 deficiency. Also, the patient is aphasic since he is known case of catatonic schizophrenia with no other comorbidities. MRI spine revealed Acute Transverse myelitis. His personal history includes reduced appetite, disturbed sleep wake cycle, disturbed bowel bladder and has no addictions. Currently patient is on certain medication. Owing to patient's lack of ability to move all four limbs, later he was advised physiotherapy treatment which was started on 6th of November.

3. CLINICAL FINDING

On observation-Patient was conscious, oriented to time place and person, obeying commands and is in supine lying position. Ectomorphic in body built. Ryle's tube and Foley's catheter can be seen. Hearing and vision were intact. Speech was affected since patient was aphasic. On examination- Superficial, deep and combined cortical sensations were intact. MMT for upper extremity muscles was 2/5 and for lower extremity was 1/5. Deep tendon reflexes were exaggerated with Babinski sign positive. Patient was having difficulty in performing coordinated activities due to weakness.

Timeline

Occurrence of fever- 27th October 2021

Onset of weakness in limbs- 29th October 2021

Admission to hospital- 5th November 2021

Beginning of physiotherapy rehabilitation- 6th November 2021

Follow up- 16th, 30th November 2021 and 8th December

Diagnostic assessment

CBC showed normal values

ESR was 18mm/hr which is considered slightly raised but under the normal range.

Peripheral smear suggested that RBCs are normocytic normochromic with few microcytes seen.

CSF examination reveals glucose levels of 51mg/100ml and protein levels of 17mg/dl.

CRP was 47.58mg/L which is raised and suggestive of inflammation.

Nerve conduction studies are within normal range.

MRI spine reveals (figure 1)

Longitudinal homogeneously enhancing long segment intramedullary T2W cord signal hyperintensities extending from C3 to conus medullaris, likely inflammation etiology suggestive of transverse myelitis.

Cervical canal stenosis at C3-C4 to C6-C7 disc levels without neural foraminal stenosis and neural compression.

Posterior annular tear at central aspect of C5-C6 disc level

Early spondylo degenerative changes in whole spine.

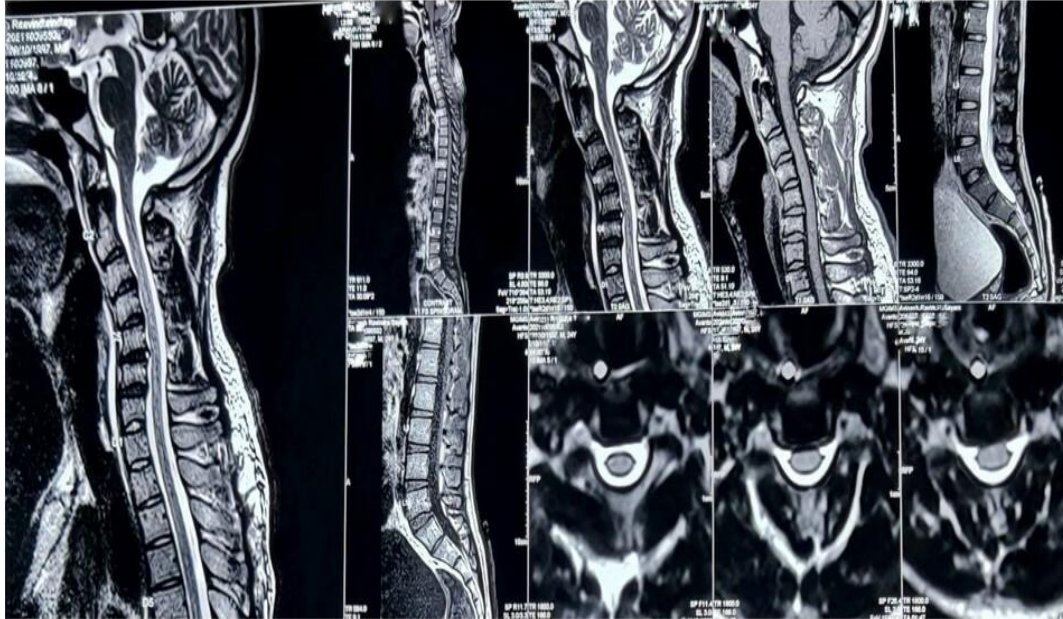


Figure 1 MRI

Therapeutic intervention

Physiotherapy rehabilitation protocol has been illustrated in table 1

Table 1 Physiotherapy rehabilitation protocol

Goals	Intervention	Rationale
To educate patient about condition, its prognosis and benefits of physiotherapy intervention.	Education and counselling of patient and his family.	Better understanding of the patient about the condition and active participation.
To improve strength of core muscles and upper and lower extremities.	Core strengthening (figure 2B). Using Weight cuffs and Thera band for upper and lower extremity strengthening.	Reduces fatigue and improves exercise outcome.
Maintain range of motion of upper and lower extremities.	Active assisted range of motion exercises in initial phase and further progress with active range of motion exercises (figure 2A).	Maintaining integrity of joints and associated ligaments and muscles.
To reduce anxiety and depression.	Buteyko breathing technique.	Helps to relax the patient.
To improve exercise tolerance.	Graded exercise program, starting with hallway ambulation (figure 2C).	Improves cardiovascular functioning.
To improve quality of life.	Home exercise program.	A special program to maintain the gained progress and promoting further improvement.



Figure 2 (A) heel slides (B) pelvic bridging for core strengthening (C) ambulation

Follow up and Outcome

Follow up was taken by using various outcome measures illustrated in table 2 and 3

Table 2 Primary outcome measure

Scale	Scoring on 6 th November 2021	On 16 th November 2021	On 30 th November 2021	On 7 th December 2021
Berg Balance Scale	28/56	35/56	39/56	41/56
MMT	Upper limb-2/5 Lower limb-1/5	Upper limb-3/5 Lower limb-2/5	Upper limb-4/5 Lower limb-3/5	Upper limb-4/5 Lower limb-3/5
Hamilton Rating Scale for Depression	14 (moderate depression)	12 (mild depression)	8 (mild depression)	8 (mild depression)

Table 3 Secondary outcome measure

Scale	Scoring on 6 th November 2021	On 16 th November 2021	On 30 th November 2021	On 7 th December 2021
Fatigue Assessment Scale	5	4	3	3
Barthel Index of Activities of Daily Living	8/20	10/20	11/20	13/20

4. DISCUSSION

Transverse myelitis is an uncommon inflammatory condition of the spinal cord affecting white and grey matter of spinal cord extending longitudinally and bilaterally up to one or more spinal segments (Cox and Russo, 2020; Krishnan et al., 2006). There is demyelination of spinal cord following inflammation leading to neural tissue damage resulting in various symptoms of deficit of neurological origin which includes motor weakness, alteration of sensations, tingling numbness in lower limbs extending to upper extremities (Pandit, 2009a; Arroyo, 2013; Cree, 2014). Involvement of bowel and bladder leading to disturbed normal functioning can be seen (Masson, 2005; Arroyo, 2013; Cree, 2014). In this condition there is need of long-term rehabilitative care for reducing adverse effects of immobilization due to weakness and hence making patient functionally independent. Maintaining optimal level

of physical exercise result in repairing of nervous tissue and prevent further deconditioning owing to this reason rehabilitation and exercise are the key objectives for the patients with Transverse Myelitis (Sadowsky et al., 2011; Sadowsky and McDonald, 2009).

Patients suffering from Transverse myelitis should include rehabilitation as a major component of their physical therapy hence facilitating early recovery (Calis et al., 2011). The rehabilitation of patients helps to improve the disease's outcome clinically and functionally (Calis et al., 2011). Physiotherapy intervention can prove beneficial in the improvement of patients with Transverse Myelitis (Han-Hung, 2018).

5. CONCLUSION

The study concluded that Transverse myelitis is an inflammatory and degenerative condition of spinal cord leading to varying degree of deficits of neurological origin which involves motor and sensory deficit which can be effectively managed by proper physiotherapeutic rehabilitation protocol leading to augmentation of functional capabilities.

Author's Contribution

All authors contributed equally.

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Informed Consent

Oral as well as written informed consent was taken from the individual, who is been included in the case report.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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