Efficacy of Physiotherapy Rehabilitation for Hemiparesis following Cerebral Venous Sinus Thrombosis: A Rare Case Report

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Authors’ contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: In Cerebral Vascular Disease when one or more arteries are thrombosed it results in Cerebral Venous Sinus Thrombosis (CVST) and affects in all ages. This condition is very challenging as it is not diagnosed early due to diverse signs and symptoms and involvement of extensive collateral circulation. Superior sagittal sinus is a large sinus which is commonly affected. Usually, patient comes with clinical presentation of headache with papilledema, to focal deficit, seizures and coma.

Aim: To investigate the efficacy of Physiotherapy Rehabilitation for Hemiparesis following Cerebral Venous Sinus Thrombosis.

Presentation of Case: A 18-year-old male patient presented with a history of severe headache, weakness in his right arm and leg, dizziness upon rising from bed, and a unilateral headache. On investigation CT scan and MRI brain was done. The physiotherapy has started from 2 days after admission in AVBRH.
Discussion: In the cases of cerebral venous sinus thrombosis the management of hemiparesis is shown to enhance the ADL and quality of life of patients.  
Conclusion: The rehabilitation protocol planned will help in improving the range of motion and ADL of patient when started as early as possible.

Keywords: Cerebral venous sinus thrombosis (CVST); hemiparesis; Range of Motion (ROM); rehabilitation.

1. INTRODUCTION

The incidence of cerebral venous sinus thrombosis and acute bacterial meningitis in adults are almost same. Ischemic stroke or intracerebral hemorrhage are more common as compared to CVST. Cerebral venous sinus thrombosis (CVST) is diagnosed with acute and sub acute headaches, blurred vision, fainting or loss of consciousness, loss of control over movement in part of body, seizures, coma [1]. Young and middle aged population are mostly affected and women’s are more affected than man. The annual incidence of CVST is approximately seven cases per million in the pediatric population [2]. Recurrence is rare (less than 10%), and most relapses happen within the first 12 months [3]. Very often CVST influences the working age population and hence the remaining symptoms has a huge effect on patient’s quality of life [4]. The threat element of CVST is divided into two: (1) Transient risk factor, which involves oral contraceptives, the medications which are having prothrombotic effects, pregnancy, etc. (2) Permanent risk factor which involves prothrombotic medical conditions, myeloproliferative disorders, etc. [5]. The complications are impaired speech, increased fluid pressure inside the skull, pressure on nerve, developmental delay.

2. PATIENT INFORMATION

An 18 years old male, is a student of 12th standard with right hand dominant. He gave the history of severe headache two years prior, for which he visited a local physician, who gave him analgesic for relieving pain. He was alert and conscious when he was admitted to the neurology department on October 8, 2021. He had an 80-beat-per-minute pulse and a blood pressure of 120/80 mmhg. He'd been suffering from a severe right-sided headache, weakness in his right arm and leg and sleep disturbances. There was no history of diabetes, hypertension, asthma, surgery, trauma, or addiction in the family. The patient consumes a mixed diet, his bladder and bowel functions normally. Computed tomography (CT) scan and Magnetic resonance imaging (MRI) were done. Following that, the patient was kept in the intensive care unit for 5 days before being transferred to the general ward, where he developed a fever and vomited whenever he was awake.

3. CLINICAL FINDING

Patient was conscious, co-operative and oriented to time, place and person with Mini- Mental State Examination (MMSE) 25/30. On observation attitude of limb in supine position. Pillow under head, right upper limb (UL) and lower limb (LL) is in external rotation. Left UL and LL side was neutral.

Posture- sitting position in lateral view shows the evidence of forward neck, shoulder protracted, elbow flexed, forearm pronated rested over the thigh, with pelvis anterior tilt, ankle in plantarflexion

Standing position – not assessed as the patient was not able to stand.

Tone examination of the right side was hypotonic for the upper limb and lower limb while for the left side it was normal.

3.1 Sensory Examination

Superficial, Deep and Cortical sensations were intact.

Balance – sitting position patient is able to maintain with support
Standing position - patient is able to stand with support

3.2 Investigations

CT angiogram was done on 10th October 2021. The reports revealed that there was hyper density noted in superior sagittal sinus, straight sinus, right transverse sinus and right sigmoid sinus.
**Tone:**

<table>
<thead>
<tr>
<th>Muscle tone (MAS)*</th>
<th>Right Side</th>
<th>Left Side</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper limb-Shoulder</td>
<td>Grade 0</td>
<td>Normal</td>
</tr>
<tr>
<td>Elbow</td>
<td>Grade 0</td>
<td>Normal</td>
</tr>
<tr>
<td>Wrist</td>
<td>Grade 0</td>
<td>Normal</td>
</tr>
<tr>
<td>Lower limb- Hip</td>
<td>Grade 0</td>
<td>Normal</td>
</tr>
<tr>
<td>Knee</td>
<td>Grade 0</td>
<td>Normal</td>
</tr>
<tr>
<td>Ankle</td>
<td>Grade 0</td>
<td>Normal</td>
</tr>
</tbody>
</table>

**Reflex:**

<table>
<thead>
<tr>
<th>Reflex</th>
<th>Right Side</th>
<th>Left Side</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial reflex</td>
<td>Babinski positive</td>
<td>Normal</td>
</tr>
<tr>
<td>Planter response</td>
<td>Diminished (+)</td>
<td>Normal</td>
</tr>
<tr>
<td>Abdominal response</td>
<td>Diminished (+)</td>
<td>Normal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Deep tendon reflex</th>
<th>Right Side</th>
<th>Left side</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicep jerk</td>
<td>Diminished (+)</td>
<td>Normal</td>
</tr>
<tr>
<td>Triceps jerk</td>
<td>Diminished (+)</td>
<td>Normal</td>
</tr>
<tr>
<td>Supinator jerk</td>
<td>Diminished (+)</td>
<td>Normal</td>
</tr>
<tr>
<td>Knee jerk</td>
<td>Diminished (+)</td>
<td>Normal</td>
</tr>
<tr>
<td>Ankle jerk</td>
<td>Diminished (+)</td>
<td>Normal</td>
</tr>
</tbody>
</table>

**Timeline of events:**

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of admission</td>
<td>8th October 2021</td>
</tr>
<tr>
<td>Date of start of physiotherapy</td>
<td>14th October 2021</td>
</tr>
<tr>
<td>Date of discharge</td>
<td>18th October 2021</td>
</tr>
<tr>
<td>Last date of rehabilitation</td>
<td>Still ongoing</td>
</tr>
</tbody>
</table>

**Short term goals:**

<table>
<thead>
<tr>
<th>Goals</th>
<th>Rationally</th>
<th>Intervention</th>
<th>Weeks / Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>To prevent bedsores</td>
<td>To minimize the pressure due to prolonged immobility</td>
<td>Bed mobility exercises, Positioning after every 2 hours, Water or air bed to reduce pressure,</td>
<td>Till the patient cannot able to do bed mobility by himself.</td>
</tr>
<tr>
<td>Trunk control exercise</td>
<td>Reduce back pain, improve trunk balance</td>
<td>Pelvic bridging - movements, hip rotations, posterior pelvic tilting exercises.</td>
<td>Till the patient cannot able to sit independently.</td>
</tr>
<tr>
<td>To improve posture</td>
<td></td>
<td>Shoulder – protraction, retraction exercises</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Static balance exercises in sitting and progressed to standing.</td>
<td></td>
</tr>
<tr>
<td>To prevent tightness</td>
<td>To improve circulation, Prevent contractures.</td>
<td>Passive movements, range of motion , stretching forward bend stretch , standing quads stretch</td>
<td>Started from 1st day of physiotherapy rehabilitation.</td>
</tr>
</tbody>
</table>
Goals | Rationally | Intervention | Weeks / Days
--- | --- | --- | ---
Muscle re-education | To develop motor awareness, voluntary motor response, strength. | Static exercises, Active assisted ROM exercises of upper and lower limb, balance exercises. | Should be started from day 1 of rehabilitation.

Long term goals:

Goals | Rationally | Intervention | Weeks / days
--- | --- | --- | ---
Strength upper limb, lower limb | To improve ADL, to gain confidence, regain muscle tone | Static – isometric exercise - plank, low squats, split squats, leg extension, static lunge, lateral shoulder rise | Started as soon as the patient can able to do the ROM exercises of the affected extremity independently.
To improve balance | Maintain stability, improve posture. | Weight shifting exercise – standing feet together, stepping activities, | Started as soon as the patient will be able to stand.
Gait training | Improve walking pattern. | Frenkel’s exercise in standing. | Started as soon as the patient will be able to stand.

3.2.1 Diagnostic assessment
As per the investigation patient was diagnosed as a case of Right hemiparesis.

3.2.2 Therapeutic intervention
In physiotherapy management of right hemiparesis due to CVST, an exercise program is designed for patient.

3.2.3 Follow-up and outcomes
There was a tremendous improvement in the WHO-Quality of Life (WHO-QOL) post-rehabilitation

4. RESULTS
Early rehabilitation for patients with CVST stroke will help for early recovery post-stroke. Basic bed mobility training improves mobility and joint integrity. The vitals were taken into account while targeting the best possible outcome of the patient. Patient is coming for regular follow-up and rehabilitation in our department.

5. DISCUSSION
There are different representatives of CVST which includes the epidemiological component, clinical presentation, etiological component. Most commonly found in South Asia and in the Middle East [6] CVST is the rarest pathology seen but few therapeutic experiments can practice heparin, thrombolysis, and oral anticoagulants [7].

Cerebrovascular sinus thrombosis is rare form of stroke associated with hemiparesis. For the intervention of hemiparesis, rehabilitation begin in the acute stage is the best option [8,9]. The reason for this is that bed rest has a negative impact on musculoskeletal, cardiovascular, respiratory, and emotional health, which may cause recovery to be interrupted in the acute stage. Different exercise are progressively planned under the short term and long term exercise goals which include prevention of bed sore by bed mobility, muscle reeducation, pelvic bridging, balance exercise, strengthening of affected side and gait training. All this physiotherapy management will help the patient to improve their posture, muscle tone, and stability and ADL of patient.

6. CONCLUSION
Rehabilitation has been shown to be beneficial in improving a patient's condition, resulting in a favorable outcome, as well as raising the patient's confidence and mental health. These methods open up the possibility of starting rehabilitation from the ICU itself, resulting in better outcomes. The earlier the intervention is provided, the better the outcome.

CONSENT
A proper informed consent was taken from the patient prior.

ETHICAL APPROVAL
It is not applicable.
COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES


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