The Pediatric PT Management of a Survivor of Cancer: a Case Report

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Background

• Cancer in the cerebellum in a pediatric population is rare.
• The cerebellum is responsible for:
  - Coordination of ongoing movements
  - Postural control
  - Visual gaze
  - Performing smooth purposeful movements.
• There is limited evidence investigating the physical therapy management of pediatric survivors of cancer, more specifically, in cerebellum brain tumors.

Purpose

The purpose of this case report was to investigate the PT management of a pediatric survivor of cancer who had a cerebellar tumor resection.

Case Description

• Five-year-old boy, post cerebellum tumor resection.
• Patient presented with cerebellar pathology including impairments:
  - Balance, gait, coordination, vision, strength, range of motion
  - Impairments resulted in overall functional limitations and disabilities (unable to attend school).

Examination

The majority of tests and measures were collected through clinical observation.

<table>
<thead>
<tr>
<th>Tests and Measures</th>
<th>Initial Evaluation (Start of Care – SOC)</th>
<th>End of 12 Weeks Clinical (22 weeks post-rec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy, Attention, Cognition</td>
<td>Poorly engaged, unsteady, located</td>
<td>Attended same environment with minimal assistance</td>
</tr>
<tr>
<td>Environment, Home, School/Work Barriers</td>
<td>Mobile</td>
<td>Attended same environment with minimal assistance</td>
</tr>
<tr>
<td>Assistance and Adaptive Device/Orthosis, Protection and Supportive Devices</td>
<td>Bilateral Ankle Foot Orthosis (AFO)</td>
<td>Bilateral Ankle Foot Orthosis (AFO)</td>
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<td>EMG and Motor Mechanics</td>
<td>Impaired Gait Mechanics</td>
<td>Impaired Motor Mechanics, gait improved since SOC</td>
</tr>
<tr>
<td>Gait, Locomotion, and Balance</td>
<td>Impaired strength of trunk and bilateral extremities</td>
<td>Impaired strength of trunk and bilateral extremities</td>
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<tr>
<td>Muscle Performance</td>
<td>Moderate Assistance</td>
<td>Minimal Assistance</td>
</tr>
<tr>
<td>Range of Motion</td>
<td>Headturns: IP (with pain)</td>
<td>15°</td>
</tr>
<tr>
<td></td>
<td>Sleeping: 90°</td>
<td>90°</td>
</tr>
</tbody>
</table>

Interventions

• Physical therapy interventions, while wearing the DMO, which has been shown to improve core stability included:
  - Functional Training
  - Balance Training
  - Gait Training
  - Stair Management
  - Treadmill and stair training
  - Balance activities such as reaching outside base of support in various positions.
  - Obstacle course designed to improve balance, coordination, core activation, and gait while stepping over objects and accommodating various surfaces.

Dynamic Movement Orthosis

Orthosis worn for all therapeutic exercises

Interventions

• Interventions were provided using a Neurodevelopmental Technique (NDT).

Methods

• Examples of interventions performed during treatment sessions:
  - Tall Kneel → Half Kneel
  - Sit → stand
  - Side stepping
  - Squatting
  - Treadmill and stair training

Discussion

The PT management of this pediatric patient after tumor resection included therapeutic exercise, functional training, and balance training with the use of a DMO.

Outcomes

• The patient demonstrated improvements in:
  - Balance
    - Pediatric Balance Scale: 5/56 → 26/56
  - Coordination
  - Strength
  - Range of Motion (ROM)
  - Gait

• Particularly noticeable improvements when DMO was first used in week 15.
• Functional gains were observed throughout the plan of care. These gains increased with DMO use however, overall, gains occurred at a slow rate.

References