



Early Intervention Physical Therapy for a Toddler with Hypoplastic Left Heart Syndrome (HLHS) Following Cardiac Surgeries: A Case Report

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Introduction:

Hypoplastic Left Heart Syndrome (HLHS) is a complex congenital heart defect characterized by underdevelopment of the left side of the heart, leading to significant medical challenges and developmental delays in affected children. Kevin, a 13-month-old male with HLHS, presents for a developmental assessment in a multidisciplinary outpatient clinic setting due to concerns regarding gross motor delay. This case report focuses on Kevin's journey through early intervention physical therapy following two cardiac surgeries to address his motor delays and optimize his functional outcomes.

Kevin's medical history reveals a prenatal diagnosis of HLHS, followed by birth in a specialized unit and immediate transfer to the Cardiac Intensive Care Unit for stabilization. He underwent two cardiac surgeries: a stage one repair with a Blalock–Taussig shunt on day three of life and a bidirectional Glenn procedure at 4.5 months. However, these surgeries were complicated by left vocal cord paralysis and venous sinus thrombus, adding to his medical complexity.

During the physical therapy examination, Kevin exhibited mild cyanosis and displayed resistance to lower extremity weight-bearing, raising concerns about his gross motor development. The Peabody Developmental Motor Scales assessment revealed delays in stationary/balance skills, locomotor skills, and object manipulation skills, indicating the need for targeted intervention to address these deficits.

The goal of Kevin's physical therapy intervention is to improve his leg strength and weight-bearing abilities, thereby enhancing his standing and walking skills. The plan of care includes weekly early intervention physical therapy sessions focusing on standing skills, along with parent education to facilitate home-based activities and promote optimal motor development. Specific goals for Kevin over the next 12 weeks include standing independently at a support surface, pulling to stand independently, cruising laterally, and taking steps with minimal assistance.

This case report underscores the importance of early intervention and multidisciplinary collaboration in addressing the complex needs of children with HLHS. By targeting motor delays through structured physical therapy interventions, Kevin aims to achieve age-appropriate motor milestones and enhance his overall quality of life.

Case Description:

Toddler with HLHS following two cardiac surgeries

History of present illness and chief complaint Kevin is a 13-month-old male with HLHS who presents for developmental assessment in a multidisciplinary outpatient clinic setting. Kevin has a history of gross motor delay, and his parents are concerned that he does not put his feet down to stand. Birth and medical history Kevin was diagnosed prenatally with HLHS and was born full term in the Special Delivery Unit at a children's hospital and transferred immediately to the Cardiac Intensive Care Unit for stabilization. Surgical history Kevin underwent a stage one repair with Blalock–Taussig shunt on day of life three, which was complicated by left vocal cord paralysis and venous sinus thrombus. He had a bidirectional Glenn procedure at 4.5 months. Current medications Lasix 0.8 mg 1/day; Lovenox 0.7 mg 1/day; Benefiber 1 tsp/day Social history Kevin's parents are very involved in his care, and his mother stays home with him. He has been receiving early intervention physical therapy weekly since 8 months of age. Physical therapy examination General appearance/Lines/Tubes: Kevin presents with mild cyanosis and no external supportive devices or lines. State of consciousness: He is awake, alert, oriented and interactive with his parents in the exam room. Pain: FLACC score of 0 out of 10. Vital signs at rest: Heart rate = 130, SpO₂ = 87%, blood pressure in the right upper extremity = 92/59, respiratory rate = 30. Integument/Skin integrity: Median sternotomy scar well healed with good scar mobility. Capillary refill: Rolling: rolls bilaterally supine to prone, leading with hips. Pull to sit: with + chin tuck. Sitting: sits independently, reaches out of the base of support, and manipulates toys in sitting. Transitions: per report transition from sit to prone, but not supine or prone to sit. Standing: does

not stand or place feet on the ground, very resistant to lower extremity weight bearing. The Peabody Developmental Motor Scales, 2nd edition was administered with scores at the 16th, 2nd, and 37th percentile for stationary/balance skills, locomotor skills, and object manipulation skills, respectively. The gross motor quotient is 79 (8th percentile). Physical therapy evaluation and diagnosis Kevin is a 13-month-old male with HLHS s/p stage two repair. He presents to physical therapy with decreased leg strength and decreased weight bearing, impacting his standing and walking skills, leading to delayed gross motor skills. He presents with overall gross motor skills at the 8th percentile on the Peabody Developmental Motor Scales, 2nd edition, with performance at the 16th, 2nd, and 37th percentile for stationary/balance skills, locomotor skills, and object manipulation skills, respectively. This corresponds to the 7- to 12-month level. His delayed motor skills impact his ability to age-appropriately interact with his environment.

Plan of care Early intervention physical therapy once per week, with a focus on standing skills. Parent education for standing skills and shoe wear. Goals (for 12 weeks) 1. Kevin will stand at a support surface when placed for 5 minutes without loss of balance. 2. Kevin will pull to stand at the support surface independently. 3. Kevin will cruise laterally for 5 feet in each direction. 4. Kevin will take steps for 10 feet forward with one handheld. Procedural interventions Parent education: Role of shoe wear, ways to encourage standing and walking, continue scar massage. Developmental skills: Play activities to encourage standing, transfers to stand, cruising and walking. Strengthening: Via standing and walking repetition activities.

References:

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