The Effectiveness of Partial Weight Bearing Treadmill Training For Increasing Gait Speed in Children with Spina Bifida

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PICO QUESTION: Does the use of partial weight bearing treadmill training in children with spina bifida, L3 or lower, result in the development of increased gait speed?

SPINA BIFIDA BACKGROUND
- Group of birth defects affecting the spinal cord
- Malformation of embryonic neural tube
- Neural tube fails to develop or close properly
- Causes defects in spinal cord and in the spine
- Can cause musculoskeletal and neurological impairments

COMMON IMPAIRMENTS L3 LEVEL AND BELOW
- Hip and knee flexion contractures
- Increased lumbar lordosis
- Genu and calcaneal valgus
- Pronated foot while weight bearing
- Ambulate with crouched gait
- Often primarily weight bear through calcaneus
- Impairments often asymmetrical
- Postural deformities can also be present

CLINICAL RELEVANCE
- Treadmill training programs can be utilized to help facilitate ambulation in patients with spina bifida
- Individualized programs have shown to provide improvements in gait speed, endurance, VO₂ max, and overall ambulatory status
- Tactile sensory treadmill training can be utilized in order to encourage stepping rate in infants with spina bifida

REVIEW OF THE LITERATURE

Treadmill Training for Toddlers with Spina Bifida
- Case report analyzing the treatment of pre-ambulatory toddler with spina bifida with lesion at the L4-5 level
- 25 minutes of weekly PWB treadmill training began at 18 months of age
- Treadmill speed, duration, and level of assistance were individualized and progressed
- Child was ambulatory with AD at 23 months, much quicker than the literature defines
- Functional mobility outcomes supported improvements in patient ambulation and ambulation distance

RCT on Treadmill Training in Ambulatory Children with Spina Bifida
- RCT of 34 children with Spina Bifida, with 18 receiving treadmill training and 14 receiving standard care
- Training program lasted for 12 weeks
- Treadmill training group saw significant improvements in gait speed correlating with adaptive muscle activation
- Progressive treadmill training was found to have large long-term effects on ambulation
- VO₂ max

APPLICATION FOR SPINA BIFIDA
- Evaluate patient’s functional ambulation status
- Determine feasibility of treadmill training program based on patient ambulatory needs
- Progress level of assistance, belt speed, and duration based on patient response
- Continue to monitor patient progress and determine readiness to ambulate off of treadmill with assistive device for enhanced participation at home and in community

REFERENCES