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MOTOR CONTROL FOR GAIT IN CASES OF IDIOPATHIC TOE WALKING

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Abstract

This case report shows a motor control exercise program as a treatment for walking patterns in children with idiopathic tip toe walking. A 5 year old child with talipes equiness walking pattern, during treatment received motor control with stair-step standing, standing balance, stooping and transition activities, control stepping, sensory and intrinsic foot activities, age-appropriate motivation method, information for parents, and home activities to facilitate a more upright standing and walking posture to strengthen surface reaction forces relative to the ankle axis. This program is conducted for 1 hour per session twice a week. Prior to intervention the patient had a Functional Gait Assessment (FGA) score of 8 with the highest score of 30. After 2 weeks of treatment, the Functional Gait Assessment (FGA) score increased by 17 with the highest score of 30. Our results suggest that a functional rehabilitation program may be beneficial in functional recovery. walking patients with idiopathic tip toe walking in children.

Keyword: Idiopathic Toe Walking, Motor Control, physiotherapy, Fungtional Gait Assesment



Introduction

The prevalence of Idiopathic Toe Walking (ITW) varies from 5% to 12% of healthy children (1) As many as 24% of toddlers have toe walking, but this usually resolves spontaneously. When a child has toe walking for more than 2 to 3 years without any neurological evidence, it is called idiopathic toe walking (ITW). (2) Another study also reported that children with ITW experienced a decrease in the strength of the triceps surae and tibialis anterior muscles, decreased ROM DF, impaired coordination, and balance compared to healthy children. (3) Most ITW interventions aim to lengthen the archilles tendon, increase DF, and by facilitating a heel-toe gait. However, there are clinical data reporting other interventions aimed at inhibiting gait patterns, facilitating heel contact, and challenging sensory systems in children (4) This motor control intervention leads to changes in movement capacity (2)

Case Presentation

An. R has a history of premature and growth retardation where he started crawling at 10 months of age, standing at 18 months of age, and walking at 25 months of age. At the age of 2 years when the patient started walking, he often rode a Vespa motorbike and his feet did not reach the ground, causing the child to tiptoe. This habit continues until now. The child is able to tread when standing, but tends to valgus, semi-flexion of the hip and knee, and internal rotation of the hip. The patient walks in a talipes equinus and talipes valgus gait pattern in mid-stance. Where the patient walks with his heels not touching the floor so that when he walks he loses the initial contact, loading response, and midstance phases. There is contracture of the Achilles tendon, and shortening of the hamstring, adductor, and calf muscles. ° for the left leg with a muscle strength of 3 while the right leg is only able to do 5° with muscle strength 2. Sensory examination was performed using a light touch test (rough and smooth), a sharp and blunt test, and a two-point discrimination test. All three tests were positive. The patient did not complain of pain when standing or walking. For radiographic examination there is no asymmetry in the pelvis. No specific abnormal signs were observed.



Conservative treatment, using citicoline and multivitamin syrup, was given by an orthopedic and traumatology specialist. then referred to physiotherapy to optimize his gait so that the function of walking and balance is achieved and the use of HKAFO.

Management and Outcome

Motor control is defined as an important mechanism for movement(5)Motor control interventions are directed at changing movement, in contrast to other conservative treatments such as archilles tendon lengthening which focus on achieving normal DF motion. Its main purpose is to facilitate a more upright standing and walking posture to maintain ground reaction forces relative to the ankle axis(6)In addition, changing the pattern of spontaneous walking in children at the preschool stage of cognitive development. By repeatedly encouraging the child to overcome situations where his ability to manage center of mass above the feet is limited, this strategy is expected to expand mid-stance control during walking. Details of the exercises performed are attached in appendix 1. The patient participated in 8 exercise sessions for an average of 1.5 hours, twice a week for 2 weeks. For 2 weeks the same therapy was carried out. The therapist instructs the patient's parents to do the exercises alone at home for 10 minutes of movement per one exercise session.

The assessment was carried out before and after the physiotherapy program for 2 weeks. Patients were evaluated using a functional gait assessment (FAG) which is used to assess posture stability during walking and to assess an individual's ability to perform several motor tasks while walking. FAG consists of 10 items, namely walking on a flat surface, changing walking speed, walking with turning head horizontally, walking with turning head vertically, walking with head swivel (horizontal-vertical), stepping over obstacles, walking with a narrow bottom, walking with eyes closed, ambulation backwards (walking backwards), and stepping (up and down stairs). FAG has a minimum detectable change (MNC) value of 6 points in balance disturbances(7) and reliability value (ICC = 0.84) (8).



Discussion

An. R experienced a significant increase in FAG score where before therapy had a value of 8 with the highest score of 30 and after 2 weeks of therapy it had a value of 17 with the highest score of 30. At week 2, the patient's parents felt that the patient had not often fallen while playing.

Children with idiopathic toe walking are usually done with lengthening the archilles tendon, increasing muscle strength, and stretching the hip adductor muscles, hamstring muscles and calf muscles (9). However, in this case report using motor control which is directed at changing the movement that is usually done.

In mature gait, the point of contact of the weight of the body begins at the heel, moves forward under the ankle during midstance, and ends with the thrust of the foot forward. The midstance support surface contact is maintained by the superimposed body segment organization(10). With tiptoe walking, normal loading and midstance transfer from body weight are absent(2).

At the time of midstance the foot tends to pes valgus and internal rotation of the hip causes "out-toeing". This out-toeing creates instability in the standing phase and limits heel distance from the rest in the swing phase(11). This causes the child to fall easily. Motor control can change spontaneous walking patterns in preschool children at the stage of cognitive development(12). By encouraging the child to overcome the limits of his ability to manage the center of load in the foot, it is hoped that it will expand the mid-stance motor during walking. In addition, pay attention to biomechanical attributes (body symmetry, segment alignment, and weight distribution) and provide verbal and physical stimulation to guide optimal motor control.

Conclusion

Motor control carried out for 2 weeks in cases of idiopathic toe walking can improve functional gait assessment scores. Motor control is an intervention used to facilitate standing and walking postures to secure ground reaction forces relative to the ankle axis. By repeatedly encouraging the child to overcome situations where his ability to manage center of mass above the feet is limited, this strategy is expected to expand mid-stance control during walking.

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