

The Role of Dynamic Ankle Foot Orthosis on Temporo-Spatial Parameters of Gait and Balance in Patients with Hereditary Spastic Paraparesis: Six-Months Follow Up

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Abstract : Background: Recently a supramalleolar type of dynamic ankle foot orthosis (DAFO) has been increasingly used to support all of the dynamic arches of the foot and redistribute the pressure under the plantar surface of the foot to reduce the muscle tone. DAFO helps to maintain balance and postural control by providing stability and proprioceptive feedback in children with disease like Cerebral Palsy, Muscular Dystrophies, Down syndrome, and congenital hypotonia. Aim: The aim of this study was to investigate the role of Dynamic ankle foot orthosis (DAFO) on temporo-spatial parameters of gait and balance in three children with hereditary spastic paraparesis (HSP). Material Method: 13, 14, and 8 years old three children with HSP were included in the study. To provide correction on weight bearing and to improve gait, DAFO was made. Lower extremity spasticity (including gastocnemius, hamstrings and hip adductor muscles) using modified Ashworth Scale (MAS) (0-5), The temporo-spatial gait parameters (walking speed, cadence, base of support, step length) and Timed Up & Go test (TUG) were evaluated. All of the assessments about gait were compared with (with DAFO and shoes) and without DAFO (with shoes only) situations. Also after six months follow up period, assessments were repeated by the same physical therapist. Results: MAS scores for lower extremity were between "2-3" for the first child, "0-2" for the second child and "1-2" for the third child. TUG scores (sec) decreased from 20.2 to 18 for case one, from 9.4 to 9 for case two and from 12,4 to 12 for case three in the condition with shoes only and also from 15,2 to 14 for case one, from 7,2 to 7,1 for case two and from 10 to 7,3 for case three in the condition with DAFO and shoes. Gait speed (m/sec) while wearing shoes only was similar but while wearing DAFO and shoes increased from 0,4 to 0,5 for case one, from 1,5 to 1,6 for case two and from 1,0 to 1,2 for case three. Base of support scores (cm) wearing shoes only decreased from 18,5 to 14 for case one, from 13 to 12 for case three and were similar as 11 for case two. While wearing DAFO and shoes, base of support decreased from 10 to 9 for case one, from 11,5 to 10 for case three and was similar as 8 for case two. Conclusion: The use of a DAFO in a patient with HSP normalized the temporo-spatial gait parameters and improved balance. Walking speed is a gold standard for evaluating gait quality. With the use of DAFO, walking speed increased in this three children with HSP. With DAFO, better TUG scores shows that functional ambulation improved. Reduction in base of support and more symmetrical step lengths with DAFO indicated better balance. These encouraging results warrant further study on wider series.

Keywords : dynamic ankle foot orthosis, gait, hereditary spastic paraparesis, balance in patient

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