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CASE STUDY: CEREBRAL PALSY SLEEP BRUXISM

Effect of a hyperbolide mastication apparatus for the treatment of severe sleep bruxism in a child with cerebral palsy: Long-term follow-up

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Summary *Purpose:* Sleep bruxism is common among the various oromotor alterations found in individuals with cerebral palsy (CP). Few studies have investigated the use of the mastication device denominated "hyperbola" (HB) and none was found describing the use of such a device for the treatment of bruxism in children with CP. The aim of the present study was to evaluate the effect of the HB on electromyographic (EMG) activity in the jaw-closing muscles and the reduction in sleep bruxism in a child with CP using surface EMG analysis before and after nine months of treatment. *Methods:* A seven-year-old boy with severe spastic CP and sleep bruxism was enrolled in this study. The HB was chosen as the treatment option for sleep bruxism in this case because the child did not accept an occlusal splint.

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The HB has a hyperbolic shape and is made of soft, non-toxic, odorless, tasteless silicone. There are five different sizes of HB manufactured based on the diversity of tooth sizes. This device produces proprioceptive excitation in the dentoalveolar nerve, spindles and Golgi tendon organs. HB has been employed for the treatment of temporomandibular disorder, abnormal oro-dental development, abnormal occlusion, xerostomy, halitosis and bruxism.

HB therapy was performed for 5 min six times a day over a nine-week period. Surface EMG of the mandible at rest and during maximum contraction was performed on the masseter and temporalis muscles bilaterally to evaluate electromyographic activity before and after nine months of HB usage.

Results: HB usage led to a visible tendency toward the reorganization of mastication dynamics, achieving a marked balance in electromyographic activity of the jaw-closing muscles and improving the child's quality of life.

Conclusion: Based on the findings of the present study, this noninvasive therapy may be useful for individuals with cerebral palsy due to its positive effects and low cost, which allows its use in the public health realm. Further clinical studies with a larger sample size are needed to validate these results and allow the development of a new treatment protocol for patients with spastic cerebral palsy.

Introduction

Cerebral palsy (CP) is a limiting condition involving the impairment of gait, cognitive function and fine and gross motor function as well as changes in the pattern of the muscles of mastication (Koman et al., 2004). Sleep bruxism in childhood has been widely investigated, but few studies have addressed the presence and treatment of this habit in children with CP (Rodrigues et al., 2003; Peres et al., 2007; Ortega et al., 2007; Zarowski et al., 2008; Miamoto et al., 2011).

Recent studies have shown that 15.29% of normal children exhibit sleep bruxism (Fonseca et al., 2011), while the prevalence among children with CP ranges from 25% to 32% (Zarowski et al., 2008; Miamoto et al., 2011). There is agreement that the treatment of sleep bruxism (SB) in this special population requires a combination of approaches, such as physical therapy, speech therapy and myofunctional therapy (Dougherty, 2009). Regarding the myofunctional approach, there is a safe, effective option known as the "hyperbola" (HB), which can be employed to treat temporomandibular disorders, abnormal oro-dental development, abnormal occlusion, xerostomy, halitosis and bruxism (Cheida, 1997). The HB has a hyperbolic shape with rounded apices and is made of soft, non-toxic, odorless, tasteless silicone. There are five different sizes (extra small, small, medium, large and extra large) (Fig. 1), manufactured based on the diversity of tooth sizes. After curing, the HB has 35 Shore A hardness, allowing non-traumatic exercises. Its hardness and texture are compatible with the ideal force applied during mastication. There are different Shore Hardness scales for measuring the hardness of different materials. The Shore A Hardness Scale measures the hardness of flexible mold rubbers that range in hardness from very soft and flexible (1—9), to soft (10—39), to medium and somewhat flexible (40—80), to hard with almost no flexibility at all (81—100) (Meththanandra et al., 2009).

The HB produces proprioceptive excitation in the dentoalveolar nerve, spindles and Golgi tendon organs. This device causes jaw movements performed by a complex system of neuromuscular pathways controlled by sensory afferents of the oral tissues, muscles and joints, leading to muscle toning responses, the modulation of myoelectrical activity, stimulation of bones and adjacent structures (salivary glands) and the growth and development of the stomatognathic system (Cheida, 1997). There are no other devices scientifically designed for chewing exercises that achieve neural excitation levels with positive responses (Cheida, 1997). The HB was invented by a Brazilian dentist (patent no. 8901216-0) and is registered as a mastication apparatus at the National Institute of Intellectual Property. To facilitate the reader's understanding, the authors suggest the name "myofunctional device". This is the first study to investigate this HB.

The aim of the present study was to evaluate the effect of the HB on electromyographic activity in the jaw-closing muscles and the reduction of sleep bruxism in a child with cerebral palsy, as assessed through electromyography (EMG) before and after nine months of treatment.

Case presentation

A seven-year-old boy with spastic quadriplegic CP caused by hypoxic-ischemic brain damage (also exhibiting kernicterus - a bilirubin-induced brain dysfunction) visited the Bioscience Center for Special Health Care Needs of the

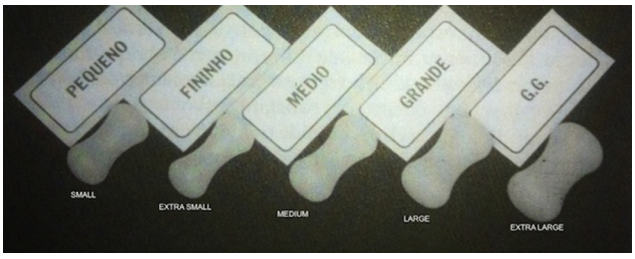

Figure 1 Different sizes of hyperbola.