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REVIEW ARTICLE

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Feeding problems and temporomandibular dysfunction in children with cerebral palsy

ABSTRACT

Children with cerebral palsy encounter many problems in everyday life. One of them is feeding difficulties. These are some crucial problems which cause feeding disfunction in children with cerebral palsy. The first problem is structural abnormalities such as abnormal muscle tone and dysfunction of the temporomandibular articulation. Non-progressive brain injury manifests in uncoordinated mandibular movements, reduced biting force and alterations in muscular tone. Main muscles which are engaged in the process of eating are: masseter, suprahyoid or temporal muscles. Another issue which may be associated with feeding problem is excessive drooling and its variable consequences. The next dysfunction refers to breathing problem, which may be the primary or secondary reason of feeding difficulties. To summarize, the therapy of feeding dysfunction should contains harmonization of muscle tone, especially tone of muscles directly connected to the temporomandibular joint and stomatognathic system, reducing sialorrhea and regulating breathing.

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KEY WORDS: feeding; temporomandibular joint; cerebral palsy

INTRODUCTION

The problem with eating is one of the most common problems encountered in pediatric and neonatal care. It occurs at about a quarter of healthy children and up to 90% of children at risk for developmental delay according to Batron and Bickel's research [1]. Approximately 85% to 99% children with cerebral palsy (CP) experience feeding problems, which may lead not only to medical consequences such as malnutrition or constipation but also to psychosocial dysfunction such as lower self-esteem, social isolation, depression, and poor quality of life [2–4]. The epidemiologic Oxford Feeding Study reported significant correlations between severity of motor impairment and feeding problems [5]. The etiology of feeding problems may be complex. First of all, children with CP present motor impairment because of central nervous system (CNS) disorders; neonatal brain injury interferes with the frontal/insular–basal ganglia–brainstem swallowing pathway [6].

Primitive reflexes may be strong and persistent. However, children with neurological dysphagia may not produce a gag reflex or sucking reflex [7]. Children with CP may present difficulties with sucking, chewing, swallowing, and other oral-motor skills, including oral sensorimotor control and positioning [5]. Problems with positioning are related to muscle tone disorders (hypertonia often with spastic CP or hypotonia with hypotonic CP) — ataxia, athetosis or mix CP. All phases of eating: preoral, oral (oral dysphagia) and pharyngeal (oral-pharyngeal dysphagia) may be problematic [8]. Secondly, children with CP may suffer from visceral problems, for instance, gastroesophageal reflux (GER), which lead to inadequate intake and as a consequence poor nutritional status and inadequate growth [7]. Thirdly, children with CP sometimes present behavioral disorders. Fourthly, children with

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CP are at risk for recurrent aspiration which can lead to hypoxemia during oral feeding and chronic pulmonary disease [5]. Children with CP present with a wide range of feeding and swallowing problems that need to be analyzed to provide adequate therapy. Choosing the adequate therapy, the priority consideration should be how much therapists want children to be oral feeders; children must be well nourished and hydrated in order to maximize global developmental and overall health [7].

Cerebral palsy is a group of disorders of movement, posture, and motor function [2]. The process of eating involve more than 30 nerves and muscles [2]. Considering just the swallowing, it requires the coordinated action and inhibition of the muscles located around the oropharynx and esophagus and is controlled by the brainstem, cortical and subcortical central pathways [6]. Swallowing and speech use similar oral musculature and structures therefore it is possible that even early patterns of eating may impact speech sound development [9].

Rosenboum wrote that "We have too easily forgotten some quite dramatic successes at preventing CP". That is why what can be done is therapy based on the assessment. As Keith wrote "Professor Keith Brown once said, 'CP is not a diagnosis, it's an assessment!'". Therefore it should be described what aspect of eating should be precisely diagnosed to improve skills and condition important to safe eating [10]. Symptoms of CP attributed to nonprogressive disturbances of the fetal or infant brain may affect movement, sensation, perception, cognition, communication, and behavior. Very often motor control during reaching, grasping, and walking is mentioned. Feeding is still not so much described. Thanks to analyzing aspect of diagnosis and therapy of feeding, the proper effort may be putted into enhancing function [11]. These are some studies which refers to oral appliances, food thickeners, specialized formulas, and neuromuscular stimulation and positioning [5].

The current level of evidence about feeding and swallowing interventions is poor with limited information regarding outcomes [7]. The purpose of this review was to analyze what others problems referring to feeding disorders children with cerebral palsy may present. Detecting of this disfunction may help in making a valid assessment and methods of therapy of feeding disorders' and plan proper intervention.

Feeding problems referred to both eating and drinking problems, including problems with breast or bottle feeding in the beginning.

The first problem may appear in children just because of the structural conditions. That is why structures of stomatognathic system such as maxilla, mandible, hyoid bone, skull bones, muscles, nerves should be assessed during recognizing problems with eating. The masticatory structures in CP children are affected by motor dysfunction. Non-progressive brain injury manifested in uncoordinated mandibular movements, reduced biting force and alterations in muscular tone, cause lesions in the motor pathways, which, in turn, may lead to hypertonia and affect antigravitational muscles, such as those raising the jaw [12]. Children with cerebral palsy have a greater chance of developing symptoms of temporomandibular joint dysfunction (TMD). They can present sever malocclusion, mouth breathing and mixed dentition problems which can lead to TMD. Those structures also participate in fascial expression and speech. What is more muscles engaged in breathing such as diaphragm, scalene and muscle of the chest should be also assessed. Stimuli provided by muscles and nervous system are the major determinants of growth, as they interact with the bones, resulting in their growth.

The activity of suprahyoid muscle may be heightened during swallowing because of spasticity [13]. Other muscles which may be disordered are masseter muscles. The process of the disfunction comes from the impaired the development of mastication is in children with CP [14].

The effect of head and neck positions on swallowing have been shown in many studies [15]. Especially chin touch and rotation to the paretic side was shown as effective in the improvement of swallowing studies [15]. Previous studies have reported that the masseter muscle is the strongest muscle among the masticatory muscles with respect to chewing hard food. While suprahyoid muscles are involved in swallowing that is why the geniohyoid muscle may be associated with severe dysphagia [16].

The second problem refers to sialorrhea. The definition of drooling were almost in all researches the same: It is an involuntary loss of saliva from the mouth [2, 16] The estimation of drooling in children with CP differs in studies from 10 to 43% [4, 17]. The prob-

lems with drooling is very complex and that is why the treatment is very variable. Excessive drooling can cause difficulties chewing, skin and mouth infections, dehydration, interference with speech social rejection or isolation, unpleasant odor, irritated skin around the mouth [18]. There are some factors which may correlate with the appearance of drooling such as: epilepsy, intellectual disability, inability to control head posture, quadriplegic distribution of motor impairment, Gross Motor Function Classification System (GMFCS) levels IV or V, limited speech, poor lip closure, anterior open bite, and eating difficulties.

Excessive drooling may be also a risk factor of salivary aspiration [19]. Respiratory diseases in general may be primary or secondary reason of dysphagia in children with CP. Respiratory failure can result from diaphragmatic muscle weakness which make eating process very dangerous and can cause of long-term hospitalization. That is why the therapy of breathing, including manual diaphragmatic stretching technique (MDST), should be one of the approaches or a component of managing with feeding difficulties. What is more, respiratory illness is the most common cause of mortality, morbidity, and poor quality of life in the most severely affected children [20].

Management of feeding disfunction in children with CP should be complex and requires well-coordinated multidisciplinary teams who communicate clearly with families [19].

AUTHOR CONTRIBUTIONS

R.M. and E.M.; methodology, W.S.; software, W.S.; validation, R.M., E.M. and W.S.; formal analysis, W.S., E.M..; investigation, R.M., E.M. resources, W.S.; data curation, W.S.; writing—original draft preparation, R.M. W.S.; writing—review and editing, R.M. and E.M.; visualization, R.M.; supervision, W.S.; project administration, W.S.; funding acquisition, W.S.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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