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Research Article

An Overview of Oral Findings in Cerebral Palsy Patients

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Abstract

Cerebral Palsy (CP) is a well known group of disorders of movement, muscle tone, or other features that reflect abnormal control over motor function by the central nervous system. The oral findings in these groups of patients are important to know in order to allow efficient dental management of such patients. The article presents a review of oral findings in such patients and the specific dental features encountered.

Keywords: Cerebral palsy, oral, dental management.

Introduction

Cerebral Palsy (CP) is a well known group of disorders of movement, muscle tone, or other features that reflect abnormal control over motor function by the central nervous system. The overall global prevalence of CP is 2.11 per 1000 live births, with the highest pooled prevalence found in children weighing 1.0 to 1.5 kilograms at birth and in those born prior to 28 weeks' gestation (oskoui M). It may occur due to damage to the brain at prenatal, perinatal or post natal periods (sankar). Oral function is impaired in cerebral palsied patients that results in vulnerability of such patients to oral diseases such as dental caries and periodontal disease (rodrigues 2003). The purpose of this review is to highlight the oral features of cerebral palsied patients.

Oral Features in Cerebral Palsied Patients

Cerebral palsied patients present with characteristic oral features that need to be recognized and managed appropriately. The prevalence of the predominant oral diseases - dental caries and periodontal disease - is known to be high in cerebral palsied populations. The motor disorders observed cerebral palsied individuals can affect speech, swallowing and breathing (koolstra 2002). Oral motor function is most severely deranged in quadriplegic CP patients (santos mt 2005 j dent child and de carvalho 2011).

Dental Caries and Periodontal Disease

Dental caries is a biosocial disease that affects children, adolescents and adults of all ages. However, in cerebral palsy, several factors predispose affected individuals to a *greater* dental caries rate and risk of developing caries than an average healthy individual. The rate and risk of developing periodontal disease is also greater in patients with CP. Predisposing factors include inability to maintain regular oral hygiene due to motor deficiency, inability to ingest solid food, difficulty in swallowing, biting and chewing, increased time between ingestion and swallowing, mouth-breathing and malocclusions (rodrigues 2003).

The dental caries rate in a healthy individual varies inversely with oral clearance time (time difference between ingestion and swallowing), salivary flow rate and salivary buffering capacity. Patients with CP have reduced salivary flow rates, increased oral clearance time, alterations in the antimicrobial salivary enzymes such as amylase and peroxidase, and a compromised saliva buffering capacity, all of which are risk factors for dental caries (Rodrigues Santos MT Quintessence Int. 2007, Santos MT 2009 Sep-Oct, Santos MT, 2010 Sep-Oct).

The risk of developing dental caries increases further in cerebral palsied patients due to compounding factors such as the intake of sweetened medications, lower salivary flow rate, pH and buffering capacity (santos mt 2011), poor lip and tongue control and inability to maintain oral hygiene by the patient himself (due

to poor manual dexterity) as well as by caregivers (de carvalho 2011, Rodrigues dos Santos MT, 2003). Socio-economic status of CP patients, however, has not been found to be related to caries rate (de carvalho 2011).

Nature of Diet

Nature of diet is also implicated in the etiology of dental caries with evidence that sugary and sticky foods that adhere to teeth or are retained in the mouth for long periods (e.g. sticky or slowly dissolving food) tend to cause greater demineralization of tooth structures. The ingestion of solid food is usually difficult for individuals with CP who have impaired oral motor function (swallowing and chewing dysfunction) and muscle weakness (yoshida 2004). These patients tend to rely on liquids with added

sugar or food with semisolid consistency that adheres more to tooth surfaces. These dietary patterns are associated with the development of dental caries. (Rodrigues dos Santos MT j dent child 2003, mitsea 2001, santos mt 2012)

Oral Motor Function

Normally, infantile oral reflexes such as sucking and swallowing diminish as an infant matures and eventually give way to a mature, adult pattern of swallowing and feeding. The persistence of any normal oral reflex beyond its expected time of integration may be a warning sign of cerebral palsy, head injury or oral motor delay. Persistence of abnormal reflexes as a child matures interferes with normal chewing, swallowing and positioning of food bolus which impedes the patient's feeding skills and

nutrition (Dos Santos MT infantile reflexes 2005). A prolonged and exaggerated biting reflex is the most frequently reflex seen in individuals with cerebral palsy (de carvalho 2011). This biting reflex obstructs the patient's feeding.

Drooling or unintentional loss of saliva from the mouth is considered normal in infancy up to the age of 15-18 months when the oral motor muscles mature. Drooling beyond the age of 4 years is not considered normal, and is often associated with neurological problems such as cerebral palsy or mental retardation (chavez mc 2008). The cause of drooling in cerebral palsy is not hypersalivation, but poor motor control and inability to coordinate breathing and swallowing (Tahmassebi JF 2003).

Oral muscular activities may be divided into functional or parafunctional activities. Functional activities are those required for chewing or speech while parafunctional activities, on the other hand, are not required for any one normal oral muscular function. Parafunctional habits, of which bruxism or tooth grinding has been found to be most frequent, are seen frequently in patients with CP (Ortega AO 2007). The consequences of bruxism may be tooth wear, temporomandibular joint pain/ masticatory pain or masseter/ temporalis muscle hypertrophy. The causes of bruxism in CP patients have been variously attributed to spasticity, myofunctional dysfunction and use of neuroleptics (Oliveira 2011).

Malocclusion and Occlusal Discrepancies

Malocclusion or deranged occlusion is commonly found in cerebral palsy patients. Most often, Class II malocclusion is seen in CP patients and rarely Class III malocclusion may be present (carvalho 2011, Carmagnani FG 2007). The head and tongue posture and poor tonus of the orbicularis oris muscle, may be associated with the high prevalence of malocclusion in patients with (Winter K 2008). Other occlusal discrepancies such as mouth breathing, open bite, deep overbite and tooth wear have also been observed in CP patients (winter, 2008).

Dental Developmental Defects

Defects in enamel are also seen in patients with cerebral palsy. The prevalence of enamel defects varies from 24 to 60% in the primary dentition and in the 38.5 % in the permanent dentition. Cerebral Palsy *per se* is not a risk factor for defects in enamel formation (Bhat M 1989). However, prematurely born children with cerebral palsy show greater incidence of enamel defects, such as, hypoplasia and opacity. The underlying mechanism of enamel defect formation in premature CP children is unclear, but insufficient calcium and phosphorus content of breast milk for preterm infants and metabolic bone disease of prematurity have been proposed as reasons for enamel defects in premature children (Schanler RJ 1995, Seow WK 1996). Dental enamel defects most often affect the central and lateral incisors, canines,

and first premolars (carvalho 2011, bhat 1989) and the maxillary central and lateral incisors and maxillary first molars in the primary dentition (Lunardelli SE 2006, Lin X 2011).

Traumatic Dental Injuries

Patients with CP are prone to traumatic injuries to the teeth and body due to poor motor control. Primary and permanent central incisors are most frequently affected and enamel and enamel/dentin fractures are common in CP patients (costa mm 2008, dos santos 2009).

Challenges in Dental Management of CP Patients

Cerebral palsy is a disease that requires lifelong management that is best managed by an interdisciplinary team of medical, dental and allied professionals (dougherty nj, dcna). Dental management of such patients is complex and presents significant challenges. Challenges faced by the dentist include difficulty in managing uncontrolled head and body movements, prevention of injury to the patient or dentist, impaired swallow and gag reflex, difficulty in expectorating. Dental treatment of CP patients also poses challenges in the form of difficulty in sustained mouth opening, delivery of medicaments and maintaining tooth isolation. Preventive at-home dental care is also compromised (santos mt 2005 j dent, santos mt 2010, kumar s 2009)

Dental Management of Cerebral Palsied Patients

Individuals with CP have physical and mental limitations that require modification in dental management methods.

Conventional dental behavior management includes the tell-show-do technique, voice control and behavior modelling. Dental treatment in CP patients is carried out with the help of adjuncts to stabilize the patient as well as to prevent injury to the patient or dentist due to uncontrolled head or body movements. These adjuncts include assistive stabilization (santos, sep 2007), use of dental sedation or general anaesthesia. An aided augmentative communication system has also been described which involves the use of symbols placed on a communication board (darwis we). Some studies have demonstrated the benefits of Nitrous oxide or midazolam induced conscious sedation in reducing the

orofacial muscle tonus in CP patients during dental treatment probably because of the N2O inhibiting the function of the central nervous system (yoshida, 2003 and curl c 2012). At-home oral hygiene maintenance is done through modification of toothbrushes, for example, customized toothbrush handles may be used. Assisted toothbrushing (with the help of a family member) may also be beneficial.

Summary

Oral dental findings in patients affected with cerebral palsy include primitive dental reflexes, drooling and malocclusion. Limited muscular coordination may result in changes in the structure of the orofacial region and the development of parafunctional habits that can lead to malocclusions and tooth

wear. Experience of dental trauma is also highly prevalent due to instability as a result of neuromuscular defects and/ or seizures. Added to this scenario is a high rate of dental caries due to improper mastication and poor oral hygiene. Knowledge of common oral findings in CP patients can lead to a better understanding of their problems and thus to a better care.

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