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Consideration for care for your patient with cerebral palsy

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Abstract

Cerebral palsy (CP) is a common developmental neurological disorder affecting about 2-3 children out of 1,000. CP is the result of infant brain damage or abnormal development, resulting in impaired muscle control, coordination, tone, reflex, posture, and balance. These patients are unable to control motor movements of their muscles of mastication and facial expression, causing excessive drooling, clenching, bruxism, and other oral health-related issues. This lack of motor control affects their ability to swallow and often limits these patients to a liquid diet. This can lead to vitamin deficiencies and result in further developmental problems. As an example, a deficiency in vitamin D may lead to osteoporosis, which manifests in the oral cavity as periodontal disease.

Even into adulthood, these individuals are often reliant on the care of others. It becomes the caregiver's responsibility to ensure the individual with cerebral palsy is receiving consistent and effective oral hygiene, and to monitor the oral tissues for signs of disease or injury. The researchers reviewed primary and secondary literature published after 2014 on the subjects of cerebral palsy, general health considerations, and oral care. The aim of this investigation focuses on unique issues faced by patients with cerebral palsy, and how to effectively educate caregivers on risks and proper techniques for providing oral hygiene to these individuals.

Introduction

Cerebral palsy (CP) is an incurable and non-progressive motor disorder associated with communication, awareness, performance, and cognition. Studies show that about one third of present cases are the result of unknown causes, while the majority are connected with prenatal factors such as birth asphyxia, genetic disorders, maternal fever, and intrauterine infections.

CP diagnosis depends on neurological examinations, posture, a lagging development of motor skills, and absence of primitive reflexes. Diagnosing this condition is less difficult if brain damage has occurred and can be observed by CT scans, cranial ultrasounds, or MRI tests. Evaluations of these patients include, but are not limited to, observing motor functions, cognitive abilities, speech, hearing, and their senses. Cerebral palsy patients also show weak ankle joints, muscle spasms, scoliosis, and hip dislocations. Because of these medical complications, these individuals are most often confined to wheelchairs and require assistance from a caregiver in activities of everyday life.

In addition to many medical issues, patients with cerebral palsy commonly face a multitude of dental treatment concerns. These include malocclusion, traumatic dental injury from seizures, bruxism, sialorrhea (drooling), poor oral hygiene and increased caries risk. Access to dental care poses a large obstacle for CP patients, as they may be apprehensive to meeting strangers, have communication barriers, and are typically unable to cooperate in the dental office due to risk of convulsions, muscle spasms, or general inability to concentrate for the appointment duration. Adjustments such as patient positioning and use of sedation and anesthesia can be considered if it enhances the experience of the patient and practitioners

Literature Consulted

A search was conducted for literature on the subject of Cerebral Palsy, the oral health and conditions of individuals with Cerebral Palsy, oral hygiene for these individuals, as well as nutritional deficiencies associated with this condition. The search was limited to articles published after 2014 to ensure that the information was current and relevant. A total of twelve primary research articles and three secondary articles were consulted in this review. The findings from said articles were summarized and discussed under their respective categories below:

- Risk factors for Individuals with Cerebral Palsy
- Limitations of Caregivers
- Nutrition related to systemic health
- Comparisons of Oral Hygiene Methods



Findings

In general, CP patients are at a higher risk for dental caries. This trend has been explored in various studies and attributed to a multitude of factors such as low socioeconomic status, poor oral hygiene and higher salivary osmolality. Since CP patients have an inability to swallow, they often have excess saliva. Unstimulated salivary flow contributes to a higher risk of gingivitis and subsequent periodontitis. Malocclusion/malalignment and bruxism occur at higher frequencies in patients with CP, as well. These factors both contribute to increased risk of dental trauma from clenching teeth that are not in ideal alignment with each other.

Often times, the primary caretaker of a patient with CP is the parent, who may have no training or knowledge of taking care of a person with physical limitations. Since CP patients are unable to communicate discomfort verbally, the caretaker becomes responsible to recognizing medical & dental issues and addressing them in an appropriate manner.

Since CP patients cannot swallow, they are limited to a liquid diet, putting them at risk to become undernourished and various nutritional deficiencies, especially anemia and vitamin D deficiency.

When comparing biofilm reduction after brushing, manual brushing and power brushing were both effective. When adding a chemotherapeutic agent, in one case chlorohexidine spray, to the mechanical plaque removal oral hygiene strategy, gingival statuses were most improved. A three-sided toothbrush designed to allow the occlusal, lingual, and facial surfaces of teeth to be cleaned simultaneously proved more effective in decreasing plaque index and improving gingival index.



Limitations & Future Studies

Although extensive studies have been done to determine an increased risk for unfavorable oral conditions for patients with CP, management of these patients still poses present difficulty to both the caretakers and the oral health professional. Additional research would be beneficial on the subjects of methods for caregiver education, as well as implementation of lessons or oral home care techniques. Follow-up studies on the continued efficacy of these caretakers could be compared with the longitudinal changes in their patient's oral health status.

Like any patient, CP patients deserve and will benefit from individualized care both in-office and at home. Continued exploration on oral home care products that are not only effective, but provide ease of use for the caregiver is necessary. For example, several studies were discussed that considered mechanical plaque removal from a toothbrushing standpoint, but little was found on flossing or other methods of interproximal plaque removal. A proposed study may consist of comparing traditional flossing to the Sonicare Airfloss in their effectiveness of improving gingival health in patients with CP or special care dentistry patients. This same study might aim to compare the caretaker's perceived ease of use of the two methods.

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Consideration for care for your patient with cerebral palsy

A Literature Review

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Date submitted: 29 March 2018

Abstract:

Cerebral palsy (CP) is a common developmental neurological disorder affecting about 2-3 children out of 1,000. CP is the result of infant brain damage or abnormal development resulting in impaired muscle control, coordination, tone, reflex, posture, and balance. These patients are unable to control motor movements of their muscles of mastication and facial expression, causing excessive drooling, clenching, bruxism, and other oral health-related issues. This lack of motor control affects their ability to swallow and often limits these patients to a liquid diet. This can lead to vitamin deficiencies and result in further developmental problems. As an example, a deficiency in vitamin D may lead to osteoporosis, which manifests in the oral cavity as periodontal disease.

Even into adulthood, these individuals are often reliant on the care of others. It becomes the caregiver's responsibility to ensure the individual with cerebral palsy is receiving consistent and effective oral hygiene, and to monitor the oral tissues for signs of disease or injury. The researchers reviewed primary and secondary literature published after 2014 on the subjects of cerebral palsy, general health considerations, and oral care. The aim of this investigation focuses on unique issues faced by patients with cerebral palsy, and how to effectively educate caregivers on risks and proper techniques for providing oral hygiene to these individuals.

Introduction:

Patients with Cerebral Palsy (CP) present one of many medically compromised populations that face daily challenges in dental skills and knowledge. Cerebral palsy is an incurable and non-progressive motor disorder associated with communication, awareness, performance, and cognition. Studies show that 30% of cases are the result of unknown causes, while 70 to 80% are connected with prenatal factors such as birth asphyxia, genetic disorders, maternal fever, and intrauterine infections.

Cerebral Palsy diagnosis depends on neurological examinations, posture, a lagging development of motor skills, and absence of primitive reflexes. Diagnosing this condition is less difficult if brain damage has occurred and can be observed by CT scans, cranial ultrasounds, or MRI tests. Evaluations of these patients include, but are not limited to, observing motor functions, cognitive abilities, speech, hearing, and their senses. Cerebral palsy patients also show weak ankle joints, muscle spasms, scoliosis, and hip dislocations ^[1]. Because of these medical complications, these individuals are most often confined to wheelchairs and require assistance from a caregiver in activities of everyday life.

In addition to many medical issues, patients with cerebral palsy commonly face a multitude of dental treatment concerns. These include malocclusion, traumatic dental injury from seizures, bruxism, sialorrhea (drooling), poor oral hygiene and increased caries risk ^[2]. Access to dental care poses a large obstacle for CP patients, as they may be apprehensive to meeting strangers, have communication barriers, and are typically unable to cooperate in the dental office due to risk of convulsions, muscle spasms, or general inability to concentrate for the appointment duration. Adjustments such as patient positioning and use of sedation and anesthesia can be considered if it enhances the experience of the patient and practitioners ^[1].

It becomes the caretaker's responsibility to make themselves aware of these concerns and work with the patient's healthcare professionals, both medical and dental, to ensure that the best care possible is provided.

Literature Consulted:

A search was conducted for literature on the subject of Cerebral Palsy, the oral health and conditions of individuals with Cerebral Palsy, oral hygiene for these individuals, as well as nutritional deficiencies associated with this condition. The search was limited to articles published after 2014 to ensure that the information was current and relevant. A total of twelve primary research articles and three secondary articles were consulted in this review. The findings from said articles were summarized and discussed under their respective categories below:

Risk factors for Individuals with Cerebral Palsy:

There are several aspects that contribute to the caries risk of a cerebral palsy patient. A study conducted in rural Bangladesh showed that children with less functional CP had a greater caries risks, while those who have a more functional form of CP were lower risk. This study also found significantly higher rates of decayed, missing, and loss of tooth structure in children with CP compared to a normoreactive patient. The experimenters concluded that early preventative care is necessary in patients with CP, which can be especially difficult if the patient is from a family of a low socioeconomic status ^[3].

In a study done comparing salivary osmolality and gingivitis in children with cerebral palsy, it was noted that children with compromised motor skills associated with cerebral palsy had a higher rate of gingivitis. Another contributing factor that contributed to higher risk of both

caries and periodontal disease was the amount of unstimulated salivary flow with increased viscosity, since their inability to swallow impedes these patients from adequate fluid intake ^[4]. Although this study was done using child-subjects, it is assumed that these limitations would extend throughout the patient's lifetime.

In another study comparing salivary osmolality and caries risk in cerebral palsy patients, higher salivary osmolality values in individuals with CP did not predict higher caries risk when compared to normoreactive individuals. It was discussed, however, that the caries risk factors in the individuals with CP may have been effectively controlled by increasing caregiver knowledge of oral hygiene and using devices to help with tooth brushing while the patients were treated in a rehab center providing preventative care ^[5].

Malocclusion is an incorrect relationship between the maxilla and mandible. In patients with cerebral palsy, it most commonly consists of an overbite and anterior open-bite. These abnormalities have been reported worsen with age ^[6]. A cross-sectional study including 120 individuals used the Angle's Classification to determine that malocclusion is a common problem faced by patients with CP. Excess saliva, another common issue for these patients, can be a manifestation of particularly poor oral facial muscle functions in these patients. Other factors that contribute to dental complications are the presence of dental crowding, overjet, and deviation of the midline ^[7].

When looking at the impact of oral conditions on the quality of life of children with cerebral palsy, one study discovered dental caries experience and presence of bruxism each had a negative impact on the oral-health-related quality of life of the child with CP ^[8]. Some proposed reasons for these connections were; if the child with CP has already sought dental treatment for caries, they may have a higher score of disease and other conditions. Concerning bruxism, many

parents described their children's behavior as anxious and irritable which can influence the presence of this habit.

"In general, mentally challenged children have higher rates of poor oral hygiene, gingivitis, and periodontitis than the general population". Those with a mentally challenged condition, such as cerebral palsy, is a major factor of deprivation and dependency among most developing countries. They are excluded from a normal communal lifestyle due to their psychological, social, and physical barriers. These barriers make them less desirable and accepted in society, leaving them minimal access to decision making and proper services to benefit their systemic, as well as oral, health. Due to their lack of access to caregivers, it is difficult for doctors to obtain proper medical and dental history needed to develop a treatment plan.

A study was done in Chennai, India consisting of 150 children, of which 70 were Down syndrome patients and 80 with cerebral palsy. Results of the study found that lack of communication, due to a speech impairment with these patients, interfered with necessary exchange of information between the patient and the dentist. Periodontitis was displayed in 55% of the Cerebral Palsy patients and 61.3% with gingivitis, due to their overall lacking oral hygiene status. About 63% of cerebral palsy patients were also presented with fractured teeth, prominently the maxillary anterior. Mouth breathing was in 60% of the patients. Malalignment was seen in 58.8% of the cerebral palsy patients. Drooling of saliva presented in 70% of cerebral palsy patients, due to their malalignment of teeth and inability to control the muscles to swallow. Difficulty to swallow in cerebral palsy patients can also be a result of poor posture, reduced head control, and reduced sensation around the mouth ^[9].

Limitations of Caregivers

"Attention deficit hyperactivity disorder, intellectual disabilities, autism, and cerebral palsy are among the most prevalent developmental disabilities". Population-based samples have shown a correlation between patients with developmental disorders and an increase in the occurrence of periodontitis, caries, and lack of teeth compared to the ordinary population. Those who have cerebral palsy face many limitations in performing preventative oral home care, therefore leaning on their caregivers for proper assistance. It is estimated that 72% of the estimated 4.9 million developmental disabilities rely on their family members for oral hygiene care.

A study was done with 808 caregivers at two clinics to understand their experience on assisting adults with oral home care. Care takers must have accompanied a disabled adult above the age of 20 and must either be a family member or paid support help to the patient for at least six months. Out of the 808 caregivers, 683 of them were paid and 125 were family members, predominately parents. Surveys were completed to obtain data on positive and negative oral characteristics. The study showed that 28.5% of patients had bad breath, 24.5% exhibit bleeding gums, and 55.1% had poor tooth condition. A total of 296 patients displayed tooth decay, possibly due to the fact that 44.6% of the disabled patients never flossed, according to the caregiver's survey.

Caregivers stated that they are more comfortable with brushing assistance than flossing. Those who received formal training in structured group sessions and clinicians during dental visits felt more confident in their flossing services. The results of the study also indicated a

higher prevalence of periodontitis than what the caregivers noted in their survey, displaying the caregiver's inability to recognize oral diseases^[10].

For some CP patients, their primary caregiver for a large portion of their life is a parent. Not surprisingly, the additional stress this responsibility puts on a parent can lead them to have heightened concern about the health of their child during everyday life. Parents of children with CP reported fewer oral symptoms than were expected and confirmed by oral examination. This suggests that, although the parents of CP children report a higher level of anxiety and concern for their children's oral health, they may be unaware of the severity of their child's oral health problems^[3].

Education of caregivers is a vital piece of the equation when considering improving the quality of oral healthcare provided to special needs patients, in this case focusing primarily on CP patients. Since many CP patients are unable to communicate discomfort verbally, the responsibility of the caregiver extends into the realm of recognizing medical and dental issues and addressing them in a timely and appropriate manner. Caregivers with less education on the specific traits and needs of CP patients, as well as less knowledge of health-literacy are less likely to be able to provide appropriate care to their patients.

Nutrition related to systemic health:

A cross-sectional study was conducted to evaluate the association between orofacial motor function and nutritional status in children and adolescents with CP. The results showed that nutritional status, described in this study as the weight gained, is favored by better oral motor performance^[11]. It can be extrapolated, based on this, that individuals with decreasing oral

motor ability would have a more difficult time maintaining a healthy weight and could likely be at risk of malnutrition and nutrient deficiency.

Another cross-sectional study investigated multiple nutrient statuses in children diagnosed with CP in a hospital setting. This study found that 90% of the children were undernourished and various nutritional deficiencies, especially anemia and vitamin D deficiency. These problems were likely due to feeding difficulties and the fact that many of the children were from economically disadvantaged families, making them prone to malnutrition ^[12]. Aside from the negative effects malnutrition can have on the body and organ systems, vitamin D deficiency in particular can cause osteoporosis, which can cause bone resorption and potentiate in the oral cavity as periodontal disease.

Comparisons of Oral Hygiene Methods:

When developing an effective oral hygiene routine, the patient with cerebral palsy or their caretaker must consider the kind of toothbrush they wish to implement. Although many studies have shown power brushes can be more effective in plaque removal than a manual brush, it is likely that these trials were done using able-bodied subjects who understood the proper technique for each method. In a study done comparing reduction of biofilm after brushing, both a manual brush and an electric toothbrush (turned off and on in separate groups) were effective in reducing biofilm after brushing ^[13].

A study done in India in 2015 was aimed less toward the confirmation that patients with cerebral palsy were at higher risk of periodontal disease and complications, and more toward evaluating methods of oral hygiene to eliminate dental plaque in children with cerebral palsy. The experimenters compared several groups, varying the kind of brush used (manual and

powered) as well as the presence/absence of a chlorhexidine spray. The results suggested that a combined oral hygiene strategy, including mechanical plaque removal as well as a chemotherapeutic measure was most effective in improving the gingival status of children with cerebral palsy ^[14].

Two separate studies were conducted to evaluate the effectiveness of a three-sided toothbrush designed to aid caregivers in simultaneously cleansing the lingual, occlusal, and facial surfaces of the patient's teeth. These studies concluded that the three-sided toothbrush was superior to the single-headed in reducing bacterial plaque in people with and without CP. After a month, the triple-headed toothbrush was most effective in decreasing plaque index scores and improving gingival index.

Previous to using the three-sided toothbrush, caregivers were unable to cleanse the lingual portion of the teeth in CP patients due to involuntary tongue movements. Since the bristles on the triple-headed toothbrush wrap around the whole tooth, caregivers were able to access all tooth surfaces and able to "stay" longer on the tooth surface. With a surface horizontal to the occlusal plane, the toothbrush ensures if the patient bites down during brushing, they will not injure themselves or the caregiver ^[15].

Limitations & Future Studies:

Although extensive studies have been done to determine an increased risk for unfavorable oral conditions for patients with CP, management of these patients still poses present difficulty to both the caretakers and the oral health professional. Additional research would be beneficial on the subjects of methods for caregiver education, as well as implementation of lessons or oral

home care techniques. Follow-up studies on the continued efficacy of these caretakers could be compared with the longitudinal changes in their patient's oral health status.

Like any patient, CP patients deserve and will benefit from individualized care both in-office and at home. Continued exploration on oral home care products that are not only effective, but provide ease of use for the caregiver is necessary. For example, several studies were discussed that considered mechanical plaque removal from a toothbrushing standpoint, but little was found on flossing or other methods of interproximal plaque removal. A proposed study may consist of comparing traditional flossing to the Sonicare Airfloss in their effectiveness of improving gingival health in patients with CP or special care dentistry patients. This same study might aim to compare the caretaker's perceived ease of use of the two methods.

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