

# Cerebral Palsy and Dentistry: A Narrative Review

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## Abstract

Cerebral palsy is defined by reduced cognitive and psychomotor capacity and ability caused by cerebral hypoxia. Patients with cerebral palsy usually have a higher incidence of diseases than the general population. Both systemic and stomatological alterations are commonly observed. Dentistry provides part of the special care that patients with cerebral palsy may require, and the dental surgeon must be prepared to meet their needs, both preventively and curatively. Care requires not only specific oral health care, but also a psychological approach and support for family members and carers, favouring general health and quality of life of the patient with cerebral palsy. The purpose of this article is to review stomatological and behavioural characteristics to help establish a protocol for caring for patients with cerebral palsy.

**Keywords:** Cerebral palsy; Dentistry; Oral health; Oral hygiene; Palliative care.

## Introduction

Disability, according to the World Health Organization (WHO), refers to alterations related to bodily structure or mental functioning<sup>1-5</sup>. Patients with special needs are defined as having any physical, mental, sensory, developmental, behavioural, cognitive or emotional disabilities that require differentiated treatment, special intervention and/or the use of specialized services or programmes. As in other areas of health, appropriate dental treatments are needed to improve therapeutic efficacy and safety and establish best clinical practices<sup>4-6</sup>.

Included in this classification are patients with cerebral palsy, who present a broad group of motor and postural development disorders caused by non-progressive lesions that occur in the fetal or infant brain<sup>2-5,7,8</sup>. Cerebral palsy can be sub-classified as spastic, athetoid, ataxic or mixed. Spastic cerebral palsy is the most common type and is characterised by damage to the cerebral cortex, with reduced muscle strength and increased tone. Athetoid cerebral palsy is characterised by involuntary movements, while ataxic cerebral palsy is characterised by difficulties in motor coordination. Subsequently, patients show tremors when performing complex motor tasks. The mixed type can involve characteristics of two or more types concurrently<sup>9</sup>.

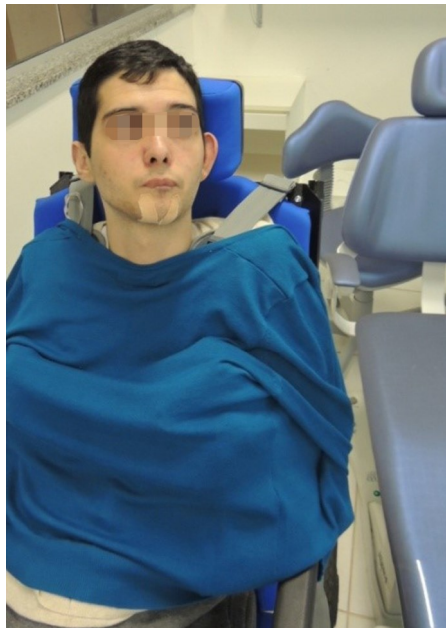
Patients with cerebral palsy have a higher incidence rate of illness than the general population. This can be seen in children with limitations such as impaired cognitive abilities, behavioural dysfunctions, neuromuscular alterations, uncontrolled body movements, gastroesophageal reflux or seizures. These complications can lead to feeding difficulties (including reduced water or fluid intake), and combined with inadequate oral care, increase the risk of developing oral health problems. Oral health inequalities in normoreactive patients compared to patients with special needs have already been proven, with the aim of revealing the importance of establishing an integrated and equitable dental care system for patients with special needs<sup>3-5</sup>. This characteristic is usually observed in the fact that they are unable to perform adequate daily oral hygiene<sup>4,5,10</sup>.

Patients with regular visits to the dental surgeon are more likely to have oral diseases detected in the early stages and get care as necessary. Unfortunately, however, this is not the case in the majority of cases. Inadequate oral hygiene is strongly related to the presence of caries lesions in patients with special needs<sup>4,5,11</sup>.

Dental care requires not only specific oral health care, but also a psychological approach and support for family members and carers. The limitations, fragilities and demands of caring for patients with cerebral palsy sometimes become a challenge for the family. Humanised care favours a broad concept of general health and increases quality of life<sup>12</sup>.

Identifying physical characteristics, specifically those of the stomatognathic system, as well as behavioural characteristics (Figure 1), can help establish a timely diagnosis, based on which a multidisciplinary approach is established for these patients, considering the best care and an increase in their quality of life<sup>4,5,7,13,14</sup>.

The purpose of this article is to review stomatological characteristics, as well as behavioural ones, to help establish a protocol for caring for patients with cerebral palsy.



**Figure 1:** Adult patient with cerebral palsy caused by hypoxia.

## Materials and Methods

This study is a narrative literature review<sup>15</sup>, based on a search for complete articles, selected by consulting PubMed/Medline and Scielo. From the first source, the following keywords were used: Cerebral palsy; Oral health; Oral hygiene. The last search to include articles was carried out in June 2023. The filters used in PubMed/Medline were: last 10 years; systematic review and meta-analysis; and free full texts. The final advanced search was: (((chlid) OR (kid)) OR (childrens)) OR (infant)) AND ((special needs) OR (handicapped))) AND ((dentistry) OR (dental care) OR (dental health) OR (oral health)) where 251 articles were found. The Scielo search used "cerebral palsy", area: Health sciences, thematic area: Dentistry, and 28 articles were found. A total of 279 articles were found.

All the articles found in the search were analysed. However, 15 articles on asthma were excluded; 11 articles on bruxism; 7 articles on pneumonia in cerebral palsy; and 226 articles on topics such as health surveillance, epidemiology, ways to induce normal labour, the use of silver fluoride, the effects of fluoride on memory, immunotherapy, sleep apnoea, forms of communication in special patients, eczema, infections in breastfeeding women, among others. After selecting the articles using the exclusion criteria, 11 articles from the above research were included in this study, as well as a further 19 articles found on Google Scholar related to the topic to complement the research's theoretical framework, totalling 39 articles.

## Literature Review and Discussion

Patients with cerebral palsy have reduced cognitive and psychomotor abilities caused by cerebral hypoxia<sup>2-5</sup>. They may have various stomatological alterations. Among the dental alterations, there may be changes in shape, number, size, structure and eruption pattern. These changes can be caused by interactions between genetic, epigenetic and environmental factors during the process of tooth development, acquired during the morphodifferentiation or histodifferentiation phases. The alterations imply in biological, anatomical and functional variations and aesthetic normality of dental structures and their supporting tissues. As a result, there are: muscular alterations; bruxism; mouth breathing; macroglossia; prolonged retention; cyst formation; root resorption; malocclusion; abnormal intermaxillary relationship; enamel hypoplasia; fluorosis; dental caries; and periodontal diseases<sup>4,5,13,16</sup>.

Patients with cerebral palsy have reduced salivary flow; changes in salivary pH; impaired salivary buffering capacity; changes in enzyme activity and sialic acid concentration. Increased salivary osmolarity and total proteins, associated with a state of hypohydration, have also been observed. These conditions are considered a risk factor for the development of oral diseases<sup>17</sup>. They are also associated with poor oral hygiene, drug administration and poor diets<sup>1,16</sup>.

Visualization of oral alterations can be impaired due to involuntary movements, pathological oral reflexes, spasticity of the chewing muscles, lack of cooperation and limited mouth opening. Bleeding gums during brushing and painful symptoms, despite altered cognition, are the main signs and symptoms that highlight the status of the oral cavity in patients with cerebral palsy. Another factor that prompts carers to seek dental care, in addition to pain, is the observation of caries lesions located on the anterior teeth of these patients, making them more visible<sup>18</sup>.

Patients with cerebral palsy can be given various drugs. Most of the time, these are oral suspensions containing some form of sugar to favour acceptance and mask the unpleasant taste. The sugars present in the composition can rapidly reduce the oral pH, contributing to erosive potential, with the onset and evolution of caries<sup>16,19</sup>. The dental surgeon or paediatrician is expected to replace drugs containing sucrose with sorbitol and xylitol, as they do not act as a substrate for biofilm bacteria. In addition, these professionals, and particularly the dental surgeon, should advise and warn parents and carers about the need for oral hygiene and the use of fluoridated dentifrice after administering these liquid drugs to children<sup>19</sup>.

From a pharmacological perspective, there is also the administration of anticonvulsants. Most of the time, in combination with poor oral hygiene and the accumulation of dental biofilm, anticonvulsants can develop gingival overgrowth. The presence of gingival overgrowth can hinder oral hygiene and favour the occurrence of periodontal diseases, which in turn also further favour inflammatory features, worsening the status of gingival overgrowth<sup>16</sup>.

The dental surgeon must pay attention to humanized care, not only for patients with cerebral palsy, but also for their families and carers. Family members and carers are responsible for making decisions and carrying out daily activities related to the general and oral health of patients with cerebral palsy. Regular visits to the dental surgeon are necessary to meet the preventive and curative demands of patients with cerebral palsy<sup>1,11,18,20</sup>.

Despite the general reduction in the prevalence of dental caries and advances in preventive and minimally invasive Dentistry, patients with cerebral palsy have been undergoing more restorative treatments and tooth extractions compared to healthy individuals of a similar age<sup>5,6</sup>.

Dental care for patients with disabilities often represents a different challenge for the dental surgeon, due to the behavioural management and anxiety that these patients experience. In addition, there is the difficulty in co-operating and limited attention span. Patients with cerebral palsy tire quickly. From this perspective, the appointment time should be as quick as possible<sup>4,5,21</sup>.

In view of uncooperative behaviour, it is sometimes necessary to use conscious sedation for dental care, combined with resources such as protective stabilization and behavioural management techniques for patient and team safety. General anaesthesia can be used when this is impossible or if the patient cooperates minimally. Despite the high cost, it can all be carried out in a single visit<sup>3-6,22-29</sup>. However, based on the evolution of dental knowledge, materials and techniques, work at hospital level has been reduced<sup>28,29</sup>. Considering the contemporary understanding of caries, supported by the dynamic process of remineralization or demineralization, the management of caries disease can be more preventive and less curative, being easily carried out by professionals<sup>21</sup>. For the restorative approach, minimally invasive strategies such as the use of the atraumatic restorative treatment and the Hall technique have been shown to be suitable and effective for management caries lesions in both deciduous and permanent teeth in the dental office, thus reducing the need for interventions under conditions of general anaesthesia<sup>28-31</sup>.

Thus, maintaining the oral health of patients with cerebral palsy requires systematic oral hygiene practices that require supervision. Patients with special needs and their carers need professional guidance and proper oral health management<sup>3</sup>.

Other factors that influence the oral conditions of patients with cerebral palsy are: low family income; low educational level of carers; living in rural areas; and poor access to quality oral health care. As a result, poor and precarious oral health is a reflection of existing social inequality. In addition, carers have barriers to accessing dental care and a lack of satisfaction with dental care. These situations increase and worsen untreated oral health problems<sup>3</sup>.

## Conclusions

Patients with cerebral palsy may have more stomatological and systemic alterations compared to normoreactive patients. This is due to the conditions that favour difficult oral hygiene, xerostomia and poor diet, including reduced water intake. Preventive dental care, guidance for family members and carers, and specialized treatment are necessary for better care and performance in the management of these patients.

## Conflict of Interest

The authors declare no conflict of interest.

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