



## DENTAL MANAGEMENT OF PATIENTS WITH CEREBRAL PALSY: A REVIEW

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Article Info	ABSTRACT
<p>Received 15/01/2016 Revised 27/01/2016 Accepted 22/02/2016</p> <p><b>Key words:</b> Cerebral Palsy, Dental treatment, Oral Care, Immobilizations.</p>	<p>Cerebral palsy is a complex group of motor abnormalities and functional impairments that affect muscle coordination. This developmental disability may be associated with uncontrolled body movements, seizure disorders, balance-related abnormalities, sensory dysfunction, and intellectual disability. Providing oral care to people with cerebral palsy requires adaptation of the skills to be used every day. The provision of dental care to individuals with mental retardation and cerebral palsy poses a particular challenge to the dental practitioner. A detailed knowledge of the dental implications of this disorder, together with an innovative and problem solving approach to providing treatment options will do much to further the oral health of these individuals. The limitations to treatment choices must be carefully explained to parents/guardians if inappropriate expectations are to be avoided.</p>

### INTRODUCTION

Cerebral palsy is a group of disorders that affect a person's ability to maintain his posture and movement. It is a condition that affects muscle control and movement. It's usually caused by an injury to the brain before, during or after birth or child abuse, preterm labor, an insufficient supply of oxygen to an infant's or newborn's brain during pregnancy or delivery, stroke and infection. Children with cerebral palsy have difficulties in controlling muscles and movements as they grow and develop. For some, the disorder is mild, causing movements to appear merely clumsy or awkward. These patients may need little or no day-to-day supervision. Others, however, experience such severe forms of cerebral palsy that they require a wheelchair and a lifetime of personal care. In fact, most people with mild or moderate forms of cerebral palsy can be treated successfully in the general practice setting. Cerebral palsy itself is not progressive; the injury to the brain does not change. However, the effects may change over time for better or worse [1]. Children with this

disorder are often misinterpreted as mentally disabled due to the presence of primitive postural reactions or reflexes and speech defects. Although most children with spastic quadriplegia have severe mental disability, the intelligence of children with other types of cerebral palsy may be within normal range. Cerebral palsy itself does not cause any unique oral abnormalities. However, several conditions are more common or more severe in people with cerebral palsy than in the general population. These children may fully understand speech, but often have difficulty in producing speech due to abnormal movements of the tongue and vocal cords. Other children may also have hearing impairment. It is a permanent disorder and no treatment is possible. Although some procedures have been tried to alleviate the abnormal voluntary muscle stimulation (e.g., temporal pacemaker, spinal rhizotomy) little positive long-term effect has been reported [2].

The strategies for the general management of the physical disabilities resulting from cerebral palsy (e.g.



adaptive equipment, positioning, wheelchair transfer techniques, speech therapy, etc.) are too extensive to cover in this review, and are not directly germane to the dental management of the person with cerebral palsy.

### Types and forms of cerebral palsy:

There are few types of cerebral palsy: spastic, athetoid, ataxia and mixed combination.

**Spastic cerebral palsy** Present in around 75-88% of people with cerebral palsy, spasticity means the muscle tone is tight and stiff causing a decreased range of movement. As the muscle tone is so tight, spasticity can be very painful with muscles often going into spasm. It can affect many different areas of the body.

**Dyskinetic cerebral palsy** Sometimes referred to as dystonic, athetoid or choreoathetoid cerebral palsy. It is present in about 15% of people with cerebral palsy. Dyskinetic cerebral palsy causes uncontrolled, involuntary, sustained or intermittent muscle contractions as the muscle tone changes from tight to loose, often accompanied with slow, rhythmic movements. The whole body can be affected which can make it difficult to maintain an upright position. Speech can also be affected as the person may experience difficulty in controlling the tongue, vocal chords and breathing.

**Ataxic cerebral palsy** Ataxia is defined as an inability to activate the correct pattern of muscles during movement. Balance is affected and the person may have poor spatial awareness or find it difficult to judge their body position in relation to things around them. It's present in about 4% of people with cerebral palsy and can affect the whole body. Most people with ataxic cerebral palsy can walk but they will be unsteady with shaky movements. Speech and language can also be affected.

**Mixed cerebral palsy** Many people with cerebral palsy

will have a combination of the above types [3].

**Primitive reflexes** are common in many people with cerebral palsy and may complicate oral care. These reflexes often occur when the head is moved or the patient is startled, and efforts to control them may make them more intense. Three types of reflexes are most commonly observed during oral care.

**Asymmetric tonic neck reflex:** When a patient's head is turned, the arm and leg on that side stiffen and extend. The arm and leg on the opposite side flex.

**Tonic labyrinthine reflex:** If the neck is extended while a patient is lying on his or her back, the legs and arms also extend, and the back and neck arch.

**Startle reflex:** Any surprising stimuli, such as noises, lights, or a sudden movement on your part, can trigger uncontrolled, often forceful movements involving the whole body.

Be empathic about your patient's concerns and frustrations. Minimize the number of distractions in the treatment setting. Movements, lights, sounds, or other stimuli can make it difficult for patient to cooperate. Tell him or her about any such stimulus before it appears. For example, tell the patient before you move the dental chair [4].

**Cerebral palsy: associated conditions** Some people with cerebral palsy may have associated conditions; while others may not.

These can include: Learning difficulty (although children with cerebral palsy cover the same range of intelligence as other children), epilepsy (up to a third of children with cerebral palsy), hearing impairment (only 8% of children), problems with sleep, communication difficulties, feeding difficulties, drooling, problems with toileting, behaviour issues (one in four children with cerebral palsy), periventricular leukomalacia [5].

Courtesy: Practical Oral Care for People With Cerebral Palsy



Fig 2. Medical immobilization device (MID) Courtesy: The Patient with Special Needs: General Treatment Considerations, Janet Jaccarino



**Fig 3 Courtesy. The Patient with Special Needs: General Treatment Considerations, Janet Jaccarino.**



### Discussion

Dental management of the patient with cerebral palsy should be done through a multidisciplinary approach when possible. This may involve the family or caretaker, physician (paediatrician or paediatric neurologist), physiotherapist, speech pathologist, psychologist, teacher, ophthalmologist, audiologist, ear, nose, and throat surgeon, orthopaedic surgeon, social worker, etc, depending on other medical conditions and special needs of the patient. Participation in such a team will help the dentist understand the child's physical abilities, intellectual capabilities, and educational status. These factors will further influence planning the appropriate treatment for the patient. Augmentative communication is defined as any communication that supplements spoken words or sounds in non-speaking people. Augmentative communication is classified into two categories: unaided and aided. Unaided communication requires no additional equipment as it involves movements of the hand and arms, facial expression, and use of the body in gestures, familiarly known as sign language. An aided augmentative communication system requires external devices such as symbolic systems placed on a suitable support. Symbol systems can be in the form of objects, photographs, pictures, pictographs, symbols, words, or the letters of the alphabet. The communication supports can be boards, books, wallets, or electronic equipment. The use of aided augmentative communication in dentistry for the non-speaking child has been rarely mentioned in dental publications. The use of a communication board and Picture Communication Symbols 14 for children with CP, multihandicaps, mental disability, and autism has been suggested previously [7].

**The COMPIC system** The use of the Computer Pictographs for Communication (COMPIC) system (© Spastic Society of Victoria, Ltd;) with a communication board has been suggested for the dental setting. The COMPIC system is based on an international symbol convention. Each symbol represents an object, word, or idea, which has been computerized and standardized by speech pathologists in Victoria, Australia. Approximately 1,200 pictographs are stored on computer discs.16

Successful use of the COMPIC system by an individual requires the ability to discriminate between pictographs, the cognitive ability to understand that the pictographs represent a specific word or object, the ability to connect symbols into long sequences, and a communication support. Advantages of this system include the ability for the symbols to be: stored in a computer, portability of the communication support, and ease of understanding. The COMPIC system appeals particularly to adolescent and adult users. However, there are some disadvantages with this system, such as difficulty in interpreting a long sequence, difficulty in distinguishing between similar pictographs, and the need for visual discrimination [8].

### Dental problems in cerebral palsy patients

**1) Dental malocclusion:** Malocclusion will be present in cerebral palsy patients due to the abnormal orofacial neuromuscular tone. Cerebral palsy patients may have maxillary protrusion and open bite. Presence of open bite and spacing in between teeth causes cerebral palsy patients to drool excessively. Unfortunately, correcting malocclusion is almost impossible in people with moderate or severe cerebral palsy. Orthodontic treatment may not be an option because of the risk of caries and enamel hypoplasia.

However, a developmental disability in and of itself should not be perceived as a barrier to orthodontic treatment. The ability of the patient or the caregiver to maintain good daily oral hygiene is critical to the feasibility and success of orthodontic treatment. Inform caregivers of emergency procedures for accidents involving oral trauma, since protruding anterior teeth are more likely to be displaced, fractured, or avulsed [9].

**2) Dental caries:** Most of the cerebral palsy patients exhibit poor oral hygiene. Dental caries may develop as a result of sweetened medications, mouth breathing and lack of oral hygiene maintenance. Physical limitations may hinder oral hygiene procedures and most of the cerebral palsy patients are dependent on their care takers to clean their teeth. Caution patients or their caregivers about medicines that reduce saliva or contain sugar. Suggest that patients drink water often, take sugar-free medicines when



available, and rinse with water after taking any medicine. Advise caregivers to offer alternatives to cariogenic foods and beverages as incentives or rewards. For people who pouch food, talk to caregivers about inspecting the mouth after each meal or dose of medicine. Remove food or medicine from the mouth by rinsing with water, sweeping the mouth with a finger wrapped in gauze, or using a disposable foam applicator swab. Recommend preventive measures such as fluorides and sealants [10].

**3) Periodontal disease:** Up to 36% of children with cerebral palsy will have onset of epileptic attacks. Thus they are often prescribed with anti epileptic drugs. Usage of anti epileptic drugs is one of the causes of gingival enlargement. Dental plaque buildup can also contribute to formation of periodontal disease. It is common in people with cerebral palsy due to poor oral hygiene and complications of oral habits, physical abilities, and malocclusion. Encourage independence in daily oral hygiene.

Ask patients to show you how they brush, and follow up with specific recommendations on brushing methods or toothbrush adaptations. Patients should be given hands-on demonstrations of brushing and flossing. Some patients cannot brush and floss independently because of impaired physical coordination or cognitive skills. Talk to caregivers about daily oral hygiene. Do not assume that all caregivers know the basics; demonstrate proper brushing and flossing techniques. Modification of regular toothbrushes to cope with grip or arm extension problems is usually easily done. The recommendation for use of an automatic brush has proven helpful and more efficient in many cases, especially when the parent/guardian carries out brushing for a dependent child. Many specially designed manual toothbrushes are commercially available. Also, dental professionals should use their experiences with each patient to demonstrate sitting or standing positions for the caregiver. Emphasize that a consistent approach to oral hygiene is important--caregivers should try to use the same location, timing, and positioning. Explain that some patients benefit from the daily use of an antimicrobial agent such as chlorhexidine. Recommend an appropriate delivery method based on patient's abilities. Rinsing, for example, may not work for a patient with swallowing difficulties or one who cannot expectorate. Chlorhexidine applied using a spray bottle or toothbrush is equally efficacious. If use of particular medications has led to gingival hyperplasia, monitor for possible delayed tooth eruption and emphasize the importance of daily oral hygiene and frequent professional cleanings. Another significant issue is the surgical management of periodontal disease in these patients, especially gingival overgrowth due to Dilantin therapy. Most dentists have become very conservative in recommending surgery, especially in conditions of poor oral hygiene, due to the common outcome of rapid regrowth.

Surgery is usually reserved for patients who have severe overgrowth of the occlusal surfaces of posterior teeth that ulcerate upon mastication or for primarily aesthetic reasons involving the anterior teeth. The choice of surgical procedure will vary. Many dentists prefer a modified flap procedure to gingivectomy, especially since maintenance of a periodontal pack is impossible with many patients. Laser surgery has promise for future use [11].

**4) Self mutilation:** Cerebral palsy patients may exhibit self mutilation habit by chewing on the soft tissues around their mouth.

**5) Dysphagia,** difficulty with swallowing, is often a problem in people with cerebral palsy. Delayed cough reflex and dysphagia are commonly associated with cerebral palsy. Food may stay in the mouth longer than usual, increasing the risk for caries. Additionally, the semi-soft foods caregivers may prepare for people with this problem tend to adhere to the teeth. Coughing, gagging, choking, and aspiration are other related concerns. Implications for dentists in airway management, especially when employing sedation, are obvious.

**6) Bruxism** is common in people with cerebral palsy, especially those with severe forms of the disorder. It can be intense and persistent and cause the teeth to wear prematurely. Before recommending mouth guards or bite splints, consider that gagging or swallowing problems may make them uncomfortable or unwearable [12].

**7) Hyperactive bite and gag reflexes** call for introducing instruments gently into the mouth. Consider using a mouth prop. A patient with a gagging problem benefits from an early morning appointment, before eating or drinking. Help minimize the gag reflex by placing patient's chin in a neutral or downward position.

**8) Trauma and injury** to the mouth from falls or accidents occur in people with cerebral palsy.

**9) Diet Issues:** Due to constant involuntary movement and resultant calorie consumption, many persons with cerebral palsy are thin and underweight. Diet consistency may be altered to cope with an altered chewing capability; soft or chopped diets are common.

**10) Patient cooperation and movement:** One issue is the increased need for restraints or stabilizing/protective devices due to uncontrollable body movement. There is a greater need for body wraps, seat belts, mouth props, positioning bags/cushions.

**11) Drooling:** Severe drooling is seen in 10-37% of the affected population. Although related to the common incidence of anterior open bite and lack of lip closure, drooling is primarily due to a swallowing dysfunction. Hyper salivation is not considered the cause of drooling in



these individuals; however the literature is confusing on the issue of whether hyper salivation is present in persons with cerebral palsy. Drooling is a major stigma for many persons with cerebral palsy [13].

Dental management of cerebral palsy patients includes need of dental practitioner to perform dental treatment under sedation or general anesthesia if patient is uncooperative/ the patient requires extensive dental treatment. Most of the cerebral palsy patients are brought in to the dental clinic in a wheelchair. Hence, basic dental examination and simple dental procedures can be performed while patient is on a wheelchair. Basic dental examination and simple dental procedures can be performed on patient's wheelchair. Remember to stabilize patient's head to avoid unwanted movement and gag reflex. Mouth prop can be used while performing dental examination and simple dental procedures.

However, there are not suitable for patients with impaired swallowing. Introduce instruments from the side of the mouth to prevent cerebral palsy patients from biting dentist's finger. Discussion should be made with the medical practitioner to change/modify drug prescription if the usage of specific drug is the main cause of gingival enlargement. Dental practitioner can place fluoride varnish to protect and reduce dental demineralization. Dental practitioner should achieve cooperation from the care takers or parents and implant the importance of oral hygiene maintenance [14]. Care takers should also modify patient's dietary habits and reduce sugar consumption. Modify regular tooth brush holders to allow cerebral palsy patients to grip their toothbrush. However, for patients with severe cerebral palsy, care takers may need to help with their daily tooth brushing. Dental practitioner should perform regular checkups on cerebral palsy patients to monitor their dental condition. Everyone who has cerebral palsy has problems with movement and posture. Observe each patient, then tailor oral care accordingly. Maintain clear paths for movement throughout the treatment setting. Keep instruments and equipment out of the patient's way. Some patients cannot be moved into the dental chair but instead must be treated in their wheelchairs. Some wheelchairs recline or are specially moulded to fit people's bodies. Lock the wheels, and then slip a sliding board behind the patient's back to support the head and neck. If one needs to transfer the patient from a wheelchair to the dental chair, ask about special preferences such as padding, pillows, or other things that can provide to ease the transition. The patient or caregiver can often explain how to make a smooth transfer.

Positioning for treating a patient in a wheelchair. Note the support a sliding board can provide. Sliding or transfer boards are available from home health care companies.

Uncontrolled body movements are common in people with cerebral palsy. Their limbs move often, so providing oral care can be difficult. When patients with cerebral palsy attempt to move in order to help, their

muscles often tense, increasing uncontrolled movements. Make the treatment environment calm and supportive. Try to help patient relax. Relaxation will not stop uncontrolled body movements, but it may reduce their frequency or intensity. Place and maintain the patient in the centre of the dental chair. Do not force arms and legs into unnatural positions, but allow the patient to settle into a position that is comfortable and will not interfere with dental treatment. Observe patient's movements and look for patterns to help to anticipate direction and intensity. Trying to stop these movements may only intensify the involuntary response. Try instead to anticipate the movements, blending movements of dental professional with those of patient or working around them. Softly cradle patient's head during treatment. Be gentle and slow if it is required to turn the patient's head. Exert gentle but firm pressure on patient's arm or leg if it begins to shake.

Try to keep appointments short, take frequent breaks, or consider prescribing muscle relaxants when long procedures are needed. People with cerebral palsy may need sedation, general anaesthesia, or hospitalization if extensive dental treatment is required [15].

**Protective Body Stabilization** Disabled patients frequently have problems with support, balance, and even aggressive behaviour. Sudden involuntary body movements such as muscle spasms can be a danger to the patient and the dental team during treatment. Severe cases could require sedation or general anaesthesia and hospitalization might then be appropriate.

In the office, stabilization may be used to make the patient feel comfortable and secure and allow for safe and effective delivery of quality care. Pillows, rolled blankets or towels may be placed under the patient's knees and neck to prevent muscle spasms and provide additional support. A beanbag chair placed on the dental chair will conform to the patient's body while filling the space between the patient and the dental chair. To minimize movement a member of the dental team or caregiver may gently hold the patient's arms and/or legs in a comfortable position. A team member can sit across from the operator and lightly place their arm across the patient's upper body to keep the working field clear. A child may lay on top of a parent in the dental chair, with the parent's arms around the child. This positioning should be monitored carefully because the parent can tire and easily lose control of the child during treatment. An inexpensive method for stabilization is a bed sheet wrapped around a patient and secured with tape that can be easily cut if necessary. This approach may be less intimidating and even provide the patient with a sense of security. A commercially available medical immobilization device (MID) is illustrated in **Figure 2**. MIDs may be used for patients who have extreme spasticity, increased muscle tension, or severe behavioral problems [16].

However, this method should not be considered for routine use. Mouth props may be necessary to provide



care due to a lack of ability, or unwillingness to keep their mouth open. Use of a mouth prop not only provides protection from the patient suddenly closing their mouth but can improve access and visibility for the dental team. Training on technique for safe use may be required. **Figure 3** illustrate commercially available devices. A long piece of dental floss should be tied through the hole in a commercially available prop and extended outside the mouth for easy removal in case of a breathing problem. Inexpensive, easy to use mouth props can readily be assembled using materials in office. One example is to tape together five wooden tongue depressors and fasten with waterproof tape. Then, wrap and tape several pieces of gauze around one end. To use, gently place the cushioned end between the teeth. Another type of prop can be customized for the amount of bite opening desired. One end of a folded, moistened washcloth or several gauze squares folded together and moistened can serve to keep the mouth open. As with the commercial prop, some type of retrieval safety measure, such as a line of floss, must be incorporated [17]. When considering the use of protective body stabilization, clinicians should be aware of the standards and regulations of their state's Dental Practice Act. Additional education or a permit may be necessary in some states. The dentist should always choose the least restrictive but safe and effective method. A thorough evaluation of the patient's medical history and dental needs is essential. Any use of protective stabilization has potential for patient injury; therefore its use during treatment must be carefully monitored and reassessed at regular intervals. Protective stabilization around extremities or the chest must not actively restrict circulation or respiration and must be terminated if the procedure is causing severe stress to the patient. Contraindications for protective stabilization include those

who cannot be immobilized safely due to associated physical or medical conditions.

For example, the use of protective body stabilization may compromise respiratory function for the patient who has a respiratory dysfunction such as asthma. Informed consent from the patient or legal caregiver must be obtained before treatment. An explanation regarding the need for stabilization, proposed methods, risks and benefits, and possible complications is necessary. Any discussion should allow an opportunity for the patient or caregiver to respond. Documentation in the record must include:

- Informed consent
- Indication for use
- Type of protective stabilization
- Duration of application
- Behavior evaluation during procedure
- The level of success or failure of the procedure [18]

## CONCLUSION

As dental professionals we must consider that there are a large number of individuals with special needs living in our communities requiring oral health care. The latest research linking systemic issues to the oral environment makes providing treatment crucial for patients with disabilities such as those who have cerebral palsy. Mandated by the Americans with Disabilities Act, it is the profession's duty by law to provide access to care. Lastly, the ethics of the dental profession obligate the dental team to provide treatment to those in need. Persons with disabilities do present challenges for the dental team, but most can receive care in the private office with a few modifications to treatment. Pretreatment planning, proper patient assessment, scheduling and possible desensitization techniques help make a successful appointment possible.

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