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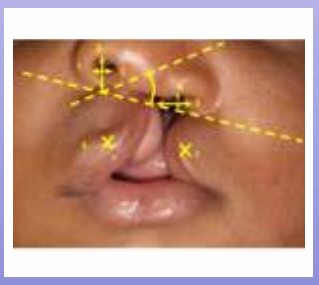
PAR and self reported improvement of malocclusion



Orthodontic considerations of children with special needs

Pre-surgical infant orthopedics experience in LUTH

Management of bimaxillary protrusion

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Orthodontic Considerations in the Management of Children with Special Health Care Needs

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Abstract

Background: Children with special health care needs (CSHCN) include individuals with any form of physical, behavioral, cognitive, emotional impairment and those with specific conditions that are at risk of developing chronic conditions. Due to the peculiarities of this group of individuals, orthodontic treatment should be modified to suit their peculiar needs.

Methods: This review will consider the peculiarities of children with special health care and how it will affect the decisions taken during orthodontic management.

Results: Children with special health care needs are grouped into physical, developmental, behavioral/emotional and those with sensory impairment. They include children with autism, bipolar, Down's syndrome, cerebral palsy, epilepsy and other chronic conditions like asthma and haemophilia. The general presentation of CSHCN like uncoordinated movement and stability, below optimal intellectual performance and poor communication makes management of CSHCN challenging. Also, the increasing prevalence of malocclusion among CSHCN is now making most parents of children with special needs to seek orthodontic care to improve their facial aesthetics and to further enhance social interaction. Modifications of treatment protocol have to ensured in order to be able to accommodate CSHCN especially with behavioral management, maintenance of oral hygiene and orthodontic biomechanics.

Conclusion: Orthodontic treatment of special need patients should be personalized and simplified as much as possible to meet the patient need. Apart from the motivation to have orthodontic treatment, parents and CSHCN must show enough willingness before they can embark on orthodontic treatment. In the light of this, unbiased orthodontic case selection is critical.

Key words: Orthodontic consideration, Special need

ORIGINAL ARTICLE

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Introduction

Special health care needs include any physical, developmental, mental, sensory, behavioral, cognitive, or emotional impairment or limiting condition that requires medical management, health care intervention, and/or use of specialized services or programs.[1] For the purpose prevention, program planning and advocacy for an inclusive service delivery, the Maternal and Child Health Bureau (MCHB) came up with a broader definition to include those with specific conditions without excluding those at risk of developing this chronic conditions. The MCHB definition states that children with special health care needs are "those who have or are at increased risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally".[2] This definition serves as a guide for an organized system of care for both patients and families of CSHCN. It also covers a wide range of individuals including those with developmental disabilities like mental retardation, cerebral palsy,

Down syndrome, attention deficit hyperactivity disorder [ADHD], to those with medical conditions and also people at risk of developing such conditions.

CSHCN suffer from wide range of conditions including congenital, genetic, metabolic to severe physical disabilities which often times negatively impact their everyday functionality and their overall health, including dental health. To be able to provide the needed healthcare for this individuals, specialized training is required with additional need for increased awareness and extra accommodative measures beyond what is usually given to the general patient.[3] Families and caregivers of CSHCN have considered it arduous and frustrating when attempting to seek dental health care, making oral healthcare one of the most unmet healthcare need for CSHCN.[4] Lack of training has been highlighted to have contributed to the unwillingness among dentists to provide care for this group of individuals.[5,6]

Categories and peculiarities of CSHCN

Children with special health care needs (CSHCN) can by grouped into 4 major categories namely; physical, developmental, behavioral or emotional and those with sensory impairment. Children with physical disability include those with muscular dystrophy, epilepsy and cerebral palsy and they usually have problems relating to movement and balance. Sensory impairment include deafness and vision. Emotionally and behaviorally challenged children have difficulty in maintaining interpersonal relationship. They include; attention deficit hyperactive disorder (ADHD). The developmental disabilities include autism, bipolar, Down's syndrome and fragile X syndrome. Other chronic health conditions like; asthma, hemophilia, leukemia, nephritis, rheumatic fever and sickle cell anaemia may also hinder full and effective participation in society on an equal basis with others.

The peculiarities of CSHCN involve the affectation of their social interaction, poor verbal and non-verbal communication, poor intellectual performance, uncoordinated movement and stability.

Malocclusion and dental characteristics of CSHCN

Studies have shown that there is a high prevalence of malocclusion among children with special health care needs.[7-9] Certain conditions like Down syndrome, cerebral palsy, visual and hearing impairment exhibit more of this malocclusion traits than the general population.[10-12] The dental and occlusal traits include; increase overjet, anterior open bite, anterior and posterior cross bite, class II and III relationships. Some of the aetiological factors linked to the development of these malocclusions among children with special health care needs include: delay eruption, oral habits, and abnormal cranio-facial growth pattern.[13,14]

Orthodontic considerations in the treatment of children with special health care needs

With the increasing prevalence of malocclusion among CSHCN most parents and caregivers of children with special needs now consider improvement of facial attractiveness as a major reason for seeking orthodontic care to further enhance social interaction.[13,15] It is important to note that the possibility of achieving an ideal treatment outcome may not always be feasible.[16] In spite of the increasing demand for orthodontic care, majority of CSHCN still find it difficult accessing a dental health profession. Lack of training by the dentists, poor patient corporation and additional time required to treat CSHCN are some of the reasons cited by dentists and orthodontists why they may not be willing to take up orthodontic treatment in their practices.[6,17] Despite all these challenges, being a special need child is not a barrier to having orthodontic treatment. Orthodontic clinician should be able to modify the treatment modalities that are usually delivered to normal patients to suite CSHCN.

This current review is aimed at bringing to fore the various considerations and techniques deployed during the management of the various malocclusion traits commonly seen among CSHCN.

Behavioral management of children with special health care needs.

Most CSHCN approach the orthodontic clinic with a heightened measure of anxiety which is greater than what is expressed by the general population.[15] The orthodontist is therefore faced with onerous task of gaining their trust and building their confidence to follow through with the entire treatment process. Impaired motor control, uncoordinated movement and hyperkinesis in certain conditions like cerebral palsy, Down syndrome and attention deficit disorder make the children cooperate poorly in dental clinics.[18] This attitudinal display is a stark opposite of the ideal orthodontic patient, therefore, making physical examination, investigation (lateral cephalograph, orthopantomogram) and taking clinical records (clinical photograph, and making of impression) difficult. It is usually important to get patient collaboration especially as long procedure like bonding of fixed orthodontic appliance may need to be performed on the dental chair.

Furthermore, parents and caregiver commitment is a major indicator to consider whether or not treatment will be carried out.

Varieties of modalities ranging from behavioral modification, conscious sedation (with benzodiazepine, nitrous oxide) and general anesthesia are available for gaining patients' cooperation, depending on the particular state of the medical conditions,[19] patient's behaviour[20] and the nature of the procedure to be carried out. Severely handicapped patients may be able to tolerate the frequent adjustment during fixed orthodontic treatment but may find it difficult to maintain a stable position when bonding.[16]

Behavioral modification: The use of Tell-Show-Do with positive reinforcement should be the standard course of action in gaining the special need patient's cooperation. This is because the negative attitudinal display cannot always be controlled using anesthesia throughout the course of treatment.[15]

Sedation: It include the conscious and deep sedation as adjuncts to behavioral technique. The use of conscious sedation is able to place the special need patient in a relaxed and conscious state. This could be achieve using the inhalational route (Nitrous oxide and oxygen), intra-mucosal (midazolam via nasal drops), orally (midazolam) or intravenously. Intravenous deep sedation is an alternative to general anesthesia where long and complex procedures like bonding of the full arch combined with extraction can be performed.[21]

In the light of this, the choice of the technique to employ in gaining the cooperation of the special need patient could be evaluated using the guidelines presented by Chaushu & Becker.[22] The guidelines include the combination of the classification of handicapped children,[19] patients behavioral rating,[20] gag reflex, drooling rate, uncontrolled movement, inability to keep still and also the need for additional procedure under general anesthesia.

Maintaining good oral hygiene

Maintaining good oral hygiene is a major factor to consider when contemplating treating a CSHCN because it is major problem usually encountered by parents of CSHCN undergoing orthodontic treatment.[23] Poor cognitive ability, poor muscle control (with lack of manual dexterity) and impaired natural cleansing ability by the oral musculature are reasons why majority of some CSHCN may not be able to maintain a good oral hygiene.[24] The orthodontist must gain the commitment of the parent/caregiver on oral hygiene maintenance for the treatment to progress.

A. The child should be taught how to identify plaque accumulation, gingival inflammation and how to perform an efficient and customized-toothbrushing technique.
B. Parental tooth brushing should be encouraged especially in cases of severe muscular incoordination.
C. The use of electric tooth brush can be introduced to assist in brushing
D. The use of mouthwash to reduce plaque accumulation has also be advocated.

If the required standard of oral hygiene maintenance is not met, the clinician can consider declining to treat the patient.[15]

Investigation and diagnostic record keeping

Routine radiographic investigations like lateral cephalograph and dental panoramic radiographs usually carried out before commencing orthodontic treatment are challenging for CSHCN due to the difficulty in gaining their cooperation. Therefore, the following alternative methods could be utilized;

Multiple intra-oral peri-apical radiographs

Conventional extra-oral oblique lateral views of the face and jaws.

Computer tomography (CS) scan under sedation.

Impression making: It may be challenging making impression for patient with exaggerated or extreme gag reflex like Down syndrome due to the tongue position and phobia. Therefore, the use of fast-setting and low viscosity impression materials will help to mitigate against such difficulty.[15] In 2010, Topouzelis and his colleagues also described a modified sectional method of making two separate impressions using left and right halves of an impression tray for uncooperative special need child suffering from Lesch-Nyhan Syndrome.[25]

Choice of orthodontic treatment technique; fixed or removable orthodontic treatment:

Simplified and individualized orthodontic treatment is advocated for special need patients. Several researchers have reported several findings with regard to the choice of orthodontic treatment to be used among CSHCN.[23,26] According to a survey conducted by Becker et al most parents of special need children (47.0%) complained that fixed appliance was most difficult to cope with by their children when compared to 11.8% who complained about removable appliance. This finding agrees with the earlier observation made among non-special need patient, that the problems encounter when wearing fixed appliance were generally more severe than those using removable appliance.[27] Most parents of CSHCN also reported that maintenance of good oral hygiene was also more challenging with fixed appliance wear.[23] On the contrary, in a case-control study conducted in 2014 by Abeleira and his colleagues, special need patients were reported to have adapted excellently well to fixed appliance than they did to removable appliance.[26]

Orthodontists consider placement of fixed appliance for CSHCN difficult due to the several challenges they present with. As a result, the use of fixed appliance should be cautiously utilized and simplified as much as possible. Less complex techniques and the use of modern auxillary that would require less clinic appointment is encouraged.[23] Consequently, it is suggested that where applicable, orthodontic treatment in CSHCN should begin with a simple removable appliance to ascertain patient cooperation, ability to sustain oral hygiene maintenance and follow simple instruction like activation of expansion screws before progressing to incorporating extra-oral forces.[23,28]

Modifications when using removable appliance

The retentive component of the removable appliance can be modified by including several retentive clasps to prevent the child from removing the appliance easily.[23]

Due to excessive stimulation, it is preferable to use less bulky removable appliance among autistic patients.[29]

Removable appliance with long range of action that will allow for fewer clinic appointment could be helpful for patient with poor muscle control. The en bloc appliance proposed for the Cranio-maxillary orthopedic correction has been effectively used as an adjunct in the orthodontic management of severe class II malocclusion in a cerebral palsy patient.[15,30]

Modifications during the placement of fixed appliance

Etching technique: self-etching primer is a single step technique that eliminates the need for separate steps of etching and rinsing. It is technique sensitive and can help save time. It is particularly useful in patient with significant drooling like Down syndrome and cerebral palsy.

Bonding: Children with special health care needs may find it difficult to cope with long time duration required for direct bonding. Hence, indirect bonding under sedation will make bonding faster with lesser risk of aspiration.[31] Care must be taken to protect the airway to prevent aspiration especially among patients with cerebral palsy and muscular dystrophy occasioned by their compromised cough reflex. This can be ensured by making use of rubber dam or the use of oro-pharyngeal airway pack.[32]

Bracket. The advantages of self-ligating brackets can be very useful when managing special need patients. Self-ligating brackets reduce chair side time and allow for short clinic appointment. In order to prevent deformation of the arch wire at the early stage of treatment and also to be to commence early space closure, Tip-Edge bracket can be used because it allows for the insertion of heavier archwire gauge.[18]

Extraction: Strategic extraction tailored toward simplifying the treatment modalities should be done. This non-routine form of extraction will allow for seamless correction of crowded segmented and ultimately reduces the entire treatment duration. This is particularly important because achieving controlled space closure in CSHCN may be challenging when the standard protocol of extraction is followed.

Archwire: Advanced memory wire like super-elastic nickel-titanium allow should be used to deliver light continuous force, thereby reducing the level of discomfort experienced by the patient.

Dealing with relapse: Active retention may be required in some case especially when a conservative approach has be undertaken for a clear surgical case. For cooperative child with special health need and good cognitive ability, removable retainer could be used, otherwise a fixed retainer is advised for a more predictable retention phase. Extended active period of retention will be helpful among CSHCN with skeletal discrepancies like cerebral palsy, myopathy or macroglossia.

Conclusion

It is quite understandable that there is high prevalence of malocclusion and orthodontic treatment need among CSHCN. However, orthodontic treatment is still considered elective for CSHCN due to the plethora of challenges faced by orthodontists and the need to avoid iatrogenic injuries. Nevertheless, some other authors have stated that it is unjustifiable to deny CSHCN that require orthodontic treatment on the bases of the severity of their malocclusion and possibly a doubtful treatment outcome. It is believed that motivation is not enough to go ahead with the treatment, willingness and gaining the cooperation of both the parents and patients are needed for a successful outcome. In the light of this, unbiased case selection is critical. Orthodontic treatment of special need patients should be individualized and simplified as much as possible to meet the patient need. Advancement in technology, innovative and the commitment of orthodontic clinicians have made treatment of CSHCN possible.

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