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Case Report

# Dental care for children with autism spectrum disorder

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***ABSTRACT***

***Background:*** *Providing dental treatment for children with autism spectrum disorder (ASD) represents a challenge for dentists. In the dental care of such children, the treatment plans implemented are usually determined by several factors, including: the type of autism spectrum disorder, the degree of patient cooperation, dentist/patient communication, the required treatment, self-care skills and parental/dentist support.* ***Purpose:*** *The purpose of this case report was to report the dental care delivered in the cases of two pediatric patients with ASD.* ***Case 1:*** *A 10.7 year-old boy with a nonverbal form of ASD who was experiencing recurrent pain in his lower left posterior tooth and also presented a blackened tooth.* ***Case 2:*** *A 9.6 year-old boy with a nonverbal form of ASD suffering from numerous painful cavities.* ***Case management 1:*** *On the day of the first visit, the boy was the subject of several behavioral observations. During the day of the second visit, he underwent a brief intraoral examination at a dental unit in order to arrive at a temporary diagnosis before appropriate was decided upon treatment in consultation with his parents. The implemented treatment plans comprised dental extraction and preventive restoration under general anesthesia.* ***Case management 2:*** *On the first visit, the boy underwent behavioral observations followed by early intraoral examination involving physical restraint approach. During the second visit, several treatment plans such as: general anesthesia, tooth extraction, restoration, and pulp-capping treatment were formulated.* ***Conclusion:*** *It can be concluded that general anesthesia was considered an appropriate dental treatment plan since the two patients in question were extremely co-operative during the necessary procedures. In other words, pediatric dental care treatment plans in cases of ASD should be determined by clearly-defined criteria, specifically the benefits and risks of the treatment plans for the safety of both patient and dental care team.*

***Keywords:*** *autism spectrum disorder; dental care; children*

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## INTRODUCTION

Autism spectrum disorder (ASD) constitutes a group of developmental disorders characterized by impaired social interaction and communication, as well as behavioral limitations or repetition.[1,2] Most children with ASD suffer several disabilities, for example: learning disabilities, attention deficiency and sensation and stimulation reaction disabilities. Autism spectrum disorder, usually diagnosed before a child celebrates its third birthday, represents a life-long condition and affects members of all racial, ethnic and socioeconomic groups.[3] The prevalence of ASD is estimated to be 1% worldwide.[2]

The etiology of ASD remains undefined, although it is believed to be a result of genetic and environmental factors.[1,2] Gene mutation, mitochondrial defects, cytosine regulatory disturbances, intrauterine androgen concentrations and the relatively advanced age of the mother during pregnancy are probable contributory factors in autistic pathophysiology.[1] Another theory is that children with autism have abnormal levels of serotonin and neurotransmitters in their brains.[4,5] Other potential factors comprise: infection, metabolic disorders, immunological disorders, poisoning, and fetal alcohol syndrome.[4]

Children with ASD tend to demonstrate behavioral problems which present a challenge for dentists when implementing routine treatment plans.[6] As a result, a knowledge and understanding of the behaviorial patterns of children suffering from ASD are key to successfully treating such individuals.[1] Those afflicted with ASD also

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tend to demonstrate limitations in verbal and/or non-verbal communication, often repeating words that do not refer to a specific context, while sudden or delayed echolalia can also occur.[7]

Children with ASD usually have little interest and engage in limited activity, while also demonstrating repetitive behavior often triggered by stress, pleasant feelings or certain stimuli (such as noise). They also tend to be routine-obsessed and show both a lack of motor coordination and repetitive body movements. One of the main characteristics of such children is a low frustration threshold often culminating in temper tantrums. The nature of agitation, aggression, and self-harming behavior can intensify as children with ASD age. Sensory perception may also be affected by audio and tactile hypersensitivity, excessive reaction to light and odor and an increased pain threshold.[7,8]

Several studies have compared the health or otherwise of oral cavities in children suffering from ASD with those of individuals free of the condition. These studies found that ASD children tend to have low levels of oral hygiene with an elevated plaque index as well as poor gingival and periodontal conditions.[9–11] Oral hygiene is the most influential risk indicator associated with the occurrence of new caries and lesions in children with ASD.[12] Consequently, their prevalence among ASD-afflicted children is higher than in those without ASD, although the difference is not significant.[10,11] Moreover, there is also an increase in the incidence of malocclusion, as well as parafunction or self-harming habits in children with ASD.[10]

Various approaches and methods should be attempted to render such children co-operative during dental care procedures. A number of previous studies have already shown that children with ASD have a tendency to be more less cooperative during dental examinations, for example, being reluctant to open their mouths or rejecting instruments inserted into their oral cavity[9,11] There are actually several behavioural approaches that can be used for ASD children during dental care. In general, more than one approach should be used for a patient with ASD during his/her dental treatment.[7] In other words, a modification of approaches in dental care is necessary.[1]

For instance, a commonly used tell-show-do approach is often ineffective with ASD children because of their limited ability to focus. Moreover, voice control technique accompanied by facial expressions are also ineffective because of the inability of ASD children to understand the language and interpret the emotional expressions of others.[6] Most ASD children have difficulty in understanding abstract contexts so communication should use short, clear, and simple language.[1,7] As a result, a visual pedagogical approach combined with sensory adaptation in the clinical environment, applied behaviour analyses, and pharmacological techniques under general anaesthesia are considered to be useful.[1]

Nevertheless, children with ASD demonstrate a range of characteristics that vary, to a greater or lesser degree, between individuals. Thus, there is no single behavioural approach that can be generalized across all ASD-affected children.[7] For these reasons, a pair of dental care cases conducted with two children presenting nonverbal varieties of ASD are reported here.

## CASE

Case 1: A 10.7 year-old boy with ASD weighing 45 kg and 130 cm tall attended a consultation accompanied by his mother and his caregiver. The mother reported that, during the previous week, her son had been shouting continuously, while pointing to the mandibular teeth on the left-hand side of his jaw. She also complained that the incisors of her son's upper jaw had become blackened. The boy had been undergoing routine therapy with a psychiatrist as well as medical rehabilitation in an attempt to train his motorics. Several drugs prescribed by the psychiatrist, such as persidal, prohiper, piracetam, carbamazepine and folic acid were being consumed by the boy on an ongoing basis. However, he had never consulted a dentist.

Significantly, the mother acknowledged that her son had been diagnosed with autism when he was three years old and had recently attended a school providing additional teacher support. Based on the results of observations made during the first visit, the boy was known to be able to mimic words spoken by another person, although with imperfect articulation, responding to a conversation with a nod or a shake of the head. Unfortunately, two-way communication proved impossible since, during the consultation at the clinic, the boy was unable to calm himself, his eyes perpetually moving, while he continually produced incomprehensible language amounting to little more than sounds.

Case 2: A 9.6 year-old boy weighing 28 kg, and 137 cm. in height was referred by a previous dentist for management of his teeth. The patient had attended the clinic on two previous occasions, but had never undergone treatment. Two weeks before the visit, his mother had phoned the reception to make an appointment and explain her son's condition.

Following an anamnesis with the patient's mother held in the dental examination room, the resulting information confirmed that the child had been diagnosed with both ASD and speech delay at the age of 3 years old. The patient did not attend school, but went to therapy sessions three times a week. He was not receiving therapy from a psychiatry and had not been prescribed any course of drugs. Several bruises on his left hand were clearly evident, the result of self-injury. Both parents observed that their child appeared to suffer from toothache because of his frequent pointing at his cavitied teeth. They also commented that their child hardly ever brushed his teeth. The child had been to a dentist, but had never received any form of treatment. On attending the clinic, the child could not speak and behaved aggressively. However, he obeyed the father's instructions.

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## CASE MANAGEMENT

Case 1: During the first visit, an extraoral examination was performed, the results of which revealed no facial asymmetry. From the outset of the consultation, the child would sit on the dental chair, although only briefly, but did not want to open his mouth. The patient simply pointed with a finger to his left cheek. Education on oral hygiene was delivered during the first visit. The patient's mother was also instructed to train the child at home before the following visit, while the patient himself was asked to practice opening his mouth for ten seconds before brushing his teeth every day.

The second visit took place one month later. The mother complained that the child was experiencing pain in his left rear mandibular teeth. Unfortunately, the response of the child himself was consistent with that of his previous consultation. While the child remained agitated, tending to make sudden movements, he opened his mouth, even if only briefly, to be inspected. The examination was, therefore, limited to one using a dental mouth mirror. The results of the initial examination indicated the widespread presence of caries in the occlusal portion of tooth 36, the persistence of the residual roots of teeth 54, 52, 51, and 75, as well as general plaque without staining. However, a radiographic examination could not be performed. Several treatment plans, including oral prophylactics, tooth extractions, and tooth restorations were to be carried out under general anesthetic by a pediatrician. In other words, the patient was scheduled for several dental treatments by a dentist and along with circumcision by a plastic surgeon on the same day under general anesthesia.

During the third consultation, a full examination was performed after the patient had been placed under anaesthetic in the operating theatre. The examination led to a diagnosis of pulp caries on tooth 36 with widespread clinical conditions in the occlusal and proximal mesials followed by: loss of tooth marks, persistence of residual roots on teeth 54, 52, 51, 75, and 84, as well as email caries on teeth 16, 15, 14, 24, 25, 26, 36, 35, 34, 44, 45, and 46 (Figure 1). Several treatments were performed, namely: oral prophylaxis, dental restorative restorations on teeth 16, 15, 14, 24, 26, 36, 35, 34, 44, 45 and 46, tooth extractions on 54, 52, 51, 75, 84, and 36 as well as fluoride application.

After surgery, several instructions were issued to maintain oral hygiene, including: brushing of the teeth, compressing the wound area with gauze soaked in chlorhexidine and following a soft food diet for two days. Management of post-action pain and fluid therapy was performed and monitored by a pediatrician with a 7-hour post-operative control subsequently being conducted. The control results consisted of subjective data indicating the absence of both pain in the extraction sites and clinical bleeding, but blood clots already covering the extraction sockets.

During the fourth visit, there was no subjective complaint when the patient came to the control two weeks after surgery. Again, attempts were made to motivate him to maintain oral hygiene at a high level, while his mother was taught, on this occasion, the most effective technique for brushing her son's teeth.

**Figure 1**. Pre- treatment intraoral examination in case 1.

The fifth visit occurred when the patient came to the control after a year. He initially resisted, having no memory of the atmosphere at the clinic. However, a brief examination was conducted by means of a mouth glass, the results of which confirmed a high level of oral hygiene and the absence of new caries.

Case 2: During the first visit, an initial examination was performed with the assistance of the subject's father and an assistant, while the subject himself was restrained in the dentist's chair. The examination resulted in a provisional diagnosis of residual roots on tooth 84, pulp caries in teeth 55, 65, 74, and 85, as well as dentine caries in teeth 16, 12, 21, 26, 36, and 46 (Figure 2). The patient's parents were then instructed during the initial visit on how to brush their child's teeth. The patient's apparent greater obedience to his father rendered the latter more motivated to help the child brush his teeth. The patient was subsequently scheduled for several treatment sessions under general anaesthetic in accordance with the parents' wishes following a discussion involving the dentist and both the mother and father. Radiographic examination could not be performed since the child could remain calm.

During the second visit, a complete diagnosis was made when the patient was in the operating room, indicating the persistence of residual roots on tooth 84, pulp caries in teeth 55, 65, 74, and 85, dentine caries in teeth 16, 12, 21, 22, 26, and 36, and rocking movement in tooth 64. Several dental treatments were subsequently performed, namely: oral prophylaxis, pulpcapping with MTA, restoration of composite resins on tooth 21, restoration of composite resin on tooth 22, restoration of glass ionomer cement on teeth 16, 12, 26, 36, and 46, as well as tooth extractions of 55, 65, 74, 84, and 85 followed 3.0 vicryl yarn stitches between teeth 84 and 85.

Management of post-action pain and fluid therapy were performed and monitored by a pediatrician. A 19-hour post-operative control was then conducted which produced clinical data indicating controlled bleeding and no swelling.

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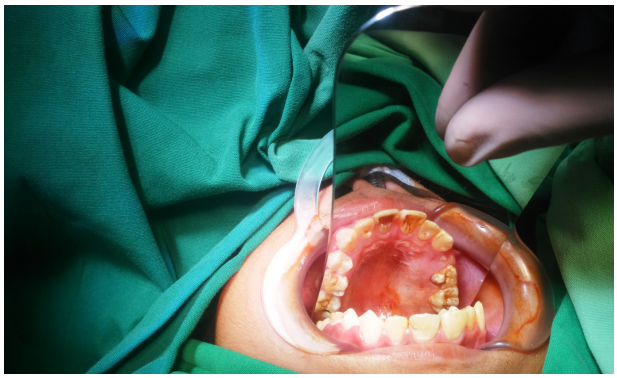

**Figure 2**. Pre- treatment intraoral examination in case 2.

The patient was able to eat 15 hours after surgery. The patient's mother was asked to compress the extraction area with chlorhexidine and maintain the oral hygiene of the child by regular brushing. She also received an explanation about the prognosis of care. The patient then returned for a further consultation three weeks later during which he made no complaint of pain.

During the third visit, the patient's behavior was more positive than during the first. For example, he proved able to briefly sit alone in the dentist's chair without being forced to. Moreover, the father confirmed that his son had started to brush his teeth regularly. The patient was then refered to the previous dentist for regular check-ups.

## DISCUSSION

The initial examinations of both patients showed signs of ASD confirmed by anamneses from the patients' mother. There are actually several indicators of autism disorders in children, namely; a failure to communicate effectively due to their ignorance about the environment as well as their inability to provide information using verbal language, gestures and eye contact.[1] A number of previous studies have also revealed that most children with ASD demonstrate a range of self-harming behavior as a means of expressing their feelings of stress, anger and discomfort.[11,13] Similarly, both patients also suffered from a similar inability to express their emotions verbally, to engage in two-way communication, to concentrate on others, to make eye contact, or to avoid aggressive behaviour. For instance, several bruises on the second patient's left hand were caused by self-harming, a fact corresponding to the findings of previous studies.

Against this background, obtaining as much information as possible from parents/caregivers is essential before treating ASD children.[7] Anamneses involving parents should focus on those children's positive points, the things they love, appropriate types of gift for them, whether they can talk or not, as well as the best means of communicating with them. In addition, it is necessary to explore information about what those children are afraid of.[14] Some experts even suggest pre-visit interviews with parents in order to establish the potential for their children to show cooperative behavior and to plan a behavioral approach.[7]

In general, certain risk factors cause ASD children to be uncooperative during dental care, namely: age (4-7 years or >7 years), reading ability (strong or weak), accompanying systemic diagnosis (present or absent) and speaking ability (evident or not evident). The presence of two or more risk factors indicates a tendency towards uncooperative behavior. By knowing these facts in advance, the dental care team is then expected to be able to predict the cooperativeness of such children. [7]

In case 1, information about the patient was obtained during anamnesis on the first visit. Meanwhile, in case 2 this was elicited from a combination of the pre-visit history and his first consultation at the clinic. However, the patient's parents in case 2 were more prepared to provide information than were their case 1 counterparts since the patient in case 2 had previously visited a dentist. The resulting information then served as the dental team's guidance in preparing its members and in managing the duration of the visit.

Actually, the presence of parents/caregivers in the clinic can also help to increase the trust and cooperativeness of patients.[7] In both cases, this had even proved extremely helpful to the dental team in treating each of the two patients with nonverbal forms of ASD. Such parental involvement also provided benefits in delivering dental health education to patients. In these cases, operators were able to motivate parents to maintain dental and oral hygiene at home as a preventive measure since they faced challenges in delivering education directly to those children.

Patients with ASD are very easily distracted. Consequently, certain steps, such as making physical contact with them during dental treatment, should be avoided. In addition, sensory stimuli (sound, odor, etc.) should also be reduced in intensity.[7] Thus, prior to the initial examination of both patients, the examination chair had been adjusted in order to minimize potential distractions. Sudden movements of the chair in question were also avoided, as was the use of dental handpiece swivel instruments during the initial visit.

Unfortunately, the intraoral examination was neither completely nor successfully performed during the first visit of either patient. Individuals with ASD generally experience hypersensitivity in the intraoral and perioral areas and tend to be sensitive to even a light touch during dental examination. Thus, refusal to cooperate or physical resistance during a dental examination is a distinct possibility with young ASD patients.[1,13] Similarly, previous research has already shown that most ASD children will demonstrate unhelpful behavior during dental examination.[11,13] Therefore, it is advisable that such patients be introduced pre-visit to clinical situations through pictorial stories or home exercises in order to familiarize them with tools and procedures, including the type of orders issued by dentists.[1,7]

Certain literature suggests that the use of a visual-based pedagogical approach, including the use of photographs,

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during dental examinations is more effective than oral explanations given to children with ASD.[1,14] In other words, before attending a dental clinic, such ASD patients should be introduced to what a consultation involves.[14] Visits to a dental clinic should also be repeated, if possible, and scheduled for the same time and day on each occasion. Similarly, they should, ideally, involve the same medical team and the same examination chair. Both waiting time and total duration of treatment should be minimized. In addition, in order to render patients calmer during an examination, it is advisable that they bring their favorite objects and/or music as a "distractor" from stress or panic.[1,7]

The patient's mother in case 1 was asked to help the dentist train the child to open his mouth by pretending to be a dentist herself. The patient's appointment was then rescheduled. However, obstacles occurred during the oral examinations of both children. For instance, the results of a provisional clinical examination indicated that invasive action in relation to certain teeth was required. However, the patients proved uncooperative and it was thus necessary to administer a pre-treatment general anesthetic.

According to certain literature, the behavior of ASD children in the clinic can actually determine appropriate approaches.[7] A number of experts also argue that a restraining approach may prevent the possibility of sudden aggressive behavior.[7] This method was then adopted in treating the patient in case 2 during the oral examination. However, such an approach is not considered a good option for ASD patients during dental treatment due to their relatively advanced age and specific physical factors. During dental treatment, ASD children also require certain pharmacological support. Consequently, both their medical history and medication intake need to be reviewed.[7]

The administering of nitrous oxide to ASD patients represents a challenge, given the prerequisite level of communication. Therefore, if the patients are unable to respond to a form of sedation using nitrous oxide, dental treatment involving the administering of a general anesthetic should be undertaken. Moreover, the need for extensive treatment (involving four quadrants) and/or complex treatment also triggers the use of general anesthesia.[7]

According to other literature, endodontic treatment in children with growth and developmental disorders depends on the patient's behavioral aspects. If radiographic examination is not possible, endodontic treatment may still be possible although the success of the treatment may be seriously compromised. Therefore, tooth extraction is considered to constitute a better option.[3]

In case 1, extraction was performed on tooth 36 following a diagnosis of pulp caries since the success of previous endodontic treatment remained uncertain. The patient could not be subjected to radiographic photograph examination. Similarly, definitive restoration after endodontic treatment of the molars in question could not be performed since it requires several visits to complete onlay restoration. Meanwhile, if direct plastic restoration had been performed, it would not have endured for long due to a lack of support from the remaining healthy dental tissues resulting in the failure of endodontic treatment.

In case 2, extraction was also performed on the first molars with pulp caries since the patient could not undergo radiographic photograph examination. As a result, the prognosis remained provisional and definitive restoration, using stainless steel crowns, was questionable since his teeth were almost exfoliated. However, while direct restoration could still be performed, restoration resistance was open to doubt since the teeth in question had already lost a considerable amount of structure. Consequently, restoration was required to protect the entire crown of each tooth. Direct restoration, however, would play a role as temporary restoration that later needed to be replaced. Partial pulpotomy treatment was also performed on tooth 21 after the pulp was opened during caries excavation, even though it was not preceded by the taking of radiographic photographs. Extraction was not carried out on tooth 21 due to aesthetic reasons. The patient's parents were then given information about the prognosis of dental care (pulp treatment and post-treatment restoration).

In addition, previous research suggests that dentists should educate parents of ASD children receiving dental care under general anesthesia about the risk of restoration failure.[15] Actually, while there is no limit to the frequency with which an individual can be placed under general anesthetic, it is advisable to reduce the risk of anesthesia by minimizing the need for revisits.[3] As a result, restoration given to patients undergoing general anesthesia should be considered for its prognosis. Another point to consider in planning dental care for a patient with impaired growth and development is the assessment of that individual's understands of the role and importance of oral care. Therefore, aggressive patients who refuse caregivers' assistance in maintaining oral hygiene will not achieve promising restoration results. Similarly, patients who are physically incapable of brushing or flossing cannot achieve any complex dental restoration since cooperation and careful attention play an important role in its success.[3]

Finally, it can be concluded that dental care for children with ASD should take account of the safety benefits and risks to both patient and dental teams. The dental care provided to children with ASD should also be supported by preventive efforts on the part of parents/caregivers and children. Moreover, general anesthesia may be considered to be a valid solution if other behavioral management options have been implemented. Ultimately, dental treatment under general anesthesia will have greater benefits than risks.

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