

Article

The Management of the Autistic Patient Undergoing Orthodontic Treatment: Case Report

Ierardo G., Corridore D.*, Guaragna M., Mazur M., Guerra F., Ottolenghi L., Polimeni A., Vozza I

Department of Oral and Maxillo-Facial Sciences, Sapienza University of Rome, 00161 Rome, Italy

*Correspondence: Dr. Denise Corridore DDS, PhD. Department of Oral and Maxillo-facial Sciences Sapienza University of Rome. Via Caserta 6-00161, Rome. Email: denise.corridore@uniroma1.it

Abstract: The purpose was to complete an orthodontic treatment of expansion in a patient with Autistic Spectrum Disorder, checking and improving his Oral Hygiene Index and managing all the risk factors using the medical-pedagogical approach. A 7-year old boy affected by Autism Spectrum Disorder came to the Paediatric Dentistry Unit, Teaching Hospital Policlinico Umberto I. At the clinical examination posterior unilateral left cross bite and Plaque Index Code 3 were observed. It has been decided to begin an orthodontic therapy of expansion, due to the difficulty in eruption of 2.1 for the permanence of 6.1 in the dental arch. After extraction of 6.1 a rapid palatal expander was cemented, activated twice a day for 15 days and kept as contention for 3 months. Successively it has been substituted with an upper removable transverse expander without activating the screw. With Alternative Augmented Communication (A.A.C) the team was facilitated in the communication with the autistic child through illustrated schemes that showed the tools used during the session and the rules of home oral hygiene.

Keywords: autism, orthodontics, children, oral hygiene

Introduction

Children are special patient who need special care. It is not easy to teach them how to collaborate during a dental visit, and moreover to make them understand the importance of the rules of oral hygiene in order to keep teeth and gums healthy [1,2]. All of the above become more complicated when the child is affected by Autism Spectrum Disorder (ASD).

Children with ASD often show multiple and complex deficiencies in their social, emotional, and communicative skills and repetitive behaviors. In these cases, it is important to go in specialized

centres where this kind of patients are taken into a dedicated path and where the team is not only capable in dental treatments but has also psycho-pedagogic skills [3-5]. The patients diagnosed with ASD are just like the other patients [6,7]. What differs from them is the frequency of follow-up to the dentist and the techniques of management used to have a successful oral check-up. It is crucial for the dental team to understand how to interact and work with autistic patients both during the visit and at home to get the best results for their oral health [8,9].

Usually dental problems in the autistic children are undervalued by their parents, as other medical problems are prioritized [10]. The truth is that we don't have to wait until the child suffers of toothache, instead, it is recommended to immediately start to educate and teach him how to take care of his mouth, considering his needs.

The higher prevalence of caries resulted from autistic populations more than other oral problems, other non-autistic patients and schizophrenic patients. On the other side, patients affected by ASD were related also to lower carious index compared to their healthy brothers and children with development disabilities [11-14].

For what that concerns oral hygiene, Toothbrushing is considered as a basic practice for maintaining oral health and it should be advocated in early childhood. It's considered a challenge for special-needs population and several scientific articles show that it generally lacks in young autistic patients. Nonetheless it emerged that children and young adults with autism maintain a better oral hygiene compared with patients with other development disabilities [15].

Bad oral habits such as, bruxism, tongue biting, object biting, and thumb sucking, may contribute to significant dental problems, such as soft tissue injury, tooth loss, tooth wear, increased overjet, anterior open bite, and posterior crossbite. Deformation of the skeletal and dentoalveolar systems may occur due to the frequency and severity of the habit. Individuals with ASD did not present a specific malocclusion, but it has been estimated a higher tendency to diastemas, deep palate, increased overjet and class II molar relation incidence [16]. Moreover, clinical manifestations of orthodontic interest, like open bite and dental crowding, are more frequently diagnosed in adults with ASD than in the non-affected control group.

A regular diet, with a moderately lower frequency of sweetened snacks and a decreasing administration of carbohydrates, were confirmed also for the low cariogenic activity in young autistic people. On the contrary an adverse dietary habit was described in individuals affected by ASD with persistent preference for sweet and soft food with prolonged retention of it in the oral cavity [5].

The autistic child is extremely methodical and tied to his routine: modifying his habits in order to go to the dentist is an enormous source of stress. That is why dental protocols are realized, customized to every paediatric patient in order to calm him.

Methods, such as tell-show-do, voice control, positive reinforcement, and behavior modification should be used to increase patient's compliance during treatments [17-19].

Recent studies have shown how the dental clinic itself is fundamental for the collaboration with the child: switching off lamps that are excessively bright, projecting images on the ceiling or on a screen, wrapping the chair with garments that make it seem a big butterfly and accompanying everything with relaxing music, contribute to reduce the stress and the fear of the child when his routine is interrupted with new sounds and objects [20-25].

Basing on these premises, we questioned whether it was possible or not to undertake orthodontic treatments with these patients reaching compliance and good orthodontic results. Scientific literature lacks in this field, having found just few papers, more centred on the technical aspect rather than the pedagogic one.

In this work, the purpose was to complete an orthodontic treatment of expansion in a patient with Autistic Spectrum Disorder, checking and improving his Oral Hygiene Index and managing all the risk factors using the medical-pedagogical approach.

Materials and Methods: Case Report

In 2017 a 7-year old boy affected by Autism Spectrum Disorder came to the Paediatric Dentistry Unit, Teaching Hospital Policlinico Umberto I, Sapienza University of Rome.

After signing the informed consent by parents, at the clinical examination posterior unilateral left cross bite (**Figure 1**) and Plaque Index Code 3 (Silness and Loe index) were observed.

As he showed a good level of collaboration, it has been decided to begin an orthodontic therapy of expansion, due to the difficulty in eruption of 2.1 (**Figure 2**) for the permanence of 6.1 in the dental arch.

The study protocol complied with the ethical guidelines of the 1975 Helsinki Declaration and and Ethics Committee of the Department of Oral and Maxillo-facial Sciences, Sapienza University of Rome, approved with protocol number 0000216/202.

Before beginning the orthodontic therapy, deep caries on 5.4 and 6.4 were observed; it has been decided to keep them checked for all the duration of the therapy. Furthermore, fissure sealing of 1.6, 2.6, 3.6 and 4.6, extraction of 6.1 were performed after signing the informed consent by parents.

Then a rapid palatal expander was cemented (**Figure 3–4**), activated twice a day for 15 days and kept as contention for 3 months.

Successively it has been substituted with an upper removable transverse expander (**Figure 5**) as contention (without activating the screw), because during the appointments it has been cemented several times and the mother referred her son's negative compliance due to the type of fixed appliance.



Figure 1. Clinical examination.



Figure 2. Radiographic examination.



Figure 3. The Rapid palatal expander inserted.



Figure 4. Clinical examination with the appliance.



Figure 5. The upper removable transverse expander as contention.

With Alternative Augmented Communication (A.A.C) the team was facilitated in the communication with the autistic child through illustrated schemes that showed the tools used during the session and the rules of home oral hygiene; suggestion for a correct diet were added in order to fully educate the little patient.

In this educational phase the role of the parents was fundamental; not only they had to follow at home the instructions given from the dentist and the dental hygienist, stimulate the child and eventually correct him, but also support and encourage him during the dental visit.

Results

Once a month, since the beginning of the therapy, oral hygiene instructions, motivation with plaque detector and professional removing of the plaque with brush were performed (**Figure 6**).

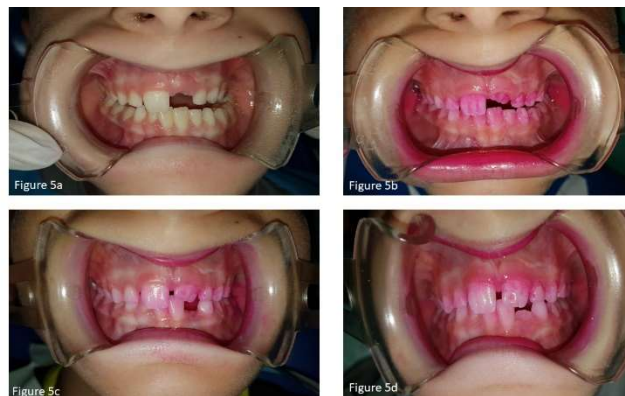


Figure 6. Follow-up executed every month

The patient and his mother were taught, through illustrated schemes, not only on the correct techniques of brushing, but also on the use of pipe dental cleaners for the domestic cleaning of the rapid palatal expander, as the daily removal of food between the orthodontic appliance and the palate is really important.

When the rapid palatal expander was replaced with the upper removable transverse expander, the patient and his mother were taught again on the domestic hygiene techniques to be used on the new appliance; the use of specific tablets with antibacterial action once a day and brushing it with water and detergent after meals were recommended.

During each follow up the plaque index was significantly reduced, and no cavity was detected, if not the ones already present before the treatment. The DMFT stayed therefore the same and no gingival inflammation nor lesions to the oral mucosa appeared.

The orthodontic problem was solved as molars reached the correct occlusal relationship and 2.1 properly erupted in the dental arch.

Discussion

Corridore D et al [26] showed as children with autism spectrum disorder (ASD) have significantly higher caries prevalence and its severity compared to the average population. Knowledge about the oral health indices of children with this mental disorder is the key to designing efficient plans of intervention [26]. Rada R et al demonstrated as despite having a high prevalence of functionally compromising malocclusions, individuals with ASD do not regularly receive necessary orthodontic treatment [27].

The success of this orthodontic treatment is due mainly to the use of Alternative Augmented Communication (A.A.C), both for domestic oral hygiene instructions and for demonstrating to the child the treatments he would undergo.

Using images and plaque detectors at each appointment, the patient learnt the optimal use of domestic oral hygiene devices; this was fundamental to maintain oral health as also demonstrated in Literature by Lefer G et al in 2018 [28].

A fundamental role was played by the mother of the child, who not only supported and encouraged the patient during the visits, but her help was constant also at home.

Probably, the compromised oral health combined with harmful habits, like bruxism, the tongue, the pushing, the biting of the lips, often showed by children with autism can cause malocclusions. With the correct techniques of approach and the oral hygiene instructions repeated at each session it has been demonstrated that it is possible to maintain a good domestic routine of oral hygiene in autistic children, supervising them or having these made from their parents or caregivers.

This case report shows how there is a lack of protocols specifically designed for these patients, in order to better improve their collaboration and subsequently their oral health and so additional strategies for a preventive care should be applied for these patients [29].

Paediatric dentists should remember that early diagnosis and treatment, effective communication skills, and a long-term follow-up of children with autism continue to be the best approaches for achieving enhanced patient psychological well-being and consequently a better answer to the orthodontic treatment [30].

In a study of Qiao Y et al. 2020 [31] it has been demonstrated as children with ASD showed a high prevalence of halitosis, oral lesions, mouth breathing, and drooling. The authors correlate this high rate of oral problems in children with ASD to the lack of tooth brushing and dental visits. This results in reduced oral health-related quality of life for both affected children and their families. For this reason parents should be informed, instructed and motivated in guiding their children to brush their teeth more frequently. Dental teams should also be aware of this kind of situation, and try to develop adequate strategies to provide accurate oral care to this special-needs patients. For example Zhou N et al. 2020 tried to use social stories to train toothbrushing skills among preschoolers with special care needs and among autistic patients and they improved their oral health [32].

Conclusions

Thus, is it possible to undertake orthodontic therapy on a patient affected by Autism Spectrum Syndrome?

This syndrome doesn't have to be a prior exclusion to the more invasive and complicate dental procedures; properly considering the level of collaboration and the grade of compliance of the patient, excellent results can be achieved.

Few papers talking about orthodontic treatment on autistic patients were found in scientific literature [16, 27, 33], and none of these shows the behavioural techniques used.

For this reason, the Paediatric dentistry unit of Policlinico Umberto I has undertaken a project of prevention on patients with Autism Spectrum Syndrome during their developmental age, through the synergy between dentistry and pedagogy [26].

Prevention, especially in this kind of patients, is fundamental not to resort to general anaesthesia for more invasive therapies [34-37]. Orthodontic therapy plays an important role too, because, bringing the patient to a correct occlusion and eliminating dental crowding, allowing the patient to better perform domestic oral hygiene procedures.

As the management of the patient both on the prevention and oral hygiene aspect were successful [38,39], crucially contributing to the success of the treatment, the same protocol is being applied to other patients, getting the same results [40,41,42].

It is advisable that in the future, combined treatments of prevention, cure and orthodontic interception will be part of the protocol of management of patients with special needs, with Autism Spectrum Disorder.

References

1. Maskey M, Warnell F, Parr J, Couteur A, McConachie H. Emotional and behavioural problems in children with autism spectrum disorder. *J Autism Dev Disord* 2013;43(4):851-9.
2. Chandrashekhar S, S Bommangoudar J. Management of Autistic Patients in Dental Office: A Clinical Update. *Int J Clin Pediatr Dent*. 2018 May-Jun;11(3):219-227.
3. Rouches A, Lefer G, Dajeau-Trutaud S, Lopez-Cazaux S. [Tools and techniques to improve the oral health of children with autism]. *Arch Pediatr*. 2018 Feb;25(2):145-149.
4. Hye Ran Park, Jae Meen Lee, Hyo Eun Moon, Dong Soo Lee, Bung-Nyun Kim, Jinhyun Kim, Dong Gyu Kim, Sun Ha Paek. A Short Review on the Current Understanding of Autism Spectrum Disorders. *Exp Neurobiol*. 2016 Feb;25(1):1-13.
5. Vozza I, Cavallè E, Corridore D, Ripari F, Spota A, Brugnoletti O, Guerra F. Preventive strategies in oral health for special needs patients. *Ann Stomatol (Roma)*. 2016 Feb 12;6(3-4):96-9.
6. Hurlbutt M, Young DA. A best practices approach to caries management. *J Evid Based Dent Pract*. 2014 Jun;14 Suppl:77-86.

7. American Psychiatric Association: *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. Arlington, VA: American Psychiatric Association; 2013.
8. Shreya Bhat, U. Rajendra Acharya, Hojjat Adeli, G. Muralidhar Bairy and Amir Adeli. Autism: cause factors, early diagnosis and therapies. *Rev. Neurosci.* 2014; 25(6): 841–850.
9. da Silva SN, Gimenez T, Souza RC, Mello-Moura ACV, Raggio DP, Morimoto S, Lara JS, Soares GC, Tedesco TK. Oral health status of children and young adults with autism spectrum disorders: systematic review and meta-analysis. *Int J Paediatr Dent.* 2017 Sep;27(5):388-398.
10. Capozza LE, Bimstein E. Preferences of parents of children with autism spectrum disorders concerning oral health and treatment. *Pediatr Dent* 2012;34(7):480-4.
11. Amira A. El Khatib, Magda M. El Tekeya, Maha A. El Tantawi & Tarek Omar. Oral health status and behaviours of children with Autism Spectrum Disorder: a case-control study. *International Journal of Paediatric Dentistry* 2014; 24: 314–323.
12. Bartolomé-Villar B, Mourelle-Martínez MR, Diéguez-Pérez M, de Nova- García MJ. Incidence of oral health in paediatric patients with disabilities: Sensory disorders and autism spectrum disorder. Systematic review II. *J Clin Exp Dent.* 2016;8(3):e344-51.
13. Loo CY, Graham RM, Hughes CV. The caries experience and behavior of dental patients with autism spectrum disorder. *J Am Dent Assoc* 2008;139(11):1518-24.
14. Marshall J, Sheller B, Mancl L. Caries-risk assessment and caries status of children with autism. *Pediatr Dent* 2010;32(1):69-75.
15. Pilebro C, Backman B. Teaching oral hygiene to children with autism. *Int J Paediatr Dent* 2005;15(1):1-9.
16. Büyükbayraktar ZÇ, Doruk C. Orthodontic Approach to Patients with Autism: A Review. *Turk J Orthod.* 2019;32(3):172-175.
17. Wilson K. Teaching social-communication skills to preschoolers with autism: efficacy of video versus in vivo modeling in the classroom. *J Autism Dev Disord* 2013;43(8):1819-31.
18. Cagetti MG, Mastroberardino S, Campus G, Olivari B, Faggioli R, Lenti C, Strohmenger L. Dental care protocol based on visual supports for children with autism spectrum disorders. *Med Oral Patol Oral Cir Bucal.* 2015 Sep 1;20 (5): e598-604.
19. Crozier S, Tincani M. Effects of social stories on prosocial behavior of preschool children with autism spectrum disorders. *J Autism Dev Disord* 2007;37(9):1803-14.
20. Guerra F, Mazur M, Ndokaj A, Corridore D, La Torre G, Polimeni A, Ottolenghi L. Periodontitis and the microbiome: a systematic review and meta-analysis. *Minerva Stomatol.* 2018 Dec;67(6):250-258. doi: 10.23736/S0026-4970.18.04198-5. Epub 2018 Sep 10. PMID: 30207437.
21. Thiemann-Bourque K. Peer-Mediated AAC Instruction for Young Children with Autism and other Developmental Disabilities. *Perspect Augment altern commun.* 2012 Dec;21(4). doi: 10.1044/aac21.4.159.
22. Vozza I, Capasso F, Calcagnile F, Anelli A, Corridore D, Ferrara C, Ottolenghi L. School-age dental screening: oral health and eating habits. *Clin Ter.* 2019 Jan-Feb;170(1):e36-e40. doi: 10.7417/CT.2019.2105. PMID: 30789195.
23. Mineo B, Ziegler W, Gill S, Salkin D. Engagement with electronic screen Media among students with autism spectrum disorders. *J Autism Dev Disord* 2009;39(1):172-87.

24. Ozdemir S. The effectiveness of social stories on decreasing disruptive behaviors of children with autism: three case studies. *J Autism Dev Disord* 2008;38(9):1689-96.
25. Roopa P. Gandhi, BDS, MSD, and Ulrich Klein. Autism Spectrum Disorders: An Update On Oral Health Management. *J Evid Base Dent Pract* 2014;14S: 115-126.
26. Corridore D, Zumbo G, Corvino I, et al. Prevalence of oral disease and treatment types proposed to children affected by Autistic Spectrum Disorder in Pediatric Dentistry: a Systematic Review. *Clin Ter.* 2020;171(3):e275-e282.
27. Rada R, Bakhsh HH, Evans C. Orthodontic care for the behavior-challenged special needs patient. *Spec Care Dentist.* 2015;35(3):138-142.
28. Lefer G, Bourdon P, Mercier C, Lopez-Cazaux S. Apprentissage du brossage dentaire chez des enfants présentant un trouble du spectre autistique : effets de l'utilisation de tablettes tactiles [Teaching tooth brushing to children with autistic spectrum disorder : A tablet-based training programme.]. *Sante Publique.* 2018;30(3):297-306.
29. Bossù, M.; Trottni, M.; Corridore, D.; Di Giorgio, G.; Sfasciotti, G.L.; Palaia, G.; Ottolenghi, L.; Polimeni, A.; Di Carlo, S. Oral Health Status of Children with Autism in Central Italy. *Appl. Sci.* 2020, 10, 2247.
30. Herrera-Moncada M, Campos-Lara P, Hernández-Cabanillas JC, et al. Autism and Paediatric Dentistry: A Scoping Review. *Oral Health Prev Dent.* 2019;17(3):203-210.
31. Qiao Y, Shi H, Wang H, Wang M, Chen F. Oral Health Status of Chinese Children With Autism Spectrum Disorders. *Front Psychiatry.* 2020;11:398.
32. Zhou N, Wong HM, McGrath C. Efficacy of Social Story Intervention in Training Toothbrushing Skills Among Special-Care Children With and Without Autism. *Autism Res.* 2020;13(4):666-674.
33. Özsoy ÖP, Bingöl Sİ. Extraction Orthodontic Treatment in an Autistic Patient. *Turk J Orthod.* 2017;30(1):28-32.
34. Messieha Z. Risks of general anesthesia for the special needs dental patient. *Special Care Dent* 2009;29(1):21-5.
35. Rayner CS. Video-modelling to improve task completion in a child with autism. *Dev Neurorehabil* 2010;13(3):225-30.
36. Corridore D, Campus G, Guerra F, Ripari F, Sale S, Ottolenghi L. Validation of the Italian version of the Oral Health Impact Profile-14 (IOHIP-14). *Ann Stomatol (Roma).* 2014 Feb 4;4(3-4):239-43. PMID: 24611088; PMCID: PMC3935349.
37. Trottni M, Campus G, Corridore D, Cocco F, Cagetti MG, Vigo MI, Polimeni A, Bossù M. Assessing the Predictive Performance of Probabilistic Caries Risk Assessment Models: The Importance of Calibration. *Caries Res.* 2020;54(3):258-265. doi: 10.1159/000507276. Epub 2020 Jun 9. PMID: 32516777.
38. Guerra F, Pasqualotto D, Rinaldo F, Mazur M, Corridore D, Nofroni I, Ottolenghi L, Nardi GM. Therapeutic efficacy of chlorhexidine-based mouthwashes and its adverse events: Performance-related evaluation of mouthwashes added with Anti-Discoloration System and cetylpyridinium chloride. *Int J Dent Hyg.* 2019 Aug;17(3):229-236. doi: 10.1111/idh.12371. Epub 2019 Feb 11. PMID: 30375179.

39. Guerra F, Corridore D, Cocco F, Arrica M, Rinaldo F, Mazur M, Sanavia C, Nardi GM, Campus G, Ottolenghi L; Italian Society of Dental Hygiene Sciences. Oral health sentinel-based surveillance: a pilot study on dentinal hypersensitivity pain. *Clin Ter.* 2017 Sep-Oct;168(5):e333-e337. doi: 10.7417/T.2017.2030. PMID: 29044357.
40. Guerra F, Guzzo AS, La Rosa P, Miatto I, Vergati D, Miredi F, Gasparrini N, Guerra F, Raimondi L, Corridore D, Nardi GM, Mazur M, La Torre G, Ottolenghi L. Risk management and Healthcare responsibility. How to guarantee legal protection in Medicine. *Clin Ter.* 2021 Jan-Feb;171(1):e63-e66. doi: 10.7417/CT.2021.2285. PMID: 33346331.
41. Vozza I, Guerra F, Marchionne M, Bove E, Corridore D, Ottolenghi L. A multimedia oral health promoting project in primary schools in central Italy. *Ann Stomatol (Roma).* 2014 Nov 20;5(3):87-90. PMID: 25506412; PMCID: PMC4252857.
42. Bossù M, Corridore D, D'Errico A et al. Education and dentistry: advanced synergy in the dental treatment of children with autism; a pilot clinical trial. *Senses Sci* 2014; 1 (3):107-112. doi: 10.14616/sands-2014-3-107112