

Multidisciplinary approach on lateral incisors agenesis: a case report
Abordagem multidisciplinar na agenesia dos incisivos laterais: relato de caso
Abordaje multidisciplinario de la agenesia de los incisivos laterales: reporte de un caso

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Abstract

Teeth absence in the anterior region of the maxilla can lead to psychosocial impairments, especially in young patients. Thus, the treatment of congenital agenesis of upper lateral incisors should consider prosthetic, restorative, and periodontal approaches to recover the patient's social and aesthetic functions. This article aims to present the case report of a 23-year-old male patient, who visited the Prosthodontic Clinic of the Piracicaba Dental School for the treatment of congenital agenesis of teeth 12 and 22. Implant-supported metal-free ceramic crowns, homemade dental bleaching, and restoration of maxillary canines with composite resin were planned. In addition, to improve gingival thickness around the peri-implant region of tooth 12, a periodontal surgery was performed using the vestibular tunnel access surgical technique (VISTA - Vestibular Incision Subperiosteal Tunnel Access). Thus, a multidisciplinary approach

in the treatment of congenital agenesis of the upper lateral incisors has proved to be a reliable alternative to achieve patient's functional and aesthetic demands.

Keywords: Tooth agenesis; Protheses and implants; Periodontics.

Resumo

A ausência de dentes na região anterior da maxila pode levar a comprometimentos psicossociais, especialmente em pacientes jovens. Assim, o tratamento da agenesia congênita de incisivos laterais superiores deve considerar abordagens protéticas, restauradoras e periodontais para recuperar as funções social e estética do paciente. Este artigo tem como objetivo apresentar o relato de caso de um paciente do sexo masculino, 23 anos, que procurou o Ambulatório de Prótese da Faculdade de Odontologia de Piracicaba para tratamento de agenesia congênita dos dentes 12 e 22. Foram planejadas coroas cerâmicas sem metal sobre implantes, clareamento dental caseiro e restauração dos caninos superiores com resina composta. Além disso, para melhorar a espessura gengival ao redor da região peri-implantar do dente 12, foi realizada cirurgia periodontal por meio da técnica cirúrgica de acesso ao túnel vestibular (VISTA - Vestibular Incision Subperiosteal Tunnel Access). Assim, a abordagem multidisciplinar no tratamento da agenesia congênita dos incisivos laterais superiores demonstrou ser uma alternativa satisfatória para suprir demandas funcionais e estéticas do paciente.

Palavras-chave: Agenesia dentária; Próteses e implantes; Periodontia.

Resumen

La ausencia de dientes en la región anterior del maxilar puede provocar alteraciones psicossociales, especialmente en pacientes jóvenes. Así, el tratamiento de la agenesia congénita de incisivos laterales superiores debe considerar abordajes protésicos, restauradores y periodontales para recuperar las funciones sociales y estéticas del paciente. Este artículo tiene como objetivo presentar el caso clínico de un paciente masculino de 23 años que acudió a la Clínica de Rehabilitación Oral de la Facultad de Odontología de Piracicaba para tratar la agenesia congénita de los dientes 12 y 22. Se planificaron coronas cerámicas libres de metal en implantes, blanqueamiento dental casero y restauración con resina compuesta de caninos superiores. Además, para mejorar el grosor gingival alrededor de la región periimplantaria del diente 12, se realizó cirugía periodontal utilizando la técnica quirúrgica para acceder al túnel vestibular (VISTA - Acceso al túnel subperióstico de incisión vestibular). Así, el abordaje multidisciplinar en el tratamiento de la agenesia congénita de los incisivos laterales superiores

ha demostrado ser una alternativa satisfactoria para cumplir las demandas funcionales y estéticas del paciente.

Palabras clave: Agenesia dental; Prótesis e implantes; Periodoncia.

1. Introduction

Agenesis is defined by the absence or malformation of any part of the body (Driscoll, Freilich, Guckes, Knoernschild, & McGarry, 2017). Considering dental agenesis, the number and morphology of teeth can vary (Pegoraro, Do Valle, Pegoraro, Corotti, & Vidotti, 2014). In specific cases, it can be related to syndromes or systematic abnormalities, such as Down syndrome, ectodermal dysplasia and other low prevalent conditions (Coster, Marks, Martens, & Huyseune, 2009; Vastardis, 2000), whose hypodontia is one of the major symptoms.

On the other hand, non-syndromic dental absences can be caused by altered family genes (Coster et al., 2009). However, it is unknown whether agenesis occurs by an evolutionary process or due to the improvements in clinical diagnosis (Coster et al., 2009). However, it is possible to identify dental agenesis easily by means of panoramic radiographs, when crown mineralization is not observed (Gracco et al., 2017).

The total frequency of dental absences of one or more teeth ranged from 0.1% to 4.4% (Gracco et al., 2017). The most affected teeth, excluding third molars, are the second lower premolars, followed by the upper lateral incisors and upper second premolars in the Caucasian population (Polder BJ, Van't Hof MA, Van der Linden FP, 2004). Curiously, unilateral agenesis is more common than bilateral agenesis; however, for maxillary lateral incisors, bilateral agenesis is more prevalent (Polder BJ, Van't Hof MA, Van der Linden FP, 2004). Although these numbers change in different populations, (Vastardis, 2000) it is important to emphasize the need for rehabilitation treatments under this oral health condition.

Considering the agenesis of anterosuperior teeth, it is essential to identify not only aesthetic issues, but also the biological, functional, and financial factors involved in the rehabilitation procedures (Kiliaridis, Sidira, Kirmanidou, & Michalakis, 2016). Thus, orthodontic and prosthetic treatments are proposed to patients with dental absences as an attempt to ameliorate phonetic, masticatory and aesthetic parameters (Branzén, Eliasson, Arnrup, & Bazargani, 2015; Kiliaridis et al., 2016; Pegoraro et al., 2014; Sasaki, Hirano, Nomoto, Nishii, & Yajima, 2018; Silveira, de Almeida, Pereira, Mattos, & Mucha, 2016; Stylianou, Liu, O'Neal, & Essig, 2016). A recent systematic review of the literature (Kiliaridis et al., 2016) has shown that both types of rehabilitation therapies are acceptable, although

orthodontic appliances are the main choice of treatment (Pegoraro et al., 2014; Sasaki et al., 2018). The orthodontics allows the maintenance of alveolar bone and existing gingival architecture as a conservative and low-cost proposal, (Antonarakis, Prevezanos, Gavric, & Christou, 2014; Pegoraro et al., 2014) although the mesial movement of the upper canines requires a restorative reconstruction into lateral incisors for esthetical recovery (Schneider, Moser, Fornasetti, Piattella, & Siciliani, 2016).

Likewise, keeping maxillary incisors spaces through prosthetic treatments includes the use of fixed prostheses, whether cantilever, resin-bonded, or full-coverage, or the use of removable partial dentures (Antonarakis et al., 2014; Keefe, 2009; Stylianou et al., 2016). Of those, the resin-bonded fixed prostheses have been pointed as the less costly tooth-supported restorations, while the full-coverage fixed partial denture is the least conservative, but the indications are still debatable and vary according to the clinical situation (Antonarakis et al., 2014). Therefore, considering the current concepts of minimally invasive dentistry, treatments involving the wear of healthy teeth adjacent to the agenesis space, should not be highlighted (Dallı, Çolak, & Mustafa Hamidi, 2012; Frascaria M, Casinelli M, Mauro S, M D'Amario M, Gatto R, 2016).

For these reasons, the use of dental implants has shown good long-term survival (Branzén et al., 2015; Heuberer, Dvorak, Mayer, Watzek, & Zechner, 2015), as well as advantages related to the maintenance of permanent dentition, especially in young patients (Antonarakis et al., 2014). Although it is an expensive treatment option, it is a viable, comfortable, functional, and aesthetic alternative (Frascaria M, Casinelli M, Mauro S, M D'Amario M, Gatto R, 2016). In addition, the orthodontic appliance can also be used to recover the mesiodistal space between upper central incisor and canine, to accommodate the definitive crown of the lateral incisor, (Sasaki et al., 2018) acting as an adjuvant and multidisciplinary treatment to the definitive step using implants.

Therefore, the purpose of this study was to report the prosthetic rehabilitation with the use of implant-supported ceramic crowns in a patient with bilateral agenesis of the upper lateral incisors.

2. Methodology

This is a clinical, descriptive, and qualitative case report, describing the multidisciplinary approaches used in the treatment of congenital agenesis of the upper lateral incisors. This study had been assessed by the Ethics Committee from Piracicaba Dental School,

through the number CAAE 12065119.0.0000.5418, and all procedures were in accordance with the Declaration of Helsinki. Moreover, the patient signed an informed consent form allowing the treatment to be carried out and authorizing the scientific use of his photographs.

3. Case Report

A 23-year-old male patient sought the Prosthodontic Clinic of Piracicaba Dental School (FOP/UNICAMP) complaining about the congenital agenesia of both upper lateral incisors and the dark color of his teeth, as these conditions affected his aesthetics and self-esteem. During anamnesis, the patient reported having dental implants (13 mm length x 3.5 diameters; Cone Morse, Neodent, Curitiba, PR, Brazil) in the agenesia region, placed in 2016 at the Periodontics Clinic of FOP/UNICAMP. The medical history did not reveal any important chronic disease, but a small frequency of the smoking habit.

Intraoral and X-ray examinations showed the presence of all teeth, except the upper lateral incisors (teeth 12 and 22). In addition, temporary adhesive crowns were observed in this region, with an excess of composite resin in the buccal and proximal regions of teeth 11, 13, 21, and 23 (Figure 1). In occlusion, the patient had a slight maxillary overjet and a low smile line. No remarkable alterations were observed in the extraoral examination.

Figure 1. Initial dental condition showing adhesive prostheses in replacement of 12 and 22, both absent due to congenital agenesia.



Source: Personal archives (2020).

Initially, the upper and lower impression moldings were taken using alginate (Hydrogum, Zhermack, Badia Polesine, Italy) to assist in case planning. After pouring the impressions with type III gypsum (Asfer, São Caetano do Sul, São Paulo, Brazil), both stone casts were set in a semi-adjustable articulator (Bioart plate, Bioart, São Carlos, São Paulo, Brazil) and the provisional lateral incisors were removed with a bur. A diagnostic wax-up was performed in the agenesis spaces, showing the need for lateral incisors with large widths, which in turn would compromise the aesthetical results. Thus, orthodontic treatment was primarily proposed to the patient to align the occlusal plane of both maxillary and mandibular arches, and to improve the toothless width space for the definitive treatment.

When the orthodontic treatment was completed, the patient was reassessed. Biofilm accumulation, gingivitis, and a gingival tearing on the buccal aspect of the right upper lateral incisor region were observed. Also, the thin gingival phenotype left the alveolar mucosa with a slight greyish appearance, because of the implant body-color translucency.

Several treatment options were offered to the patient to restore the lateral agenesis and improve other aesthetical conditions, exposing their advantages and disadvantages. The patient chose to receive cement-retained metal-free single implant crowns, as the aesthetic issue was his major concern. To solve the periodontal problems, a periodontal surgery on tooth 12 region was proposed to improve gingival thickness. To increase aesthetics satisfaction, a dental home-bleaching and canines re-anatomization were additionally suggested to the patient. The patient disagreed with the surgical procedure but agreed with the conservative aesthetical treatments.

Dental prophylaxis and scaling were performed to remove dental biofilm and calculus, and new implant-supported provisional crowns were installed using prefabricated acrylic teeth, to enhance the soft tissues healing around implants. Nevertheless, the broad mesiodistal distance from the provisional crowns to the upper canines was still present, which impaired the patient's aesthetics on facial profile view, during speech and smile (Figure 2).

Figure 2. Anatomic profile of the upper canines, exposing their straight mesial aspect in a lateral view of the smile.



Source: Personal archives (2020).

Following the clinical procedures, the provisional implant crowns were replaced by definitive universal abutments, measuring 3.3 mm wide x 4 mm length x 1.5 mm transmucosal neck, 17° angulation, for the right side, and 3.3 mm x 4 mm x 2.5 mm, straight for the left side, which were screwed onto the implant platform (Figure 3). New provisional acrylic crowns (JET, Clássico, Campo Limpo Paulista, São Paulo, Brazil) were manufactured and relined around the cervical area to enhance the gingival tissue quality and architecture.

Figure 3. Definitive prosthetic abutments (universal abutment dimensions: 3.3 x 4 x 2.5 mm, straight on 22 and angled on 12). Gingival tearing on the facial aspect of the implant-supported area can be observed in the upper right maxillary incisor.



Source: Personal archives (2020).

Home-bleaching was planned with carbamide peroxide 10%. For this, teeth color was obtained from Vita Classical Shade Guide (Wilcos, Petrópolis, Rio de Janeiro, Brazil), and A2 color was prevalent in most teeth, with some wither spots in color A1. Dental arches were molded again with alginate (Hydrogum, Zhermack, Badia Polesine, Italy) and casts were made with type III gypsum (Asfer, São Caetano do Sul, São Paulo, Brazil). From these stone casts, 2-mm thick acetate trays (Bioart plate, Bioart, São Carlos, São Paulo, Brazil) were prepared in the laboratory to accommodate the carbamide peroxide bleaching gel (Whiteness Perfect, FGM, Joinville, Santa Catarina, Brazil). Three bleaching gel syringes were delivered for use for 3 weeks. Instructions regarding the amount of gel to be applied to the trays, period of use of gel trays per day (4h/day), and sensitivity during bleaching were previously given to the patient, and any adverse effects must be advised to the dentist.

One month after dental bleaching, the provisional crowns were color-adjusted using acrylic resin, and the mesial aspect of upper canines were reshaped with composite resin following the two-steps etch-and-rinse technique. Firstly, the lateral crowns were protected with a polytetrafluorethylene film previously to the enamel conditioning with phosphoric acid 37% for 30 s. Canines were rinsed and dried with an air jet. A universal adhesive system (Scotchbond Universal Adhesive, 3M ESPE, São Paulo, Brazil) was applied twice with a regular-size microbrush (KG Brush, KG Sorensen, São Paulo, Brazil) on the etched area, gently air-dried and photoactivated for 20 s. Small increments of a nanoparticle enamel resin (A1, Filtek Z350 XT, 3M ESPE, São Paulo, Brazil) was used to restore the mesial aspect of both canines and photoactivated for 40 s each. The final restorations were finished and polished with resin diamond burs and polishing discs, respectively.

Thereafter, another relining appointment was made to improve the cervical area of the provisional crown before the final prostheses' delivery; however, no prosthetics attempts were successful in covering the right implant abutment neck. For this reason, the patient was willing to undergo the periodontal surgical procedure, as previously suggested during the case planning. The surgical technique of tunnel access with vestibular incision was adopted for the positioning of the sub-epithelial gingival graft in the bed receiver (VISTA - Vestibular Incision Subperiosteal Tunnel Access). The surgery was conducted by a professor and specialist surgeon of Periodontics Clinic. The graft tissue was removed from the hard palate and placed under the small band of keratinized gingiva on the buccal region of the right toothless space.

After this procedure, we decided that this abutment (tooth 12) should be replaced by another with 6 mm-height and 3.5 mm of transmucosal. This decision was based on clinical and radiograph assessments of the region, to improve the gingival thickness and the distance

between the implant platform and the abutment transmucosal. A period of approximately 30 days was waited for tissue healing, before the final impressions being performed.

Transfer moldings were made with addition silicone (Yllar, Pelotas, Rio Grande do Sul, Brazil) by means of the closed tray technique. The casts were poured with stone gypsum type IV (Asfer, São Caetano do Sul, São Paulo, Brazil) in a dental laboratory and, from this, acrylic resin copings were made (Duralay, Reliance Dental Manufacturing LLC, Alsi) for mouth testing. After the adaptation of the copings over the abutments, these pieces were again sent to the laboratory for the manufacturing of metal-free ceramic crowns of lithium disilicate (IPS e-max, Ivoclar Vivadent, Liechtenstein).

The patient returned to the dental clinic in the following month for the ceramic crown cementation. The implant-supported crowns were installed using a self-adhesive cement (RelyX U200, 3M, Minnesota, USA) (Figure 4). Finally, the patient was again instructed about dental hygiene and maintenance of the dental prostheses.

Figure 4. Final intraoral condition (A), after definitive ceramic prostheses on 12 (B) and 22 (C). Final smile (D).



Source: Personal archives (2020).

4. Discussion

This case report is about a patient with congenital lateral incisors agenesis who had multidisciplinary treatment procedures, involving Orthodontics, Periodontics, Cosmetic Dentistry, and Prosthodontics areas of expertise, to restore the toothless spaces. Despite the variety of treatments for dental agenesis, it is important to consider that in the absence of upper anterior teeth, the clinical attention rely on the esthetical, functional, and social aspects and the cost-benefits of the treatment.

Once dental agenesis is a genetic or acquired condition featured by the absence of one or more teeth buds, either on maxillary and/or mandibular arches, the functional and esthetical issues are always of great concern. Dental implants, fixed dental prostheses, removable prostheses, space closure by canine repositioning and reshaping, autotransplantation, and other restorative treatments have been purposed to replace the missing teeth (Filius et al., 2018; Frascaria, Casinelli, Mauro, D'Amario, Gatto, 2016; Heuberer et al., 2015; Antonarakis et al., 2014). From those options, two recent systematic reviews exhibited different results (Kiliaridis et al., 2016; Silveira et al., 2016). One of them showed better occlusal and esthetical outcomes when the space closure was adopted (Silveira et al., 2016), and the same findings were confirmed by laypersons considering the esthetical perception (Schneider et al., 2016). Meanwhile, the other study did not achieve a definitive conclusion, as the orthodontic space closure and the prosthodontic rehabilitation were both acceptable alternatives in terms of periodontal, aesthetical, and complications (Kiliaridis et al., 2016).

In contrast, some authors revealed that autotransplantation presents the greatest cost-benefits, although age is a determinant factor in such cases (Antonarakis et al., 2014). Nonetheless, the use of implant-supported prostheses for replacement of missing maxillary lateral incisors is widely accepted and reported, (Branzén et al., 2015; Filius et al., 2018; Sasaki et al., 2018) as their advantages, such as bone and soft-tissue preservation, long-term survival rates, easy oral hygiene, and better occlusal function, overcome other treatment approaches (Filius et al., 2018; Heuberer et al., 2015). Despite the whole possibilities and controversies to treat dental agenesis, the treatment decisions for missing teeth are still complex and challenging (Filius et al., 2018; Heuberer et al., 2015).

An interesting and well-reported approach for dental agenesis treatment is the prosthodontic-driven implant planning (Barros et al., 2015; Brugnamì & Caleffi, 2005). A dental prosthesis, through a diagnostic set-up or wax-up, serves as a radiographical and surgical templates for implant therapy, providing the correct implant position and also identifying the

need for bone or soft tissue augmentation (Barros et al., 2015; Brugnami & Caleffi, 2005). However, in this clinical case, reverse planning was not performed since the patient had the implants already installed, and this fact represents a typical situation of what is found in clinical practice.

Under these circumstances, and regarding the limiting factors associated with the cranial skeletal growth in young patients with dental agenesis (Branzén et al., 2015; Heuberer et al., 2015), the availability of hard and soft tissues is locally reduced, which impairs an accurate implant placement. In such cases, the literature agrees that bone or soft tissue grafts must be performed together with the implant installation to enhance ridge dimensions and, by consequence, the peri-implant mucosa around the implants (Frizzera et al., 2019). The patient's maxillary right implant was in an apical-palatal position, displaying the implant body color through the thin soft tissue translucency and a gingival tearing, setting a challenging rehabilitation situation. To achieve optimal aesthetic results, it is often mandatory to establish an interdisciplinary interaction between dental specialties.

A high frequency of bilaterally upper lateral agenesis condition is associated with a thin gingival biotype (Kiliaridis et al., 2016), confirmed by our clinical report. The soft tissue margin on the facial aspect of the right maxillary implant and the 3D implant position negatively influenced the patient's self-perception about appearance. Previous outcomes confirm that gingival contour around the implant-supported crown, the bone volume, the contact point of the crowns, facial-lingual width of the papillae, and the amount of papilla fill in the embrasure space next to the implant are important esthetic parameters in the anterior tooth region (Chang & Wennström, 2013; Frizzera et al., 2019). In the current case report, the patient's age, and the long period willing to receive definitive dental prostheses may have influenced his self-perception, even though a low smile line was present.

The orthodontic treatment is an effective alternative to open, close, or maintain the dental absence spaces and it is frequently required as an adjunctive therapy before the definitive rehabilitation for dental agenesis (Barros et al., 2015; Branzén et al., 2015; Kiliaridis et al., 2016; Sasaki et al., 2018; Schneider et al., 2016; Silveira et al., 2016). Yet, in this case report, the appliances have been used uniquely to adjust occlusion and open space to the final implant-supported restoration. Then, the upper canines reshaping has been performed using composite resin (Kiliaridis et al., 2016), to keep an adequate mesiodistal width between the dental implant prostheses and adjacent teeth. Following the abovementioned idea, the contact point between the implant-supported crowns and canines also guarantees the better papillae repositioning and fill the embrasure spaces, avoiding the "black triangles" (Chang & Wennström, 2013).

A surgical procedure was performed using the VISTA technique to increase the thickness of peri-implant keratinized tissue, reduce biofilm accumulation and the sensitivity of the region, besides favoring the aesthetic of the smile (Chatterjee, Sharma, Gundanavar, & Subbaiah, 2015; Najafi, Kheirieh, Torabi, & Cappetta, 2018; Kumar, Gowda, Mehta, & Kumar, 2018). The subperiosteal graft was positioned under the periosteum without any papillae incision or tension when the coronal repositioning was performed. Therefore, on the same surgical day, the patient had the new implant abutment replaced.

Dental bleaching is a conservative method of whitening stained teeth and comprises a variety of substances and protocols. At-home bleaching has been shown to use less concentrated gels with low intensity of dental sensitivity and great efficacy (Chemin; et al., 2018). High levels of satisfaction, self-esteem, and well-being have been also reported after dental bleaching (Bersezio et al., 2018). The outcomes of our case report corroborate with these literature findings and emphasize the adoption of minimally invasive procedures in dentistry.

Finally, case reports may not reflect the whole environment of dental clinical situations but may assist in deciding the best alternatives and dental treatments. Therefore, this clinical case comes up with the importance of having an interdisciplinary treatment, involving as many dental specialties as necessary to offer the best to the patient.

5. Conclusion

A multidisciplinary approach in the treatment of congenital agenesis of maxillary lateral incisors is a satisfactory alternative to recover patient's social and aesthetic functions.

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