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CASE REPORT

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Multidisciplinary action in a patient with cleft lip and palate: esthetic-functional dentofacial treatment for more than two decades

Atuação multidisciplinar em paciente com fissura lábio palatina: tratamento estético-funcional dento-facial de mais de duas décadas

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ABSTRACT

Cleft lip and palate is a very common congenital defect in which embryonic facial processes do not achieve the ideal facial formation during their development which can cause malformation. Multiple dentistry specializations, especially oral and maxillofacial, orthodontics, oral rehabilitation and dental aesthetics are required in order to correct lip and oral cavity malformations by this congenital defect with the objective of functional and aesthetics improvement. The clinical case reported show the multidisciplinary approach in a patient with cleft lip and palate implementing an aesthetic and functional dentofacial rehabilitation. The case involves a 27-year-old female patient LCLG, Caucasian, with the presence of unilateral congenital cleft lip and palate on the left side, who started rehabilitative and reparative treatment at 3 months of age. She then started pediatric orthodontic treatment for angle class 3 crossbite correction at 7 years of age. After complete replacement of deciduous to permanent dentition at the age of 11, the patient started orthodontic treatment with a fixed appliance for several years and restorative treatment with composite resin reanatomize the anterior teeth due to agenesis of elements 22 and 25. After a few years when the resin restorations were no longer biologically favorable, an aesthetic rehabilitation treatment with ceramic laminates was planned through smile digital planning soon after completing the orthodontic treatment. This case report demonstrates that high aesthetic, functional and psychological expectations of a patient with congenital defect compromise throughout her life were met through a multidisciplinary dental treatment based on correct diagnosis and digital planning.

KEYWORDS

Congenital abnormalities; Malocclusion; Dental Technology; Rehabilitation; Diagnosis.

RESUMO

A fissura labiopalatal é um defeito congênito muito comum, no qual os processos faciais embrionários não atingem a formação facial ideal durante o seu desenvolvimento, podendo causar malformações. Múltiplas especializações da odontologia, principalmente buco-maxilo-facial, ortodontia, reabilitação oral e estética dental são necessárias para corrigir as malformações labiais e da cavidade oral por esse defeito congênito com o objetivo de melhoria funcional e estética. O caso clínico relatado mostra a abordagem multidisciplinar em um paciente com fissura labiopalatal

implementando uma reabilitação dentofacial estética e funcional. O caso envolve uma paciente do sexo feminino, 27 anos, LCLG, branca, com presença de fissura labiopalatal congênita unilateral à esquerda, que iniciou tratamento reabilitador e reparador aos 3 meses de idade. Após a substituição completa da dentição decídua pela permanente aos 11 anos de idade, a paciente iniciou tratamento ortodôntico com aparelho fixo por vários anos, e tratamento restaurador com resina composta para reanatomizar os dentes anteriores devido à agenesia dos elementos 22 e 25. Após alguns anos em que as restaurações em resina não eram mais favoráveis biologicamente, foi planejado um tratamento reabilitador estético com laminados cerâmicos através do planejamento digital do sorriso logo após a finalização do tratamento ortodôntico. Este relato de caso demonstra que as altas expectativas estéticas, funcionais e psicológicas de uma paciente com comprometimento de defeito congênito ao longo de sua vida foram atendidas por meio de um tratamento odontológico multidisciplinar baseado em diagnóstico correto e planejamento digital.

PALAVRAS-CHAVE

Anormalidades congênitas; Má oclusão; Tecnologia odontológica; Reabilitação; Diagnóstico.

INTRODUCTION

Cleft lip and palate is a very common congenital defect that occurs between the 4th and 12th week of pregnancy, in which embryonic facial processes do not achieve the ideal facial formation during their development, and can cause malformation of 3 phenotypes: cleft lip, cleft palate, and cleft lip and palate. Its etiology has been shown to be a multifactorial inheritance pattern involving genes and environment [1,2].

Depending on the development stage in which the etiological factors act, cleft lip and palate can cause esthetic, functional, psychological and social disorders of variable severity depending on the extent and type of congenic defect. It can affect the lip and oral cavity, even causing oronasal communication, as well as psychological state in the newborn's family who are also concerned with the child's future social integration.

The occurrence of cleft lip and palate in Brazil is estimated at one for every 650 births, with estimates being obtained from the first study by Nagem et al. [3] in 1968 [3,4].

Patients with cleft lip and palate from the first years of their lives undergo plastic surgery to correct malformations of the lips and oral cavity caused by this congenital defect in order to restore orofacial function and esthetics. The treatment of these patients requires an approach from multiple dentistry specializations, mainly oral and maxillofacial, orthodontics, oral rehabilitation and dental esthetics.

The malformation type that the patient presents is analyzed in the surgical stage for whether it involves deficiencies in hard and soft tissues, anterior bone defects and/or dental agenesis. Depending on the demand of the case, it may be necessary to perform plastic and oral and maxillofacial surgeries, more or less complex, depending on the magnitude of the sagittal discrepancy [5-8].

Despite the low lethality and serious health complications in patients with cleft lip and palate due to multidisciplinary rehabilitation treatment, the vast majority of patients end up developing dental issues, such as tooth agenesis, lack of bone support at the cleft site, and poor dental positioning; furthermore, according to the literature, the most frequently absent tooth in individuals with transformed cleft is the maxillary lateral incisor (ILS), followed by the 2nd mandibular premolar and maxillary central incisor (ICS). The absence of the ILS on the cleft side can reach 48.3% of the cases. The presence of a supernumerary tooth in the region is also very common, which, despite basic dental intervention, may not obtain a favorable esthetic result at the treatment end.

Orthodontic intervention is performed at different multidisciplinary treatment stages; a pre-surgical orthodontic approach is required in the early stages [9-11], and then the post-surgical orthodontic treatment is continued. At this point, it can be determined whether the patient's malocclusion can be treated with conventional orthodontic treatment, or whether another orthognathic procedure such as maxillary advancement will be necessary [1].

The last stage of multidisciplinary treatment is generally the oral and aesthetic dental rehabilitation stage, which (depending on the severity of the defects) may require indirect

restorations, implant supported prostheses, and/or aesthetic restorations to achieve functional occlusion which may not be achieved in the previous procedures [1,12-14]. In addition, aesthetic harmony in the smile is also sought [15] to fulfill the high expectations that the patient has been anxiously awaiting for a long time.

As cleft lip and/or palate is a condition which directly affects the language and hearing ability of the patient [2], in addition to the psychological implications of physical appearance, it can make social interaction difficult from the earliest stages of life. Therefore, with multidisciplinary treatments, the aim is to improve the patient's quality of life and fulfill the expectations of both the patient and their family. Thus, the objective of this clinical case report is to show the multidisciplinary approach of a patient with cleft lip and palate in an aesthetic and functional dentofacial rehabilitation.

CASE REPORT

Diagnosis and treatment plan

LCLG, female patient, Caucasian, 27 years old, with presence of unilateral congenital cleft lip and palate on the left side, diagnosed immediately after birth. The patient started her rehabilitative and reparative treatment at 3 months of age (05/1994) at the Hospital for Rehabilitation of Craniofacial Anomalies of the University of São Paulo - HRAC - Bauru, São Paulo, a reference teaching hospital throughout Latin America and internationally for the treatment.

Next, the patient underwent reconstructive and corrective surgery of the lip at the age of 7 months, and she also underwent surgery at 1 year and 8 months to reconstruct the hard palate and soft palate concomitantly. Her last reconstructive surgery was performed in a hospital setting.

Orthodontic treatment

The patient underwent multidisciplinary follow-ups carried out periodically by the hospital in the areas of dentistry, medicine and speech therapy until she was 7 years old. Then, she started pediatric orthodontic treatment for crossbite correction (Angle class 3) at 7 years of age. She used the Hyrax expander together with the face mask (extra oral expander) to expand the palatal raphe and better reposition her permanent teeth. She performed this treatment for a period of approximately 1 year. After complete replacement of deciduous for permanent dentition at 11 years of age, the patient started orthodontic treatment with a fixed appliance to correct her end-to-end bite, and better dental positioning due to agenesis of teeth 22 and 25. The orthodontic treatment was performed for approximately 6 years. Despite the long period of orthodontics and the impossibility of performing orthognathic surgery for health reasons, there was a limitation in the result obtained in the first orthodontic treatment (Figure 1).

Esthetic treatment

The patient then resumed corrective orthodontic treatment after 6 years in 2017, this time with the aid of mini-implants with bimandibular anchor plates for traction and Angle class 3 correction. Surgical treatments were performed to place and remove the miniplates, and after 3 years of using a self-ligating fixed appliance, it was possible to achieve an adequate overbite and better position of the dental arches, almost presenting Angle class 1 (within the limitations present). Despite the excellent orthodontic tooth positioning due to the agenesis of elements 22 and 25, the patient had reanatomization using composite resin, which was no longer biologically favorable for better fit of the midline, spee curve and dental characterization. In the Figure 2 can see the panoramic radiographic after the this stage to start the new restorative treatment (Figure 2).

It is important to highlight that the performance of the chosen rehabilitation procedure was based on the patient's oral condition at the time, with orthodontic and surgical limitations. Although the patient had undergone repair treatment for the cleft lip and palate at the HRAC, she did not undergo repair with a bone graft in the region due to systemic complications, thus the region of the cleft remained without alveolar bone, which meant that the orthodontic treatment had limitations, therefore the established occlusion was the most stable possible. Furthermore, the genesis of elements resulted in slight neglect of the midline, so the aesthetic rehabilitation treatment started in archived of the best viable result within the case's orthodontic, surgical, and restorative limitations.

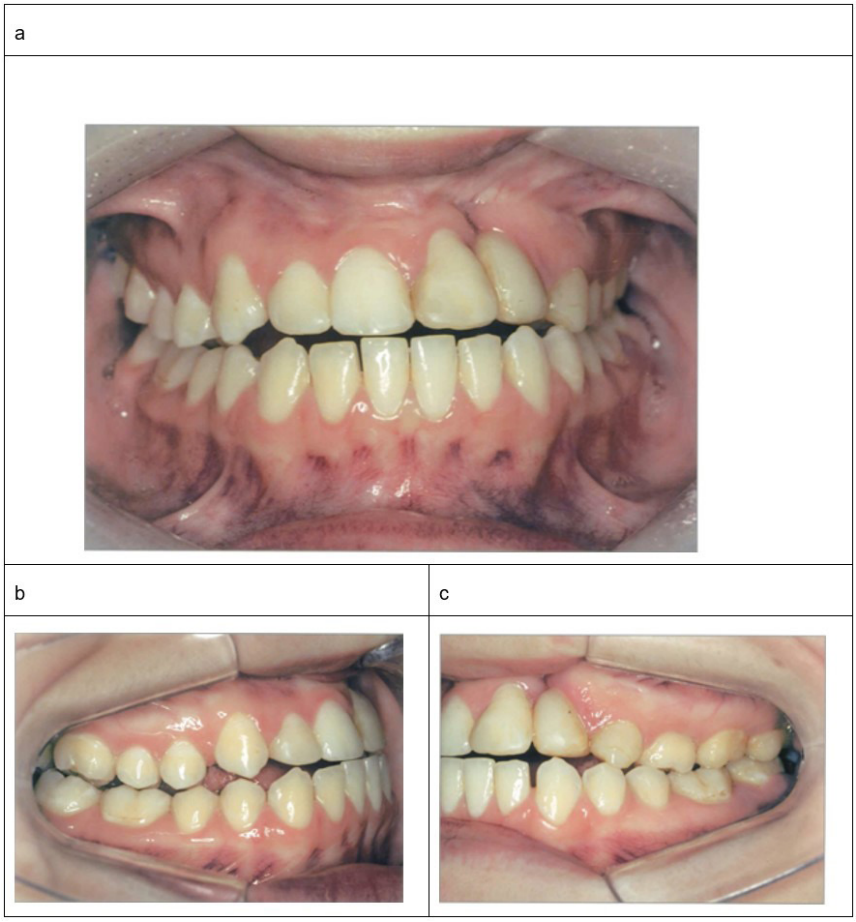

Figure 1 - Intraoral images after the first orthodontic treatment and before the second orthodontic treatment: (a) frontal occlusion, end-to-end bite; (b) right lateral occlusion; (c) left lateral occlusion.

Digital planning of the restorative treatment was performed by DSD (Digital Smile Design) of 5 ceramic laminates from element 12 to 24 (considering the agenesis of teeth 22 and 25) (Figure 3) using a slideshow software program (Keynote, MacBook Air) with reference to the patient's facial and dental parameters, such as: Tooth-labial analysis, buccal corridor, incisal plane, smile line, dental and facial midline, Zenith and gingival level, interincisal angles, tooth shape and beauty proportions and facial harmony (Figure 3a, 3b, 3c).

The DSD was sent to the prosthesis laboratory for diagnostic wax-up, and soon after the wall was made with condensation silicone (Optosil-Xantopren, Kulzer). Next, the mock-up test was carried out with Bisacrylic resin (Structur, VOCO) (Figure 4). After the mock-up was approved by the patient and the dentist, gingivoplasty was performed using the Flapless technique (Figure 5) with a piezoelectric ultrasound (DENTSURG PRO, CVDentus) on teeth 23 and 24 (as planned in the DSD) to achieve the smile parameters mentioned above. First, the teeth were marked with a periodontal probe (Figure 5a), then the incision was made with a scalpel blade no.15C around the gingival margin (Figure 5b). The gingival collar was subsequently removed (Figure 5c), and the osteotomy was performed with a TR1-PK diamond ultrasound tip (CVDentus) (Figure 5d).

Figure 2 - Panoramic radiographic after the latest orthodontic stage and before the new restorative treatment.

After 15 days of tissue healing (Figure 5e), tooth preparation of the 5 elements was

Figure 3 - DSD: (a) determination of facial parameters, midline, interpolpilary line, and horizontal plane; (b) determination of dental parameters, interdental proportions, central incisor proportion; (c) smile curvature, gingival curvature, measurement in millimeters of the incisal and gingival edges; and (d) final result of digital planning (digital mock-up).

performed guided by the Mock-up (Figure 6a). The preparations were conducted with diamond ring bits of two different diameters in their active part (FG 4141 (1.6mm); 4142 (2.1mm), KG Sorensen) to prepare the elements with guide grooves, then the grooves were joined by the drill conical diamond blade with a rounded end (FG 4138 KG Sorensen), with all drills being fine (F) and ultrafine (FF) grained. Finally, the finishing and polishing of the preparations was carried out with FF drills and softlex discs, removing the acute angles and defining the preparation term (Figure 6b), concluding this step with provisionals in bisacrylic resin.

The impression was made in the following session by adding silicone (ExpressTM XT-3M), and the B1 shade was selected based on the Ivoclar A-D Vivadent shade guide to manufacture injected lithium disilicate ceramic laminates (IPS e.max PRESS, Ivoclar), performing the cut

back technique in the incisal third. Thus, the cementing process of the ceramic laminates was continued (Figure 7), the dry proof (Figure 7a) and the wet proof were made with a try-in (Allcem Veneer OW, FGM) to define the resin cement color (Figure 7b), and then modified absolute insulation was made with a rubber sheet (Nictone) and clamps number 13A and 14A (Hu-friedy) (Figure 7c).

Figure 4 - Restorative test (mock-up).

Next, the laminate conditioning was started with 10% hydrofluoric acid (Condac Procelana-FGM) for 20 seconds on the cementing surface, and then they were washed with water for 20 seconds and dried with an air jet; then, silane (Prosil, FGM) was applied with a microbrush actively for 1 minute. The dental substrate was simultaneously conditioned with 37% phosphoric acid (Ultra Etch, Ultradent) for 20 seconds in enamel. The acid was then removed with a surgical suction device, washed for twice the etching time, and dried with a light jet of air. An adhesive layer (Ambar APS-FGM) was subsequently applied, light-cured for 20 seconds with a light-curing

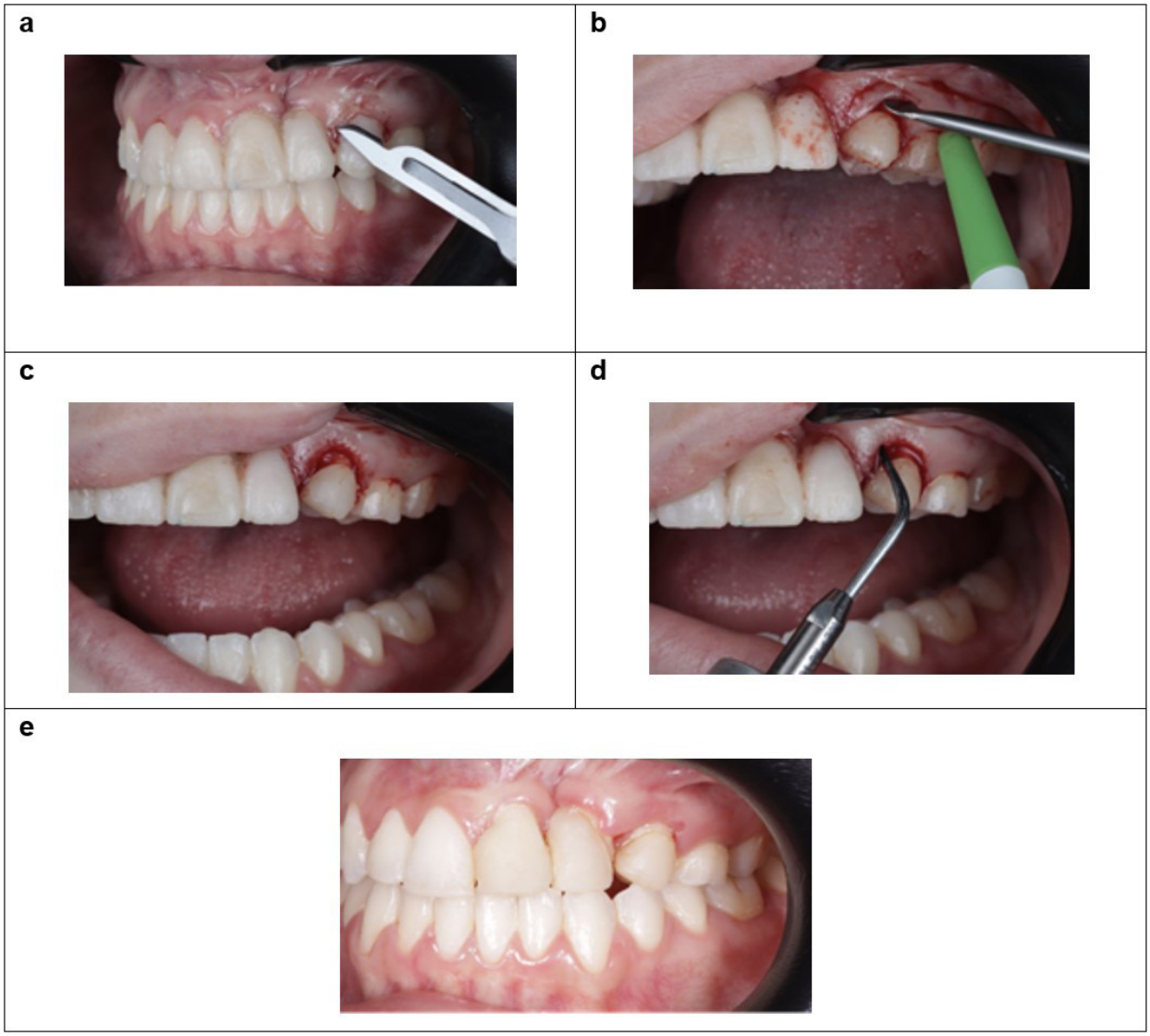

Figure 5 - Flapless gingivoplasty: (a) marking the gingival collar; (b) recontouring the gingival collar; (c) removing the gingival collar; (d) osteotomy with piezoelectric ultrasound tip; (e) healed tissue after 15 days.

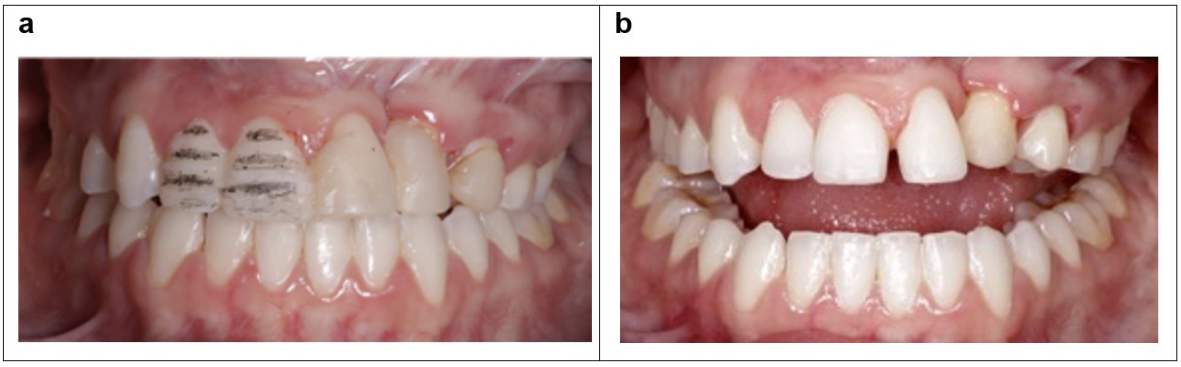

Figure 6 - Dental preparations: (a) mock-up guide in position for preparation of elements 11 and 12; (b) finished preparations.

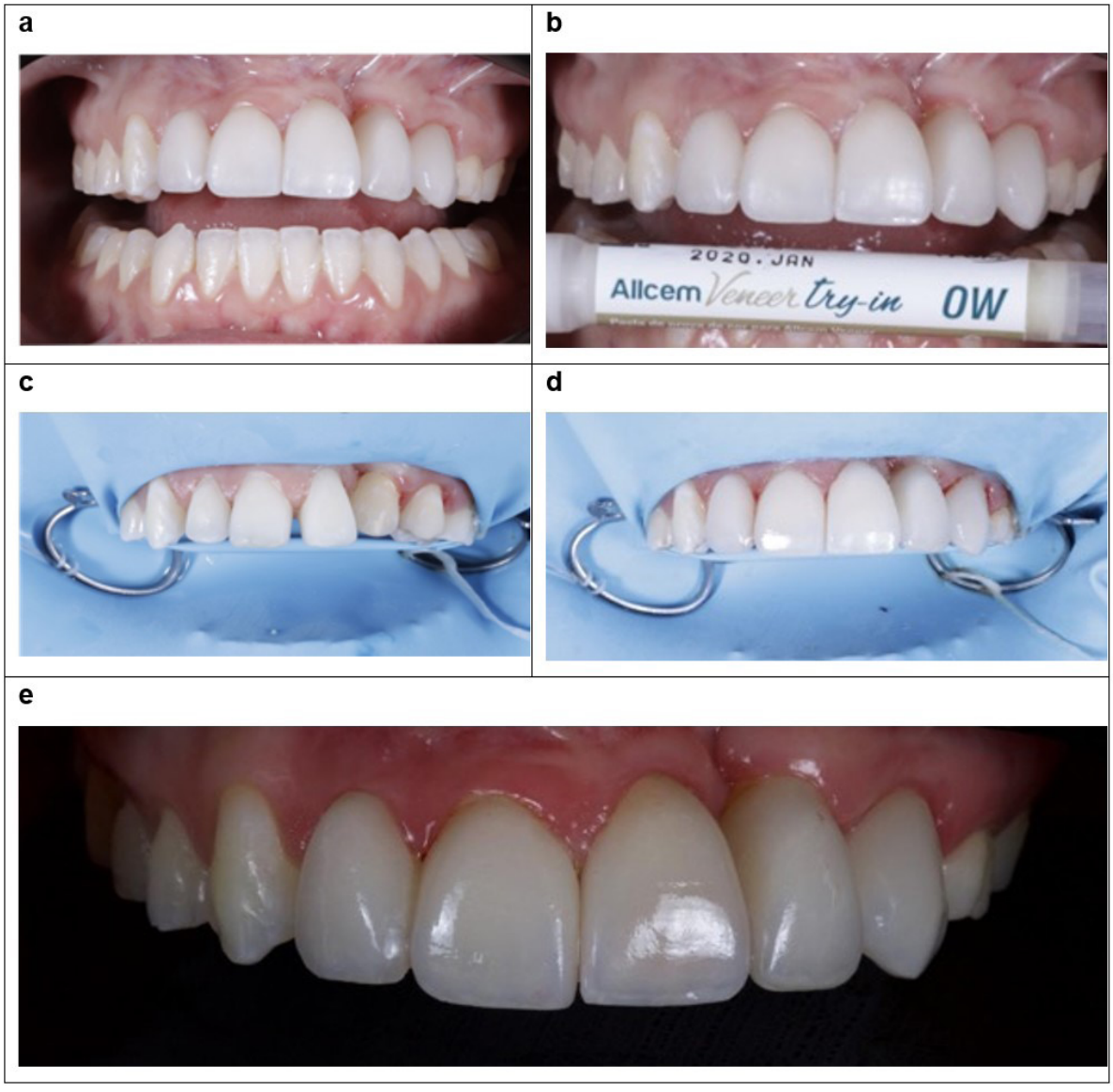

Figure 7 - Cementing process of ceramic laminates: (a) dry proof; (b) wet proof with Try-in; (c) modified absolute isolation and conditioning of the dental substrate; (d) cementing of laminates; (e) final result.

device (BluePhase N, Ivoclar Vivadent), and then the laminates were cemented with light-curing resin cement (Allcem Veneer APS-FGM). After removing the cement overflow with a brush and positioning all the pieces, they were light-cured for 20 seconds on each surface, and sprayed with an air jet at the time of changing the surface due to the high intensity of the light-curing unit (Figure 7d). The insulation was removed to remove excess cement with a periodontal curette and saw

(Microcut, TDV). Finally, occlusion of excursive movements was confirmed and polishing was performed with rubber tips for ceramics (American Burs) (Figure 7e).

The patient showed complete satisfaction with the final result of the restorative treatment, fulfilling the esthetic expectations she had waited for two decades (Figure 8).

DISCUSSION

In the present case report, the patient concluded the complete treatment at the HRAC - USP hospital (Craniofacial anomalies rehabilitation hospital - University of São Paulo); however, even after the orthodontic treatment, the dental esthetics were unfavorable due the dental agenesis of maxillary lateral incisor (ILS), and the 2nd maxillary premolar. Furthermore, the resin composite facets presented in maxillary anterior region were stained, along with marginal leakage and marginal discoloration leading to the need to change restorations.

The ceramic laminates were considered for the rehabilitation treatment due to its color stability, optical and mechanical properties which enable naturally establishing the esthetics and dental function. The esthetic treatment with ceramic laminates also presents biocompatibility, enabling dental restoration with biomechanical

Figure 8 - Completed treatment: (a) patient before restorative treatment; (b) patient after restorative treatment with ceramic laminates; (c) final treatment result.

characteristics similar to natural teeth [16,17], in addition to providing better periodontal health with a profile of adequate emergence and being a long-term durability treatment when compared to composite resin restorations [18].

A correct and adequate diagnosis and planning should be precisely carried out in order to start a treatment rehabilitation. Nowadays, technology offers many tools which improve these essential steps before beginning the restorative treatment. The diagnostic and planning restoration in this clinical case was performed using DSD (Digital Smile Design), which is a tool which offer facilities such as: expanded diagnostic vision that could be overlooked during the evaluation procedures; improved communication with the patient, dental technician, and colleagues; and increased predictability throughout treatment [19].

DSD (Digital Smile Design) was a very important tool to obtain the rehabilitation result in this case, because with its use it was possible to correctly diagnose and plan the treatment individually, taking into account the esthetic and functional aspects of the rehabilitation treatment, therefore leading to greater predictability and confidence in the planning combined with digital dentistry, in addition to being able to simulate the final result, which becomes something more concrete, precise and predictable for the patient and the dentist.

Interdisciplinary planning, esthetics, and the design of the new smile are analyzed during the DSD using extra oral and intra oral photography of the patient in a specific software or presentation software program (Keynote). First, facial analyzes are performed to determine the horizontal plane by the interpupillary line and the facial midline. Both are marked with the patient's features (glabella, nose, and chin) and are very important to be transferred to the intraoral image and analyze the smile line, occlusal plane, the pink and esthetic evaluation, and measure the tooth proportion and color [19] (Figure 3a, 3b).

Teeth shape is normally harmonized with the entire face according to gender, personality, and age parameters; nevertheless, another concept exists to help dentists precisely achieve a successful smile shape during the DSD and meet the patient's high expectations. This concept is called "Visagism" in dentistry, which not only involves the esthetic aspect but also psychosocial factors, emotions, behavior, self-esteem, and personality of the patient. Thus, personality (sensitive, dynamic, strong, and peaceful) and smile shape (Oval, Triangular, Rectangular, and Square) can be identified according to the lines, angles, and face shape, making it so the patient identifies with the designed smile [20].

Finally, the case described herein achieved successful restorative treatment complying with the fundamental bases of esthetics, function, structure, and biology, and satisfying more than two decades of expectation.

The first challenge of returning ideal occlusion, function and esthetics to meet high expectations through multidisciplinary treatment after its conclusion led to enormous acceptance and patient satisfaction for the final rehabilitation result; despite the complexity of a multidisciplinary case of this type, the treatment planning managed to attain the esthetic and functional expectations desired by the patient over the decades of previous dental treatment in a short amount of treatment time.

CONCLUSION

This case report described herein demonstrated interdisciplinary dentistry based on a correct diagnosis and detailed digital planning which successfully met the patient's high expectations in terms of esthetics, dentofacial and psychosocial function for a patient with a congenital compromise.

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Author's Contributions

LVCA, LCLG: Conceptualization. LVCA: Methodology. JMF, AT, VVBF, RDN, WU: Validation. LVCA, LCLG: Writing – Original Draft Preparation. JMF, AT, VVBF, RDN, WU: Writing – Review & Editing. JMF, AT, VVBF, RDN, WU: Visualization. JMF, AT, VVBF, RDN, WU: Supervision.

Conflict of Interest

No conflicts of interest declared concerning the publication of this article.

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Regulatory Statement

This study was conducted in accordance with all the provisions of the local human subjects oversight committee guidelines and policies of: FREZATO, Imersões odontológicas.

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