ECRONICON OPEN ACCESS

EC DENTAL SCIENCE
Case Report

Prosthodontic Rehabilitation of a Patient with Oligodontia and Anterior Crossbite

Godwin Clovis Da Costa[1]* and Paul Chalakkal[2]

[1]*Department of Prosthodontics, Goa Dental College and Hospital, India*
[2]*Department of pedodontics, Goa Dental College and Hospital, India*

***Corresponding Author:** Godwin Clovis Da Costa, Lecturer, Department of Prosthodontics, Goa Dental College and Hospital, India.

Received: September 20, 2018; **Published:** November 15, 2018

Abstract

A 25 year old female patient with oligodontia, anterior crossbite and lateral tongue thrust habit, visited the department of Prosthodontics seeking functional and aesthetic treatment for her dental condition. After partial orthodontic correction, she was prosthodontically rehabilitated using crowns and bridges made of monolithic zirconia in the posterior region, and zirconia crowns veneered with IPS e.max ceramic in the anterior region.

Keywords: *Missing Teeth; Malocclusion; Ceramic; IPS e.max*

Introduction

Oligodontia is a condition that could occur secondary to genetic abnormalities or syndromes, resulting in the partial absence of teeth in the jaws. As growth occurs, the condition may pose aesthetic and functional challenges due to spaces between the teeth. A multidisciplinary treatment approach is required in order to provide aesthetic, functional and psychological relief to such a patient.

Case Report

A 25 year old patient visited the department of Prosthodontics with the complaint of mal-aligned front teeth with spaces between them. The patient had not given any history of previous dental treatment or any medical condition. On extra-oral examination, no abnormalities were found. These observations were confirmed through a medical check-up. On intra-oral examination, the patient was found to have congenitally missing upper lateral incisors and all second premolars (Figure 1A). This had led to a lingual collapse of the upper arch resulting in anterior crossbite. A bilateral tongue thrust habit was also present in the posterior region, that had developed secondary to the edentulous spaces (Figure 1B). It was decided to undertake fixed orthodontic treatment for the patient to resolve the anterior crossbite, followed by the placement of fixed crowns and bridges for space closure and esthetics. An informed consent was obtained from the patient for undertaking the procedures.

The anterior crossbite was reduced to an edge to edge bite orthodontically, using standard edgewise brackets and 016 NiTi wire. An overbite of 1 mm, absence of any overjet and minimal retroclination of the lower incisors were observed (Figures 1C-1F). Following orthodontic treatment, the remaining procedures were carried out in the department of Prosthodontics. Diagnostic impressions were made in alginate (Tropicalgin, Zhermack) and poured with dental stone. The diagnostic casts were mounted and a wax mock-up was carried out. The upper and lower teeth were prepared with minimal occlusal reduction using a tapered flat end extra-fine diamond bur

Figure 1A: *Orthopantomograph.*

Figure 1B: *Pre-treatment anterior view.*

Figure 1C: *Standard edgewise brackets with 016 NiTi wire.*

Figure 1D: *Anterior view after partial orthodontic treatment.*

Figure 1E: *Right lateral view after partial orthodontic treatment.*

Figure 1F: *Left lateral view after partial orthodontic treatment.*

(TF-21EF bur, Mani) to obtain shoulder finish lines, in order to receive metal free coronal restorations (Figure 2A). Final impressions were made using condensation silicone putty and light body using the single step technique (Figures 2B and 2C), after which, bisacryl Temporaries (Protemp 4, 3M ESPE) were fabricated and cemented using a non-eugenol temporary cement (RelyX Temp NE, 3M USA; Figure 2D). Patient approval was obtained with regard to the shape and size of teeth that would constitute the prostheses, and the same was communicated to the laboratory via photographs and mock up cast. After three days, a bisque trial was carried out and minimal adjustments had to be made. A week after that, die-cut models were received with the final prostheses (Figures 2E-2H and Figure 3A), which consisted of IPS e.max layered zirconia crowns for the upper anteriors (11, 12, 21, 22) and monolithic zirconia crowns and bridges for the posterior region (upper first premolar till first molar comprising of a three-unit bridge, bilaterally and; lower first premolar till first molar comprising of a three-unit bridge, bilaterally). The prostheses were tried intraorally and no occlusal adjustments were required to be made. Final cementation of the prostheses was done using a self-adhesive resin cement (RelyX U200, 3M ESPE). Following treatment, a class II (by 2 mm) malocclusion was observed, bilaterally. There was also complete resolution of the tongue thrust habit, owing to closure of all edentulous spaces in the posterior region (Figures 3B-3D). The post-treatment phase has been uneventful, however, the patient has been kept on recall visits every six months for the last two years.

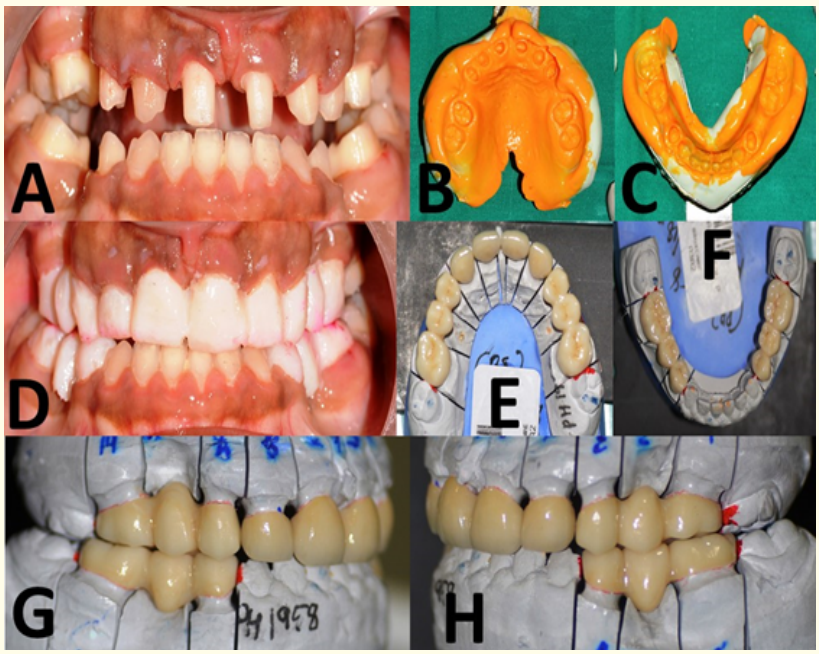

Figure 2A: *Teeth preparations.*

Figure 2B: *Upper final impression.*

Figure 2C: *Lower final impression.*

Figure 2D: *Temporaries cemented.*

Figure 2E: *Upper die-cut model.*

Figure 2F: *Lower die-cut model.*

Figure 2G: *Right lateral view of die-cut models in occlusion.*

Figure 2H: *Left lateral view of die-cut models in occlusion.*

Discussion

Oligodontia is a condition that could occur secondary to genetic abnormalities or syndromes, resulting in the partial absence of teeth in the jaws. As growth occurs, the condition may pose aesthetic and functional challenges due to spaces between the teeth. A multidisciplinary treatment approach is required in order to provide aesthetic, functional and psychological relief to such a patient. In this case, since the upper lateral incisors were congenitally missing, the canines were restored in the form of lateral incisors, due to space constraints. Moreover, premolars simulate canines when viewed anteriorly. The greatest disadvantage of using metal ceramic restorations was the difficulty in obtaining natural aesthetics and the risk of the ceramic veneer chipping off [1]. Moreover, with improvements in the properties of all-ceramic restorations, metal-free restorations are being preferred due to superior aesthetics [2]. Zirconia was introduced to dentistry as an advanced ceramic of high strength, toughness, and biocompatibility, and the development of CAD/CAM allowed for its rapid reproducibility and fabrication [3]. The monochromic and opaque properties of monolithic zirconia restorations make them aesthetically inferior to veneered zirconia restorations [4]. Håff., *et al.* reported an acceptability of 45% (55% excellent) while matching

Figure 3A: *Anterior view of die-cut models in occlusion.*

Figure 3B: *Post-treatment anterior view.*

Figure 3C: *Post-treatment right lateral view.*

Figure 3D: *Post-treatment left lateral view.*

the colour of monolithic zirconia crowns with adjacent enamel [5]. In this case, the upper anteriors were restored with zirconia crowns that were veneered with IPS e.max ceramic. Modern ceramic materials like IPS e.max have a flexural strength that is two to three times greater than that of traditional ceramics due to the presence of lithium-disilicate ($Li_2Si_2O_5$) [6]. Its crystalline volume and reactive index provides it with superior translucency, fracture resistance, wear resistance and resistance to crack formation and propagation [7]. The survival rate of zirconia-based restorations owing to marginal limitations and veneer chipping was found to be 90% after three years [4] and 91.5% after 10 years [8]. In a recent systematic review, the chipping rates for densely sintered zirconia crowns after five years were found to be 3.1% [9]. Fractures at the veneer-ceramic interface may be due to differences in the thermal expansion coefficients between the two, and the nonuniformity of condensation during ceramic build-up [10]. In this case, in order to avoid chipping of the veneers, monolithic full-thickness zirconia restorations were used in the less visible posterior load bearing areas, which rely on toughness and strength of the material [3]. Polished zirconia has been found to cause lesser opposing enamel wear than glazed zirconia [11]. This finding may be due to the fact that polished zirconia has a smoother surface than glazed zirconia, resulting in lesser abrasion of the opposing enamel. Moreover, the roughness would increase once the glaze layer wears off [12]. For this reason, the lab technician was instructed only to polish the monolithic zirconia bridges, without having to glaze it. Moreover, since no occlusal adjustments were required before cementation, it was unnecessary to re-polish any of the crowns or bridges. Class I recession was observed in relation to the lower incisors, not extending till the mucogingival junction. Recession had resulted most likely due to lingual orthodontic movement of the lower incisors, together with lack of oral hygiene maintenance. Thorough oral prophylaxis was carried out following treatment. Postoperatively, the patient is being followed up every six months for the last two years, and there have been no complaints or damages with regard to the restorations.

Conclusion

A combination of oligodontia, anterior crossbite and posterior tongue thrust habit can be successfully treated functionally and aesthetically through an interdisciplinary approach consisting of orthodontic and prosthodontic treatment methods. Monolithic zirconia based crowns and bridges in the posterior region and crowns made of zirconia veneered with IPS e.max ceramic in the anterior region, are favourable options for patients with oligodontia.

Bibliography

1. Pjetursson BE., *et al*. "A systematic review of the survival and complication rates of all-ceramic and metal-ceramic reconstructions after an observation period of at least 3 years. Part I: Single crowns". *Clinical Oral Implants Research* 18.3 (2007): 73-85.

2. Anusavice KJ. "Standardizing failure success, and survival decisions in clinical studies of ceramic and metal-ceramic fixed dental prostheses". *Dental Materials* 28.1 (2012): 102-111.

3. Beuer F., *et al*. "High-strength CAD/CAM-fabricated veneering material sintered to zirconia copings - a new fabrication mode for all-ceramic restorations". *Dental Materials* 25.1 (2009): 121-128.

4. Heintze S and Rousson V. "Survival of Zirconia- and Metal-Supported Fixed Dental Prostheses: A Systematic Review". *International Journal of Prosthodontics* 23.6 (2010): 493-502.

5. Häff A., *et al*. "A retrospective evaluation of zirconia-fixed partial dentures in general practices: an up to 13-year study". *Dental Materials* 31.2 (2015): 162-170.

6. Wolfart S., *et al*. "Clinical outcome of three-unit lithium-disilicate glass-ceramic fixed dental prostheses: up to 8 years results". *Dental Materials* 25.9 (2009): e63-e71.

7. Etman MK and Woolford MJ. "Three-year clinical evaluation of two ceramic crown systems: a preliminary study". *Journal of Prosthetic Dentistry* 103.2 (2010): 80-90.

8. Sax C., *et al*. "10-year clinical outcomes of fixed dental prostheses with zirconia frameworks". *International Journal of Computerized Dentistry* 14.3 (2011): 183-202.

9. Sailer I., *et al*. "All-ceramic or metal-ceramic tooth-supported fixed dental prostheses (FDPs): A systematic review of the survival and complication rates. Part I: Single crowns (SCs)". *Dental Materials* 31.6 (2015): 603-623.

10. Sailer I., *et al*. "Single-tooth implant reconstructions: esthetic factors influencing the decision between titanium and zirconia abutments in anterior regions". *European Journal of Esthetic Dentistry* 2.3 (2007): 296-310.

11. Janyavula S., *et al*. "The wear of polished and glazed zirconia against enamel". *Journal of Prosthetic Dentistry* 109.1 (2013): 22-29.

12. Esquivel-Upshawa JF., *et al*. "Randomized clinical study of wear of enamel antagonists against polished monolithic zirconia crowns". *Journal of Dentistry* 68 (2018): 19-27.

Volume 17 Issue 12 December 2018