

Management of a Patient with Hypodontia Using Zirconium Resin-Bonded Fixed Partial Dentures - A Case Report

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Received: June 10, 2021; **Published:** July 26, 2021

Abstract

Hypodontia is one of the most common developmental disorders of permanent dentition and creates functional and aesthetic problems, as well as problems with the correct pronunciation. Treatment of this dental abnormality is often difficult and usually requires a combination of dental specialties, such as prosthodontics, orthodontists, implantologists, e.g. Successful treatment in these situations should have as its main objective the maintenance of as much tooth substance and the least possible discomfort of young dental patients.

This clinical case analyses the conservative prosthetic rehabilitation of a young patient with oligodontia, using two zirconium resin-bonded fixed partial dentures.

Keywords: Hypodontia; Esthetics; Resin-Bonded FPD; Zirconium; Treatment; Lateral Incisors

Introduction

Congenital lack of certain permanent teeth is the most common developmental disorder of permanent dentition [1,2]. Hypodontia (Greek hypos meaning below) is the condition in which the congenital lack of five or fewer teeth of permanent teeth is observed, whereas when there is a shortage of six or more teeth it's called oligodontia, (Greek oligos meaning small) [3-8].

Its exact cause is not known, but it is believed to be a multifactorial condition that has genetic and environmental components. Multiple genes play a role in its development, and environmental factors may contribute to its development, such as eating disorders during pregnancy or infancy [9,10].

The prevalence is weak and varies according to ethnic origin. The prevalence of oligodontia mentioned in the literature range from 0.08% to 1.1%. In the Caucasian race, it has a rate of 2 - 10%, with a higher frequency in women [7,11,12]. The teeth with the highest rates of congenital deficit are the third molars, the second lower pre-molars (2.8%) and upper lateral incisors (1,6%) [9,7,13].

Its treatment depends on the age of the patient and the number and location of the missing teeth. The aesthetic disorder resulting from the congenital lack of mainly the front teeth is very annoying and most of the time it is necessary to cooperate with many dental specialties for an excellent result. Over the last several decades, dentistry has focused on various treatment modalities for the replacement of missing teeth. Treatments can include orthodontic space opening or closure before prosthetic therapy, use of adhesive restorative techniques, removable or fixed partial dentures, implant-supported restoration, or combinations of these approaches [3,9,10,13-16].

This clinical case presents in detail the aesthetic and prosthetic rehabilitation of a young patient aged 17 years, who had a congenital lack of lower lateral incisors. The restoration was done by zirconium resin-bonded fixed partial dentures (RBFPDs).

Case Report

An 18-year-old male patient reported to the dental office with the main complaint concerning having spaces between the lower frontal teeth (Figure 1A and 1B). From the patient’s medical and dental history there was no systemic disease, or tooth extraction, or injury to the anterior area of the mouth.



Figure 1A: Preoperative frontal view of the patient.



Figure 1B: Preoperative lingual view of the patient.

The clinical and radiographic examinations revealed the loss of two mandibular lateral incisors. The adjacent teeth with healthy periodontium were intact and there was no prior history of orthodontic treatment.

The patient and his parents analyzed possible therapeutic alternatives, such as implant-supported crowns, two zirconium resin-bonded FPDs, a conventional zirconia 6-unit FPD and a removable prosthesis. Finally, the patient expressed a preference for RBFDPs rather than an implant-supported prosthesis, because no surgical procedure was needed. Furthermore, the time of insertion of the RBFDPs was relatively short and the tooth preparation was more conservative compared to a conventional FPD.

Before, fabrication of ZRBFDPs, a waxing was accomplished on a diagnostic cast to demonstrate to the patient the outcome of the treatment.

Soon after, the four teeth (41, 31, 43, 33) were prepared. Enamel was removed from only the lingual surfaces to a thickness of about 0.5 mm to create the necessary space for the ceramic material [17-21]. The preparation was bounded 1 to 1.5 mm from the incisal edge and 1 mm from the edge of the gums, while on proximal surfaces it extended to the contact points. The proximal surfaces of abutments adjacent to the edentulous space were prepared to reduce convexity. Proximal contact areas were not invaded. On the lingual surfaces of the abutments, right next to the pontic side, shallow boxes were created using a ball-type diamond that acts as orientation points and stoppers so that during cementing the restoration is not moved [21-23] (Figure 2A and 2B).



Figure 2A: Lingual view of abutment teeth preparations in the mouth.

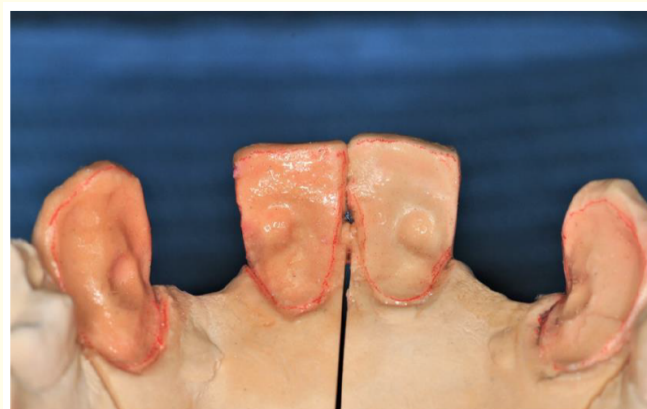


Figure 2B: Lingual view of abutment teeth preparations on the master cast.

After the preparation of the abutments, the final impression was obtained, using polyether material (Permadyne, 3M Espe), with the technique of single mixing. Although temporary restoration is usually not required due to minimal preparation, the prepared dental surfaces were directly covered using composite resin (Tetric Ceram, Ivoclar Vivadent).

The two RBFPDs were fabricated according to the manufacturer’s instructions using zirconia RDFPDs (Cercon Base, Degudent, Hanau, Germany,) with a glass-ceramic veneering (Cercon Ceram S, Degudent, Hanau, Germany).

Before the completion of the restorations in the laboratory, a clinical trial of the zirconium substructures was carried out to confirm the correct marginal adaptation, the occlusion, and the correct configuration of the pontics (Figure 3A and 3B).



Figure 3A: The zirconium substructures on the master cast.



Figure 3B: The zirconium substructures in the mouth.

After adding veneer porcelain only to the pontics, a second trial evaluation was accomplished to review all characteristics described previously and of course the esthetic result. During this evaluation, all contacts between the pontics and the opposing teeth during the eccentric movements of the mandible were eliminated.

The veneering porcelain was applied only to the pontics and not to lingual aspects of the prostheses to prevent overcontouring of lingual wings. The final prostheses were constructed within 1.5 weeks after the final impressions were made (Figure 4A and 4B).



Figure 4A: The completed restorations on the master cast.



Figure 4B: The completed restorations: inner surfaces of the wings.

The inner surfaces of the restorations were air-abraded with 110 μm aluminum oxide particles (Korax 250, Bego, Germany). The teeth were isolated using a rubber dam isolation, and the prepared surfaces were thoroughly cleaned with pumice slurry and etched with 38% phosphoric acid gel (Ultra Etch, Ultradent Inc.) for 60 seconds, rinsed with water spray, and dried with air pressure. Then, a primer (ED Primer, Kuraray Noritake Dental) was applied for 60 seconds on prepared surfaces of the abutment teeth and air-dried. The cementation was done using dual-cure cement (Panavia F2.0, Kuraray Noritake Dental) according to the instructions of the manufacturer (Figure 5A and 5B).



Figure 5A: The final aspect of the cemented restorations: labial view.



Figure 5B: The final aspect of the cemented restorations: lingual view.

The young patient was given instructions for proper oral hygiene and scheduled for clinical re-examination after three, six, and twelve months. He was very excited about the final aesthetic result. This treatment not only improved his speech and masticatory function but also had a psychological implication that greatly helped in regaining his self-confidence.

Discussion

The lack of teeth that occurs in cases of oligodontia often creates serious functional limitations in speech and chewing. In addition, the difference in the appearance of their peers can affect the self-confidence and self-esteem of young patients with oligodontia, especially if the thin teeth subject to experiments and negative comments.

Variations in the severity of this dental anomaly condition call for careful treatment planning to provide the most satisfactory result for each patient. The treatment of this condition depends on the age of the patient, the number and location of the missing teeth, the ex-

istence of other dental abnormalities as well as the existence of proper occlusion or malocclusion. Many different or combined methods of treatment are available for these patients, including orthodontic movements, implant-supported single crowns, conventional FPDs, removable partial dentures, and/or all-ceramic RBFDPs [3,6,7,12,16,17].

All ceramic RBFDPs are used as a minimally invasive, tooth-tissue loss prevention alternative for replacing anterior teeth [20-26]. This kind of restoration offers a very good prosthetic and aesthetic solution to specific cases, such as congenital or non-congenital loss of lateral incisors, tooth discolorations, enamel malformations, etc. The advantages they offer are many. Essentially they bring together the advantages of ceramic materials in combination with those of composite resins, i.e. very good aesthetic performance and color stability, strong resistance to chewing forces, and strong adhesive bond to the dental surface [18-23].

In this clinical report, we used two zirconium RBFDPs as a treatment alternative for the replacement of two mandibular lateral incisors. Zirconium RBFDP appears to address many of the concerns regarding the strength of these restorations. The use of zirconia-based ceramic was selected for its excellent mechanical properties. This material has very high strength, about six times higher than the usual ceramic materials. This allows the construction of bridges with smaller dimensions of the connector to achieve better aesthetics [27-31].

Regarding the prostheses design, in this clinical case, the two zirconium resin-bonded fixed partial dentures were constructed using two retainers on either side of the edentulous area. This choice was made because this increases the bonding surface to twice as much as the enamel. Moreover, several research papers have demonstrated the high strength of this type of restoration [22,32,33].

Special attention should be given to the occlusion to minimize the eventual risk of failure or debonding of this type of restoration. Especially, all contacts between the pontics and the opposing teeth during the eccentric movements of the mandible should be eliminated.

On the other hand, if failures occur, the situation is easily overturned, because these restorations can be easily repaired, or replaced with another prosthetic restoration or implants to be fitted [22].

Several studies confirmed that the use of zirconium RBFDPs is a treatment modality for replacing missing teeth and provides patients with functional and esthetic restorations [31-35].

Conclusion

Oligodontia is the most common developmental disorder of permanent dentition. The aesthetic disorder resulting from the congenital lack of many teeth is usually very annoying and most of the time it is necessary to cooperate with many dental specialties for an excellent result. Because each case is different, it must be decided early on whether a prosthetic rehabilitation or orthodontic treatment is better for this type of patient to fill in the adjacent teeth to fill in the gaps. The decision concerns the patient, the orthodontist, and the prosthodontist. If prosthetic restoration is decided, the use of zirconium RBFDPs has very satisfactory aesthetic and functional results.

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Volume 20 Issue 8 August 2021

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