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Resin-bonded fixed partial denture as a cost-effective prosthesis for missing maxillary lateral incisor in a cleft lip and palate patient: a case report

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Abstract

Literature suggests 66.7% of dental abnormalities among patients with cleft lip and palate (CLP). Besides posing functional difficulties, dental anomalies also raise significant aesthetic concerns among these patients, especially with missing teeth in the anterior region. Among various treatment choices like a removable partial denture, fixed and implant treatments available in the prosthetic rehabilitation of missing teeth in CLP subjects, Maryland bridges offer a conservative and cost-effective alternative in short-span edentulous spaces while carrying the advantages of supragingival marginal preparations and less intensive working times. The availability of advanced self-etch adhesive systems that chemically bond to both the tooth and metal surfaces offer these prostheses more longevity. This case report presents the fabrication of a resin-bonded fixed partial denture in the prosthetic rehabilitation of a missing maxillary lateral incisor in a 23-year-old female patient with CLP who was unwilling for orthodontic care.
Keywords: cleft lip; cleft palate; Maryland bridges.

1. Introduction

Orofacial clefts constitute a majority of the congenital anomalies, with a global frequency of around 1 in 700 births [1]. There are many factors associated with the variable incidence of orofacial clefts, ranging from 1:500 to 1:2500, such as ethnicity, race, socioeconomic status, and environmental factors [2]. The incidence of orofacial clefts among the Asian population is considered to be higher compared to other populations [3]. Literature suggests an obligatory incidence of dental abnormalities conditional on the presence of cleft lip and palate (CLP) [4]. The most common dental abnormalities among subjects with CLP are hypodontia, oligodontia, transposition, microdontia, and impactions [5]. Deciduous and permanent maxillary teeth are the most typically affected in terms of hypodontia [6], with the maxillary lateral incisor on the cleft side having the greatest predilection for hypodontia among CLP patients [7,8]. Subjects with CLP encounter a wide range of physiological and esthetic difficulties which could also affect their social well-being [9,10]. The management of CLP is multidisciplinary and must be rendered starting at the right time. With increasing emphasis on interdisciplinary management and evolving scientific knowledge, prosthodontists' convention in CLP management after completing the gamut of other treatment has been broken. The continuing role of prosthodontists in CLP management at every stage right from birth is advocated [11]. From the perspective of rehabilitation, the following challenges are encountered in the prosthodontic management of CLP: limited facial support; reduced vertical dimension of occlusion; tooth wear and the associated symptoms; lack of functional occlusion [12]. With regard to the replacement of missing lateral incisors, a common occurrence among subjects with CLP, the available prosthodontic treatment options are removable partial dentures; conventional or resin-bonded fixed partial dentures; osseointegrated implants [13].

2. Case report

A 23-year-old female patient with CLP reported to the Department of Prosthodontics and Implantology, Vishnu Dental College, Bhimavaram, with a chief complaint of missing front tooth upper anterior region. The patient had reported cleft lip and palate on the left side from birth, for which she had undergone surgical treatment, the last operative procedure of which was carried out seven years ago when the patient was 16 years old. She had not undergone any orthodontic treatment, and neither did she receive any grafts. On examination, the patient had a residual palatal defect of 3 x 4 mm on the left side with missing maxillary left lateral incisor; severe crowding was also noticed. Class III maxilla-mandibular relation was observed with Veau's class III defect in the left maxilla. There was no

intercuspation on the right side with a crossbite with regard to #36 and #46. The pretreatment intraoral pictures of the patient from the occlusal view and in maximum intercuspation, protrusive positions are presented in Figure 1. A smile evaluation was done, and it was observed that the patient had a maxillary incisor exposure of 7mm with a smile, low lip line, and wide buccal corridor space. Diagnostic models were obtained, and model analysis was performed, which included: Carey's / arch perimeter analysis, Bolton's analysis; Ashley Howe's analysis; Pont's analysis. Carey's analysis revealed existing crowding in both the arches and Bolton's analysis suggested mandibular excess with overall and anterior ratios of 103% and 100%, respectively. According to Ashley Howe's analysis, premolar basal arch width (PMBAW) was 35mm, and PMBAW% was 40%, suggestive of a borderline case for extraction. Pont's analysis calculated premolar value (CPV) was more significant than the measured premolar value (MPV), indicating the possibility of arch expansion in the premolar region. Radiographic and clinical analysis revealed no bone loss around the maxillary left central incisor and left canine. Based on these findings, the following treatment plan was considered: orthodontic correction of alignment of maxillary and mandibular teeth followed by replacing the missing maxillary left lateral incisor with fiber-reinforced/resin-bonded fixed partial denture.

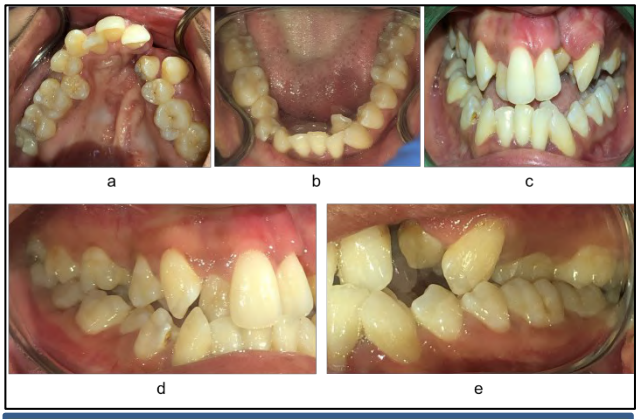

Figure 1. Pretreatment intraoral images; where, a) maxillary occlusal; b) mandibular occlusal; c) protrusive; d) maximum intercuspation position on right side; e) maximum intercuspation position on left side.

The proposed treatment plan was discussed with the patient in detail. As the patient was not willing to undergo orthodontic treatment and reported that her only concern was the missing tooth in the course of preparing for her wedding, it was decided to fabricate a conservative, minimally invasive resin-bonded fixed partial denture to replace the missing maxillary left lateral incisor after discussing with the patient the negative implications (like food lodgment and caries to the abutment teeth)of not undergoing orthodontic treatment before receiving a fixed partial denture. Following patient consent, minimal preparation of the palatal surfaces alone was done with #21, #23so that the preparations were confined within the palato-proximal line angles. On both the abutment teeth, parallel retention grooves were placed in proximity to the edentulous space. Primary impressions of maxillary and mandibular arches were made. A special tray was fabricated with auto-polymerizing acrylic resin using which final impressions of both the arches were made and sent to the laboratory. A metal framework was fabricated with 'wings' overlapping onto the prepared palatal surfaces of the abutment teeth. Figure 2 presents the frontal and occlusal views of the metal framework. No interferences were noted with metal try-in. Vita 3-D master shade guide was used for selecting the shade. To facilitate micromechanical retention, the fitting surfaces of the prosthesis was sandblasted with alumina 250 microns. The prosthesis was cemented with universal self-etch resin cement (Rely X U100, 3M ESPE). Figure 3 presents the frontal and occlusal views of the resin-bonded fixed partial denture. Occlusion was verified with no interferences, and post-cementation instructions like hygiene maintenance were given. The patient was also evaluated for improvement in phonetics disorder. Figure 4 presents the pre-treatment and post-treatment views.

Figure 2. Frontal (a) and occlusal (b) view of the metal framework.

Figure 3. Frontal (a) and occlusal (b) view of the resin-bonded fixed partial denture.

3. Discussion

Patients with CLP demonstrate poor oral health-related quality of life for many reasons [14]. Regardless of the patient's age, hypodontia poses a significant aesthetic concern besides functional difficulties. The aesthetic concerns limit the eloquent social participation of these subjects due to stigma. Therefore, addressing the aesthetic concerns contributes vastly towards the psychological well-being of the patient [15]. In this case report, we discussed the prosthetic replacement of missing maxillary left lateral incisor in a female patient with CLP. Though the patient was advised orthodontic care before prosthetic replacement, she

Figure 3. Frontal (a) and occlusal (b) view of the resin-bonded fixed partial denture.

did not wish to undergo orthodontic treatment and reported that the missing tooth was her only aesthetic concern. Patient' autonomy has become an essential and integral part of the provision of evidence-based care [16]. Respecting the patient's independence, a prosthesis was therefore planned with resin-bonded fixed partial denture preceding orthodontic treatment after disclosing the negative implications to the patient. For prosthesis of missing anterior teeth among subjects with CLP, several rehabilitation options were proposed: removal of partial dentures; conventional or resin-bonded fixed partial dentures; precision prostheses; osseointegrated implants [10.13]. The majority of patients show reluctance for removable partial dentures because of the removable nature unless there are substantial edentulous spaces and RPDs form a definitive rehabilitative means. With implants, the possible challenges for placement among patients with CLP are the reduced availability of bone, the poor contour of the labial cortical bone, and proximity to the maxillary sinus, nasal cavity [17]. Conventional fixed partial dentures require preparation of the sound abutment teeth, and it has been recommended that two abutment teeth on either side of the cleft be included [18]. Furthermore, the maintenance of oral hygiene gets difficult, potentially compromising gingival health. Given these observations and to keep orthodontic treatment possible for the patient, should she wish to undergo in the future, the resin-bonded fixed partial denture was preferred in this case which is conservative and minimally invasive. Though resin-bonded fixed partial dentures have poor retention and limited longevity as drawbacks, the availability of advanced self-etch adhesive systems offers these prostheses more longevity [19]. Other common complications are the development of dental caries and debonding [20]; therefore, patient's compliance to instructions on oral hygiene maintenance and periodic recall evaluations are imperative.

7. Conclusion

This case report discussed the successful prosthesis of missing maxillary left lateral incisor in a 23-year-old female patient with CLP reporting aesthetic concerns by fabricating a resin-bonded fixed partial denture. This economical, conservative approach improved the patient's appearance satisfactorily besides bringing a positive change in her speech and lip contour. For short-span edentulous spaces, resin-bonded fixed partial dentures among CLP patients can be considered cost-effective prosthetic alternatives.

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