

Implant Supported Prosthesis in Cleft Palate: A Multidisciplinary Approach

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ABSTRACT:

Cleft lip and palate is one of the most common congenital deformities of craniofacial region leading to various dental anomalies in early childhood. The clefts involving the alveolar ridge causes change in shape and thickness and the permanent lateral incisors are the most often missing or malformed tooth. They demand multidisciplinary efforts for rehabilitation. In this case report, we present a case with cleft lip and palate managed by orthodontic treatment, secondary bone grafting and implant prosthesis for the replacement of missing lateral incisor. Treatment included extraction of mandibular left first molar, orthodontic treatment for aligning and creating space for the missing lateral incisor, autogenous bone graft from mandibular symphyseal region and dental implant supported prosthesis for the maxillary right lateral incisor. Post-treatment evaluation showed that all the treatment objectives were fulfilled.

Keywords: Cleft lip and palate, implant supported prosthesis, secondary bone grafting, angulated implant abutment

Introduction

Cleft lip and cleft palate (CL/CP) is one of the most common congenital deformities of craniofacial region leading to various dental anomalies in early childhood. In India, prevalence of cleft lip is estimated as 9.1 per 10,000 depending upon various epidemiological factors such as ethnicity, geographic location and socio-demographic parameter. (1) Management of a cleft patient is complex and requires a multidisciplinary approach starting from infant stage to adulthood.

Alveolar clefts causes changes in the ridge shape and thickness and the permanent lateral incisors are the most often affected by being missing or malformed.^(2,3) For space closure in the cleft area, bone grafting combined with

orthodontic therapy, followed by rehabilitation of the area with removable or fixed prosthesis can be done⁽⁴⁾. Disadvantages of using conventional fixed and removable prostheses is the need to prepare healthy adjacent teeth, with removable prosthesis having additional problems like inherent aesthetic and functional problems. These disadvantages warrants the use of an alternate method leading to the use of implant supported prosthesis which has been reported in the literature. Dental implants can be used in many cases, improving the functional, aesthetic, and psychosocial aspects of cleft patients^(5,6). Here we report a case of CL/CP managed by orthodontic treatment, secondary bone grafting and implant prosthesis for the replacement of missing lateral incisor.

Case Report

A 20 year old female patient reported to Department of Orthodontics of Kunhitharuvai Memorial Charitable Trust (KMCT) Dental College and Hospitals, Kozhikode,

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Kerala, India, with chief complaint of irregularly placed upper anterior teeth and missing upper right lateral incisor. She was born with non-syndromic unilateral cleft lip and palate. Previous medical records showed that she had undergone surgery for cleft lip, at the age of six months with no further dental treatments.

Extraoral examination revealed that the patient had a concave profile with retrusive upper lip. She showed good vertical balance and facial symmetry, except for scarring in the upper lip due to primary cheiloplasty. The maxillary midline shift to the right side was also noted. Intraoral examination showed missing right lateral incisor and grossly decayed lower left first molar. The maxillary arch was constricted with anterior cross-bite in relation to right and left central incisor and right canine. The right central incisor was rotated as well. The molar relation was class III on right side. The panoramic and occlusal radiographs revealed cleft involving the alveolus and primary palate.

Treatment plan was formulated as three stage procedure. In the first stage secondary alveolar bone grafting was done with corticocancellous iliac bone graft by the department of plastic surgery in Baby Memorial Hospital (BMH). In the second stage extraction of mandibular left first molar, followed by orthodontic treatment for aligning and creating space for the missing lateral incisor was done. Third stage followed with autogenous onlay bone grafting from mandibular symphyseal region and implant placement for implant supported prosthesis in the maxillary right lateral incisor.

Orthodontic treatment began with the bonding of 0.025 x 0.028 pre-adjusted

edgewise appliance (MBT prescription) with 0.016 inch nickel-titanium (Ni-Ti) initial arch wire followed by a progressive sequence of round and rectangular Ni-Ti and Stainless steel wires. After the completion of leveling and alignment, 0.018 stainless steel wires were inserted to stabilize the arch, and an open coil spring of 0.010 inch was inserted between 8 and 6 to regain space. After 3 mm of space creation, the patient was referred to the Implantology department.

After eight months of orthodontic treatment, alveolar onlay bone grafting was done with autogenous graft harvested from mandibular symphysis region. The implant was placed seven months after the alveolar bone grafting. After surgical exposure of the grafted cleft site for implant placement it was found that the amount of bone regenerated was deficient, so the implant was placed distally towards the canine, utilizing the dense bone near to mesial aspect of canine. A 3.3mm x 11mm implant was placed and bone augmentation was done using demineralized freeze dried bone allograft and resorbable membrane. The loading of implant was done four months after implant placement. An angulated abutment (25°) was placed to compensate for the distally placed implant. The final prosthesis was placed months later and which was a Class I prosthesis.

Post treatment evaluation showed that all the treatment objectives were fulfilled. The case was finished with ideal over jet and overbite. The maxillary and mandibular dental midlines were coinciding with facial midline. Adequate space was regained for replacement of missing maxillary lateral incisor and dental implant placed showed good postoperative stability.

The patient was very cooperative and compliant throughout the entire treatment period.

Discussion

Cleft lip and palate causes deformities in the oral cavity that demand multidisciplinary efforts for rehabilitation. Dentistry has many options for the rehabilitation of individuals with clefts, including orthodontic treatment, removable and conventional fixed prostheses, and more recently, endosseous dental implants, which offer many advantages over conventional prostheses. In 1991, Verdi et al first reported the use of an endosseous implant to restore tooth in alveolar cleft area.⁽⁴⁾ One of the fundamental conditions for the success of dental implants is the quality and quantity of bone. Bone grafting is necessary in many cases to provide good conditions for implant fixation and vertical height to avoid aesthetic complications in the prosthetic rehabilitation. The use of secondary bone grafts (SBG) is related to segment stabilization of alveolar ridges and reconstruction of the alveolar ridge.⁽²⁾ SBG was first introduced by Boyne and Sands in 1972 and is the most commonly used method for reconstruction of alveolar defects in patients with cleft lip and palate.⁽⁷⁾ In our patient SBG was done using cancellous bone from the chin area. The timing of the implant placement after SBG remains controversial but it is generally accepted that a prolonged waiting period between grafting and implant placement can result in resorption of the grafted bone (Nakai et al., 1998). Boyne (1991) recommended that the interval between bone grafting and implant insertion should be between 3 and 4 months in patients without cleft. Kearns et al. (1997) also reported that the interval between SBG and implant insertion should be no longer than 4

to 6 months in cleft populations.⁽⁶⁾ Takahashi et al. showed that implant placement should be practiced within 24 months after SBG in view of the resorption of the grafted bone.⁽⁵⁾ Kawakami et al placed implant after a gap of 12 months from bone grafting and reported no progressive resorption in grafted bone.⁽⁷⁾ In the present case, there was an interval of 7 months between SBG and implant insertion, which was longer than ideal and this could be the reason for less than adequate bone volume.

Since the bone gain after SBG was not adequate, an angulated (25°) implant was placed and the angle was compensated with the prosthetic abutment. Angulated implant have been shown to be satisfactory alternative to vertical implants especially to avoid bone grafting and angulated implant do not increase amount of bone loss around implants in anterior maxilla according to a study by Tabrizi et al 2013. After one and half years post operative review the implant has been found to be stable and the treatment results have been good esthetically and functionally.

Conclusion

The case presented here was managed by collective effort from a plastic surgeon, orthodontist, oral surgeon, periodontist and a prosthodontist and multidisciplinary approach is the key to successful dental rehabilitation of cleft lip and palate patient.

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