



RECONSTRUCTION OF ALVEOLAR CLEFT DEFECT USING ILIAC CREST BONE GRAFT, OSTEON II AND PLATELET RICH FIBRIN: A CASE STUDY

Maxillofacial Surgery

Dr. Tamal Kar	MDS PGT, Department of Oral and Maxillofacial surgery, Guru Nanak Institute of Dental Sciences and Research, Kolkata
Dr. Sudip Chakraborty	MDS(CAL), Professor, Dept. of Oral and Maxillofacial surgery, Guru Nanak Institute of Dental Sciences and Research, Kolkata
Dr. Amit Ray	MDS(CAL), Professor and HOD, Dept. of Oral and Maxillofacial surgery, Guru Nanak Institute of Dental Sciences and Research, Kolkata
Dr. Utsa Mandal	BDS, MDS PGT, Department of Oral and Maxillofacial surgery, Guru Nanak Institute of Dental Sciences and Research Kolkata

ABSTRACT

Introduction- Secondary alveolar bone grafting may be crucial for individuals who show in late adolescent stage and may present with unique esthetic challenges. **Patient and Method-** This case report aims to describe the surgical rehabilitation of a 18 year female patient with unilateral cleft lip and palate (UCLP) who underwent a late secondary alveolar bone grafting with iliac crest bone graft. To improve the surgical outcome, tricalcium phosphate (β -TCP) and platelet-rich fibrin (PRF) have been used as supplemental grafting materials. Following surgery, recovery was found to be uneventful and satisfactory with sufficient bone growth. **Conclusion-** Better clinical outcomes are achieved through the use of autologous grafts, the effectiveness of a biomaterial, and PRF that supports its adoption in clinical practice.

KEYWORDS

INTRODUCTION

Cleft lip and palate is one of the most common facial deformities. In order to treat a surgically treated case of cleft lip and palate (CLCP), one must have a solid grasp of unusual anatomy and strike a balance between surgical intervention, structural harmony and aesthetic goals. According to the current protocol used worldwide secondary alveolar bone grafting (SABG) is preferably performed in individuals with cleft lip and palate during the late mixed dentition stage, prior to the eruption of the permanent canine.¹ However, the need to maintain the integrity of the alveolar arch becomes a real challenge to clinicians when patient don't turn up in time and become candidates of late secondary alveolar bone grafting. Once integrated into the recipient site, this viable graft material not only stabilizes the maxillary arch section but also helps in successful closure of oronasal communication. In addition to these well-known effects, alveolar bone grafting induces a change in the soft tissue profile Patient acceptance and low infection rates make autologous grafts a great choice. The current article aims to describe the surgical rehabilitation of a female patient with unilateral cleft lip and palate (UCLP) who underwent a secondary alveolar bone grafting.

Case Report

A 18-year-old female presented with a chief complain of difficulty in speech and regurgitation of fluids to the nose, which negatively affected the quality of life. Extra-oral examination showed deficient middle third of the face with nasal deformity, residual scars on the upper lip and asymmetry of the vermillion border on both sides. [FIG 1] The intraoral picture shows that maxillary right canine was missing, and the mandibular right premolars showed lingual displacement, with Angle class III malocclusion. There is a presence of oro-antral communication. [FIG 2.] The patient had a history of surgical correction for cleft lip and palate 12 years ago. Radiographically there is shown to be an absence of right sided maxillary canine with a huge discontinuity of the alveolar ridge. [FIG 3] She was diagnosed with a skeletal class III malocclusion due to maxillary hypoplasia causing a mid-face deficiency, with no overjet or overbite, deviated dental mid-line, based on the above, an orthodontic-surgical treatment was chosen. As she was interested in improving her dental and facial appearance, after fully explaining the risks and surgical plan and obtaining consent, we decided to proceed with the treatment. Considering the surgical phase, we as maxillofacial surgeons performed alveoloplasty with an iliac bone graft.



Fig 1



Fig 2

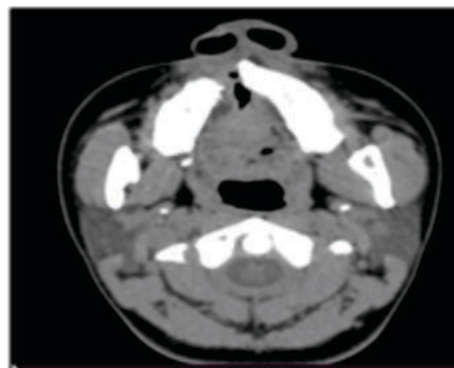


Fig 3

Intra oral approach was planned under general anaesthesia. With nasotracheal intubation, standard preparation was done. Incision was given to expose the cleft region. Full thickness mucoperiosteal flap was raised [FIG 4]. Posteriorly, the incision was extended to the second premolar of the cleft side, and anteriorly the incision was extended along the gingival border till the canine of the non-cleft side.



Fig 4

The cortico-cancellous graft was harvested from the anterior iliac crest region [FIG 5]. It was combined with one hundred percent pure β -TCP - Osteon II (Dentium Co. Ltd, Suwon, South Korea) with 70% porosity and 500–1000 particle size and placed at the intra oral donor site. 20 ml of fresh venous blood drawn during the procedure which was then put into PRF tubes. The centrifuge was set to 3,000 rpm for ten minutes after the tubes were swiftly inserted inside. Advance platelet-rich fibrin was created to be employed as a membrane covering the grafting region before 3/0 mersilk was used to stitch the wound. Postoperative healing was observed to be uneventful and satisfactory, with an adequate amount of bone formation [FIG 6].

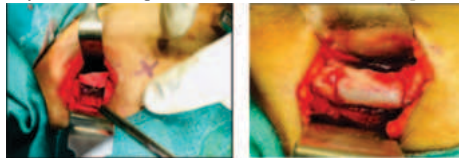


Fig 5



Fig 6

DISCUSSION

Secondary alveolar bone grafting (SABG) was first described by Boyne and Sands in 1972, and has since then been the standard surgical protocol for alveolar bone reconstruction. To date, the use of autologous bone remains the most widespread strategy despite the significant side effects of harvesting.² Among the many donor sites that have been reported in the literature, including the mandibular symphysis, calvarium, rib, and tibia, the iliac crest bone is considered the best option due to its capacity to supply large quantities of cancellous bone with endochondral potential.³ However, autologous grafts do have certain drawbacks, such as limited bone supply, the need for an additional donor site, the associated postoperative morbidity (pain, hematoma, and delayed ambulation), and an inherent susceptibility to resorption over time.⁴ Osteon II (Dentium Co. Ltd, Suwon, South Korea) is a particle-type graft material that has good osteoconductivity and biocompatibility qualities. It is made up of beta-tricalcium phosphate (TCP) and hydroxyapatite in a weight ratio of 30/70%, which is very similar to the natural mineral components of human bone.⁵

According to a recent systematic review, TCP is a biocompatible, more practical and visible ABG material that enhances the osteo-inductive and osteo-conductive qualities by inclusion of stem cells and growth factors.⁶ Additionally, PRP enriches the graft with additional factors, increasing the progenitor cell transition into osteoblasts and yielding favourable results.⁷ A study by Ho Nguyen et al. assessed the efficacy of PRF and β -TCP in unilateral alveolar bone graft. Clinically and on CBCT pictures, the use of β -TCP and PRF in alveolar bone transplant surgery is effective enough, with noticeably greater differences in the percentage of residual calcified material.⁸ Our case also mirror the consistent behavior of β -TCP and PFR mentioned herein. A systematic review and meta-analysis also reported an average of 63.38% residual calcified tissue at 1 year after alveolar bone grafting with cancellous iliac crest.⁹ The selected grafting method in this clinical instance emphasizes the benefits of autologous grafts and the effectiveness of a biomaterial that is anticipated to be encouraging and beneficial for clinical outcomes.

CONCLUSION

Using osteon II collagen bone substitutes with PRF has a highly regenerative impact, reducing the resorption of bone substitutes and conserving volume while increasing the density of bone substitutes. As our observation was limited to an individual case, there is space for future studies on a larger scale, with broader demographics and clinical trials, to determine the clinical significance of this treatment method.

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