

VIPCT- Vascularized Interpositional Periosteal Connective Tissue Flap

Dr. Silvia Rodrigues^{1*}, Dr. Dipika Mitra², Dr. Ligi Elsa John³, Dr. Rohit Shah,⁴ Dr. Harshad Vijayakar⁵, Dr Gaurav Shetty⁶, Dr. Saurabh Prithyani⁷

^{1*} Corresponding (Reader, Department of Periodontology, TPCT's Terna Dental College & hospital, India) silvia.rdrgrs@gmail.com - 7709315422

² (Professor, Department of Periodontology, TPCT's Terna Dental College & hospital, India) drdipikamitra@gmail.com - 9820180406

³(Post graduate student, Department of Periodontology, TPCT's Terna Dental College & hospital, India) lijij210@gmail.com -9920458858

⁴(Professor, Department of Periodontology, TPCT's Terna Dental College & hospital, India) rohishah17@gmail.com- 9699860609

⁵(Professor and head, Department of Periodontology, TPCT's Terna Dental College & hospital, India) drharshadvijayakar@gmail.com- 9820128432

⁶(Lecturer, Department of Periodontology, TPCT's Terna Dental College & hospital, India) gauravshettyv@gmail.com- 9867373605

⁷(Lecturer, Department of Periodontology, TPCT's Terna Dental College & hospital, India) saurabh.prithyani@gmail.com -7208020305

ABSTRACT

Nowadays esthetics plays an important role in dentistry along with function of the prosthesis. Various soft tissue augmentation procedures are available to correct the ridge defects in the anterior region. A new technique, vascularized interpositional periosteal connective tissue (VIPCT) flap, has been introduced, which has the potential to augment predictable amount of tissue and has many benefits when compared to other techniques.

INTRODUCTION

The prosthetic replacement of missing teeth should be in harmony with the adjacent soft tissues and natural dentition to fulfill the esthetic demands of the patients, especially in the anterior region. However, alveolar bone resorption due to tooth loss results in alveolar ridge defect and hampers this goal.^[1]



Fig1: Semilunar Incision

A relatively high incidence of alveolar ridge defects has been found, particularly after anterior tooth loss; majority of which are Class III defect.[2,3]



Fig 2: Full thickness flap reflection



Fig 3: Palatal reflection for harvesting exposing the defect CTG

Normally, the height and width of residual ridge should allow placement of pontic that appears to emerge from the ridge and mimics the appearance of the neighboring teeth. However, such residual ridge contours sometimes lead to unaesthetic open gingival surfaces (black triangle), food impaction, and percolation of saliva during speech.[4,5]



Fig 4: Placement of bone graft



Fig 5: Coverage of the defect

(beta tricalcium phosphate) in the defect

Deficient ridges are treated either through soft^[5-7] or hard tissue grafts^[8,9] or combination of both.^[10] Several techniques for tissue augmentation with onlay grafts, pedicle grafts or with allografts have been used since years.^[11]



Fig 6: The defect covered using the pedicled CTG



Fig 7: Sutures placed with relieving the frenum



Fig 8: Palatal sutures placed

The selection of a surgical treatment also depends on the type of prosthetic treatment. When a fixed partial denture (FPD) is planned, soft tissue augmentation may be sufficient to solve ridge defects.^[1] A novel pedicle autograft technique, vascularized interpositional periosteal connective tissue (VIP-CT) flap has been introduced for achieving large soft tissue augmentation in a single procedure. ^[12,13]



Fig 9: Case 1 – Before and After



Fig 10 : Case 2 - Before and After



Fig 11: Case 3- Before and after with temporary prosthesis

This technique has several advantages like excellent blood supply, less morbidity, primary closure of donor and recipient bed. Furthermore, it does not change the color of the area and is more acceptable to the patient because it involves a single surgical site.^[12,13] This case series will elaborate the technique and results of VIP-CT technique in augmenting the anterior ridge defects, before placing a final fixed partial denture.

MATERIALS AND METHODS

Three patients (2 males and 1 female) aged between 25-40 years with, Seibert's Class III alveolar ridge defects were selected. The patients were periodontally healthy. The reasons for tooth extraction were endodontic failure and carious lesions combined with root or crown fractures. None of these teeth were removed because of periodontal disease. All patients were systemically healthy. Fixed prosthetics was planned for all the patients.

This novel technique was approved by our institutional ethical committee. The participants signed an informed consent form before the commencement of the study. Clinical parameters recorded were the height and width of the ridge defects before and after the procedure. All clinical measurements were performed by the same examiner. Preoperative photographs were taken [Figure 1]. The procedure was accomplished in a similar manner to that described by

Sclar.^[12] An acrylic stent was fabricated for all the patients to assist in the standardization of all measurements. The stent was designed to cover occlusal surfaces of the teeth adjacent to the augmentation site. Each stent has the indelible position marker to easily identify the predetermined points on the edentulous ridge where the height and width measurements would be taken. Measurements were taken with the help of UNC-15 probe [Figure 2]. All measurements were taken at the time of surgery and 3 months after surgery. Crown preparation was done for the abutment teeth, so that temporary prosthesis can be given to the patients immediately after the augmentation procedure.

Surgical procedure

After anesthesia, a semilunar paracrestal incision was given on the buccal aspect of the recipient site [Figure 3]. A full thickness flap was reflected to expose the defect. This incision was continued parallel to the gingival margin of the teeth and 2 mm apical to the marginal gingiva up to the distal aspect of the second premolar. Vertical incisions were made connecting the horizontal incision and then the buccal flap was elevated by blunt dissection [Figure 4]. Donor site was prepared by extending the incision on the palatal aspect of the recipient bed. Vertical releasing incisions were made on the palate at the mesial and distal aspect. Subepithelial connective tissue layer was elevated beginning from second premolar area towards the anterior aspect by blunt dissection. Tension releasing cutback incisions was extended into the base of the pedicle flap for flap rotation [Figure 5]. Pedicled flap was rotated into the recipient site. An alloplastic bone graft (beta tricalcium phosphate) was placed under the pedicled graft [Figure 6]. It was then rigidly immobilized with sutures placed apically and laterally [Figure 7 and 8]. Donor and recipient sites were sutured primarily with Ethicon absorbable sutures using an interrupted suture technique and the labial frenum was relieved by a frenotomy procedure to ensure tension free healing [Figures 9 and 10]. Gentle pressure was applied with moistened gauze for 10 min. The area was temporized for 3 months. Final restoration was placed after 3 months [Figure 11]. The pre-operative and post-operative images of case 1, 2 and 3 are shown in figure 12, 13 and 14 respectively.

Postoperative instructions

The patients were given post-operative instructions and medications. Amoxicillin (500 mg 3 times a day for 5 days) and ibuprofen (3 times a day for 3 days) were prescribed. Continuous rinsing with 0.12% chlorhexidine solution twice daily for 2 weeks was prescribed. The patients were advised to refrain from retracting the lips and cheeks and to avoid brushing or flossing in the grafted area for 6 weeks.

The sutures remained in situ for 2 weeks. Before the provisional FPD was cemented, the pontic was shaped and allowed to meet the soft tissue only slightly. After 3 months, the patient was referred to Department of Prosthodontics for rehabilitation with fabrication of the final prosthesis. The postoperative follow-up was done after 3 months.

RESULTS

Immediately after the surgery, the patient was comfortable. Post-operative morbidity was negligible. At two weeks, the time showed considerable healing. At 3 months, the augmented connective tissue showed negligible shrinkage. The patients were satisfied with the final restoration

DISCUSSION

Anterior ridge defects are extremely common. Abrams et al.^[2] showed 91% prevalence of the anterior ridge deformity in the mandibular and maxillary arches of partially edentulous patients. Class III defects showed prevalence of about 55.8%, followed by Class I defect, which was 32.8% and Class II defects, which were 2.9%. As Class III defects are more prevalent, that was taken into consideration for this study.

It has been stated that up to three-tooth defects of moderate severity can be corrected successfully by this less complicated soft tissue augmentation procedure.^[4] Earlier techniques have the drawback of less gain in volume because of limited size of the graft that can be used. Large onlay grafts have chances of necrosis due to lack of sufficient blood supply.^[4,5,16] However in VIP-CT flap technique, the amount of tissue gain is more and the pedicled blood supply is derived from the connective tissue periosteal plexus within the flap that provides the

biological basis for predictable coverage.^[17]

Vascularized interpositional connective tissue grafts for ridge augmentation preserve the color match and characteristics of overlying mucosa resulting in a better esthetic blend in a potentially highly visible area. On the contrary, onlay grafts retain their palatal mucosal characteristics, which may compromise tissue esthetics.^[4,5,16]

In this technique, the pedicled connective tissue is covered with a mucoperiosteal flap resulting in maintaining natural color and texture thereby reducing the need for secondary procedures. The donor site is near the surgical field and has thus decreased morbidity. The surgical technique is simple, quick, and predictable.

Since the donor site remains primarily covered, the risk-to benefit ratio is better than with other harvesting techniques.^[18] The use of a palatal protective template can increase safety, and^[18] the potential risk of postoperative bleeding is minimized.^[19] The cost of the procedure is low, does not interfere with the possibility of implant therapy in the future and can be repeated to improve the result.

Overall, it is accepted that ridges that have been augmented with soft tissues undergo shrinkage over the first 6 weeks postoperative. In these cases, 3 months' post-surgery, the ridge dimensions remained stable. In this study, complete healing of the site occurred within a month. Although, long-term follow-up of the cases has not been done but many authors report stability. Thus, the use of VIP-CT flap seems to be a good substitute for currently available techniques of soft tissue ridge augmentation.

However, there are few limitations of the procedure. There is difficulty to correct additional mucogingival problems in the same surgical act, e.g. a shallow vestibule or a mucogingival line that is too near the crest of the alveolar ridge. No controlled studies have been performed to examine the long-term stability of localized ridge augmentation with soft tissues. Before cementing provisional FPD, the pontic should be properly shaped and allowed to be slightly in contact with the soft tissue, any defect in the ridge may lead to esthetic and functional problems.

The soft tissue ridge augmentation technique poses many difficulties one of which is a gain in

the volume of the defect that depends on the size of the graft. A larger defect cannot be treated with a full thickness onlay graft because these grafts can be harvested to a limit. A larger graft is more prone to necrosis and leads to more of an injury to the donor site.^[20] Therefore, the present study favors less injury to the donor site and a good amount of graft size that may help in proper ridge contours adapted to the shape of the pontic.

CONCLUSION

A significant gain in tissue volume can be achieved in the apico-coronal and buccolingual directions using VIP-CT technique. Based on the result of these cases, the technique would be effective in treating Class I, II, and III deformities of the alveolar crest that involve one or more missing teeth. However, further long term studies are necessary to confirm these findings in a larger set of populations.

REFERENCES

1. Prato GP, Cairo F, Tinti C, Cortellini P, Muzzi L, Mancini EA. Prevention of alveolar ridge deformities and reconstruction of lost anatomy: A review of surgical approaches. *Int J Periodontics Restorative Dent* 2004;24:434-45. ^[L]_[SEP]
2. Abrams H, Kopczyk RA, Kaplan AL. Incidence of anterior ridge deformities in partially edentulous patients. *J Prosthet Dent* 1987;57:191-4. ^[L]_[SEP]
3. Seibert JS. Reconstruction of deformed, partially edentulous ridges, using full thickness onlay grafts. Part I. Technique and wound healing. *Compend Contin Educ Dent* 1983;4:437-53. ^[L]_[SEP]
4. Studer S, Naef R, Schärer P. Adjustment of localized alveolar ridge defects by soft tissue transplantation to improve mucogingival esthetics: A proposal for clinical classification and an evaluation of procedures. *Quintessence Int* 1997;28:785-805. ^[L]_[SEP]
5. Seibert J, Lindhe J. Esthetics in periodontal therapy. In: Lindhe J, Karring T, Lang N, editors. *Clinical Periodontology and Implant Dentistry*. 3rd ed. Copenhagen: Munksgaard; 1997. p. 647-81. ^[L]_[SEP]

6. Scharf DR, Tarnow DP. Modified roll technique for localized alveolar ridge augmentation. *Int J Periodontics Restorative Dent* 1992;12:415-25. [L]
[SEP]
7. Abrams L. Augmentation of the deformed residual edentulous ridge for fixed prosthesis. *Compend Contin Educ Gen Dent* 1980;1:205-13. [L]
[SEP]
8. Proussaefs P, Lozada J, Kleinman A, Rohrer MD, McMillan PJ. The use of titanium mesh in conjunction with autogenous bone graft and inorganic bovine bone mineral (bio-oss) for localized alveolar ridge augmentation: A human study. *Int J Periodontics Restorative Dent* 2003;23:185-95. [L]
[SEP]
9. Proussaefs P, Lozada J. The use of intraorally harvested autogenous block grafts for vertical alveolar ridge augmentation: a human study. *Int J Periodontics Restorative Dent* 2005;25:351-63. [L]
[SEP]
10. Stimmelmayer M, Allen EP, Reichert TE, Iglhaut G. Use of a combination epithelized-subepithelial connective tissue graft for closure and soft tissue augmentation of an extraction site following ridge preservation or implant placement: Description of a technique. *Int J Periodontics Restorative Dent* 2010;30:375-81. [L]
[SEP]
11. Harris RJ. Soft tissue ridge augmentation with an acellular dermal matrix. *Int J Periodontics Restorative Dent* 2003;23:87-92. [L]
[SEP]
12. Sclar A. Vascularized interpositional periosteal-connective tissue (VIP-CT) ap. In: Sclar A, editor. *Soft Tissue and Esthetic Considerations in Implant Dentistry*. Chicago: Quintessence Publishing; 2003. p. 163-87. [L]
[SEP]
13. Kim CS, Jang YJ, Choi SH, Cho KS. Long-term results from soft and hard tissue augmentation by a modified vascularized interpositional periosteal-connective tissue technique in the maxillary anterior region. *J Oral Maxillofac Surg* 2012;70:484-91.
14. Silness J, Loe H. Periodontal disease in pregnancy. II. Correlation between oral hygiene and periodontal condition. *Acta Odontol Scand* 1964;22:121-35. [L]
[SEP]
15. Mühlemann HR, Son S. Gingival sulcus bleeding – A leading [L]
[SEP] symptom in initial gingivitis. *Helv Odontol Acta* 1971;15:107-13.

16. Seibert JS, Salama H. Alveolar ridge preservation and reconstruction. *Periodontol* 2000 1996;11:69-84.
17. Rahpeyma A, Khajeh Ahmadi S, Reza Hosseini V, Azimi H. A bilateral pediculated palatal periosteal connective tissue flap for coverage of large bone grafts in the anterior maxillary region. *Iran J Otorhinolaryngol* 2012;24:143-6.
18. Feichtinger M, Mossböck R, Kärcher H. Evaluation of bone volume following bone grafting in patients with unilateral clefts of lip, alveolus and palate using a CT-guided three-dimensional navigation system. *J Craniomaxillofac Surg* 2006;34:144-9.
19. Adriaenssens P, Hermans M, Ingber A, Prestipino V, Daelemans P, Malevez C. Palatal sliding strip flap: Soft tissue management to restore maxillary anterior esthetics at stage 2 surgery: A clinical report. *Int J Oral Maxillofac Implants* 1999;14:30-6.
20. Gasparini DO. Double-fold connective tissue pedicle graft: a novel approach for ridge augmentation. *Int J Periodontics Restorative Dent* 2004;24:280-7.