

# Free Gingival Grafting to Increase the Zone of Keratinized Tissue around Implants

<sup>1</sup>Harpreet S Grover, <sup>2</sup>Anil Yadav, <sup>3</sup>Priya Yadav, <sup>4</sup>Prashant Nanda

<sup>1</sup>Professor and Head, Department of Periodontics and Oral Implantology, SGT Dental College Hospital and Research Institute, Gurgaon, Haryana, India

<sup>2</sup>Assistant Professor, Department of Periodontics and Oral Implantology, SGT Dental College Hospital and Research Institute, Gurgaon, Haryana, India

<sup>3</sup>Professor, Department of Periodontics and Oral Implantology, SGT Dental College Hospital and Research Institute, Gurgaon, Haryana, India

<sup>4</sup>Resident, Department of Periodontics and Oral Implantology, SGT Dental College Hospital and Research Institute, Gurgaon, Haryana, India

**Correspondence:** Prashant Nanda, Resident, Department of Periodontics and Oral Implantology, B-53, Defence Colony, New Delhi-110024, India, e-mail: drprashantnanda@gmail.com

## ABSTRACT

**Purpose:** The importance of an adequate width of attached gingiva around periodontally affected teeth has been well-documented. However, there is no consensus regarding the relationship between the width of keratinized tissue and the health of peri-implant tissues. Clinicians in general prefer to provide enough keratinized mucosa around dental implants for long-term implant maintenance. There are various methods of increasing the width of keratinized tissue around implants at various stages of treatment. This article aims at presenting a case report where free gingival grafting was done prior to implant placement to predictably increase the width of keratinized tissue and thus enhance the long-term success of the implants.

**Methods:** Free gingival grafting was done in the edentulous region prior to implant placement to increase the width of keratinized tissue at the future implant sites. Two implants were then placed to replace the missing teeth.

**Results:** Free gingival grafting resulted in an increase in the keratinized tissue at the implant sites and also favorably increased the vestibule depth. Clinically healthy keratinized tissue was achieved and maintained around both implants. The patient was able to adequately maintain oral hygiene, with no discomfort.

**Conclusion:** The free gingival graft can be used to increase the width of keratinized tissue and increase the depth of the vestibule around implants, thus favoring their long-term prognosis.

**Keywords:** Free gingival grafting, Dental implants, Keratinized tissue.

## INTRODUCTION

The significance of keratinized tissue in implant maintenance has been a controversial issue, and there is a lack of consensus in the literature regarding the relationship between the width of the keratinized mucosa and the health of peri-implant tissues. Several authors have claimed that there is no correlation between implant success rate and the presence of keratinized tissue in the peri-implant soft tissue.<sup>1-3</sup> On the other hand, there are studies which suggest that the presence of an adequate band of keratinized tissue adjacent to the implant reduces inflammation,<sup>4</sup> hyperplasia<sup>5</sup> and recession of the marginal peri-implant soft tissues.<sup>6</sup>

Despite of the conflicting views that exist on the subject, it is believed that the presence or reconstruction of keratinized tissue around implants may help facilitate restorative procedures, improve esthetics and enable the patient to maintain adequate oral hygiene without irritation or discomfort.<sup>7-9</sup> The lack of keratinized tissue can be more apparent and pose certain difficulties, especially in patients

where significant ridge resorption has taken place.<sup>10</sup> Therefore, clinicians usually seek methods to maintain or increase the width of keratinized tissue around implants, whenever possible.

Various methods have been proposed for obtaining adequate amounts of keratinized tissue, depending on the technique and patients need. These can either be performed before implant placement, at the time of implant placement or at the time of second stage implant surgery. Apically positioned flaps, laterally positioned flaps, free gingival grafts or connective tissue grafts are some of the more commonly used methods for increasing the zone of keratinized tissue around implants.<sup>11,12</sup> In shallow vestibules with minimal keratinized tissue, the use of a free gingival graft can help increase both the width of keratinized tissue and the depth of the vestibule.<sup>13</sup>

Presented here is a case report, where the free gingival graft technique was used to increase the width of keratinized tissue prior to implant placement.

## CASE REPORT

A 44-year-old, systemically healthy, female patient was referred to the Department of Periodontics and Oral Implantology with a chief complaint of wanting replacement of missing teeth due to unesthetic appearance in the lower front region of the mouth since 8 years.

History of the present illness revealed that the teeth had become mobile due to periodontal disease and had to be extracted. On examination, the mandibular central and lateral incisors were found to be missing on either side. There was severe bone resorption, shallow vestibule and a lack of keratinized tissue in the region (Figs 1 and 2).

Treatment was planned keeping in mind the width of keratinized tissue at the future implant site. The plan involved the use of a free gingival graft to increase the width of keratinized tissue and the depth of the vestibule to be followed by placement of dental implants at a later date.

Phase I therapy included scaling and root planing of the remaining teeth along with restorations in the carious teeth with well-defined prognosis. Phase I therapy was followed by the surgical phase which was divided into two stages. In the first stage the mandibular anterior region with respect to missing teeth 32, 31, 41, 42 and the palatal mucosa on

the left side were anesthetized using 2% lignocaine (Xylocaine 2%, AstraZeneca). A partial thickness flap was raised and recipient bed prepared in the region of the missing mandibular teeth (Fig. 3). A free gingival graft was then obtained from the palate. The graft was trimmed and excess tissue removed to achieve the appropriate thickness. It was then stabilized over the recipient bed using 4-0 silk sutures (Mersilk, Ethicon) (Fig. 4). A prefabricated stent was placed on the palate to aid in uneventful healing by secondary intention. Postoperatively, the patient was prescribed a combination of Paracetamol and Ibuprofen (Flexon) three times a day for three days, along with a combination of Ofloxacin and Ornidazole (Oflox-OZ) twice a day for three days, she was also put on 0.12% chlorohexidine (Periogard) mouth rinse twice a day. The sutures were removed 14 days postoperatively.

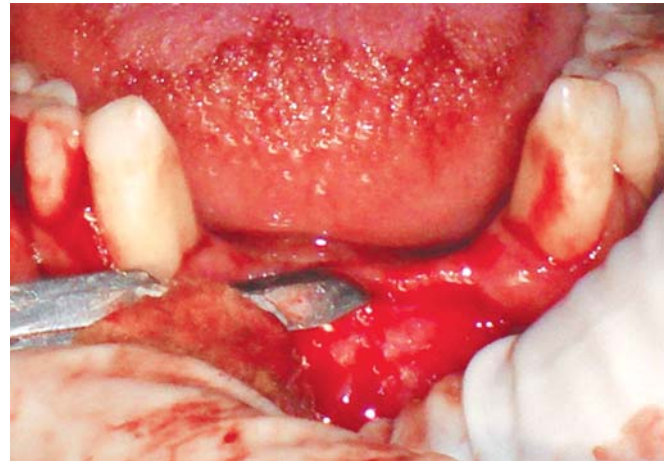
A sufficient amount of stable keratinized tissue and adequate vestibule depth was achieved at the edentulous site after two months (Fig. 5). Implant surgery was then performed by routine procedures. After sequential osteotomies, two one-piece implants (Alpha Bio) were placed in relation to the missing mandibular lateral incisors (Fig. 6). A temporary



**Fig. 1:** Absence of adequate keratinized tissue, decreased vestibular depth and severely resorbed ridge in relation to missing mandibular anterior teeth (frontal view)



**Fig. 2:** Absence of adequate keratinized tissue, decreased vestibular depth and severely resorbed ridge in relation to missing mandibular anterior teeth (occlusal view)



**Fig. 3:** Partial thickness flap elevation and preparation of periosteal recipient bed



**Fig. 4:** Free gingival graft sutured in place



Fig. 5: Two-month postoperative healing of the free gingival graft



Fig. 7: Stable peri-implant soft tissue, three months after implant placement



Fig. 6: One week after implant placement



Fig. 8: Postoperative smiling view

prosthesis was fabricated and fixed over the implant fixtures to replace the missing teeth (Figs 7 and 8).

## DISCUSSION

Lang and Loe<sup>14</sup> determined how much keratinized gingiva is required to maintain gingival health and reported that inflammation persists in areas with less than 2.0 mm of keratinized gingiva, regardless of the patient's oral health. In contrast, however, it was noted that the width cannot be the only factor deciding the adequacy of the attached gingiva.<sup>15</sup> Other factors, such as the patient's age, oral hygiene capability, esthetic considerations and patient's expectations should be considered too.<sup>16</sup>

Despite reports that a lack of keratinized tissue may not influence the long-term survival rate of implants,<sup>17,18</sup> the presence and reconstruction of keratinized tissue around implants seem to reduce the discomfort and irritation of patients during oral hygiene.

A recent retrospective study of 339 implants in 69 patients over 3 years reported that the absence of adequate keratinized tissue in endosseous dental implants was

associated with higher plaque accumulation and gingival inflammation regardless of the implant surface configuration.<sup>19</sup> Another study that randomly collected data on 200 implants and compared the mean gingival index score, plaque index and radiographic alveolar bone loss in these cases, found that all these indices were significantly higher for those implants with a narrow zone of keratinized tissue compared with those implants placed within a keratinized tissue of more than 2 mm.<sup>20</sup> Thus, clinicians consider it essential to provide enough keratinized tissue to aid in the long-term maintenance of implants, especially in patients who are not able to maintain adequate oral hygiene.<sup>9</sup>

Clinicians usually choose an appropriate technique to maximize the width of keratinized tissue from the various available methods, such as an apically positioned flap, laterally positioned flap, free gingival grafting or connective tissue graft.<sup>21</sup>

In our case, the patient displayed severe bone resorption, shallow vestibule and a lack of keratinized tissue in the edentulous region. The decision to do free gingival grafting to increase the width of attached gingiva was based on its

ability to also predictably increase the depth of the vestibule. Prior to implant placement we were able to achieve a sufficient amount of keratinized tissue at the edentulous site.

Narrow diameter one-piece implants were then placed owing to the amount of bone available. Nonfunctionally loaded temporary prosthesis was placed three weeks after implant placement and was followed up for a period of three months showing stable peri-implant soft tissue. Unfortunately, the patient moved to a different state and was unable to report for her final prosthetic restorations. Also due to the mesiodistal expanse of the edentulous site and the patients desire to not have any interdental spacing, a five unit bridge was planned using the two implants as abutments.

## REFERENCES

1. Adell R, Lekholm U, Rockler B, Branemark PI, Lindhe J, Eriksson B, et al. Marginal tissue reactions at osseointegrated titanium fixtures (I): A 3-year longitudinal prospective study. *Int J Oral Maxillofac Surg* 1986;15:39-52.
2. Lekholm U, Adell R, Lindhe J, Branemark PI, Eriksson B, Rockler B, et al. Marginal tissue reactions at osseointegrated titanium fixtures (II): A cross-sectional retrospective study. *Int J Oral Maxillofac Surg* 1986;15:53-61.
3. Schou S, Holmstrup P, Hjorting-Hansen E, Lang NP. Plaque-induced marginal tissue reactions of osseointegrated oral implants: A review of the literature. *Clin Oral Implants Res* 1992;3:149-61.
4. Warrar K, Buser D, Lang NP, Karring T. Plaque-induced peri-implantitis in the presence or absence of keratinized mucosa: An experimental study in monkeys. *Clin Oral Implants Res* 1995;6:131-38.
5. Zarb GA, Schmitt A. The longitudinal clinical effectiveness of osseointegrated dental implants: The Toronto study. Problems and complications encountered (Part III). *J Prosthet Dent* 1990;64:185-94.
6. Adell R, Lekholm U, Rockler B, Branemark PI. A 15-year study of osseointegrated implants in the treatment of the edentulous jaw. *Int J Oral Surg* 1981;10:387-416.
7. Block MS, Kent JN. Factors associated with soft- and hard-tissue compromise of endosseous implants. *J Oral Maxillofac Surg* 1990;48:1153-60.
8. Buser D, Weber HP, Lang NP. Tissue integration of non-submerged implants: 1-year results of a prospective study with 100 ITI hollow-cylinder and hollow-screw implants. *Clin Oral Implants Res* 1990;1:33-40.
9. Albrektsson T, Zarb G, Worthington P, Eriksson AR. The long-term efficacy of currently used dental implants: A review and proposed criteria of success. *Int J Oral Maxillofac Implants* 1986;1:11-25.
10. Mericske-Stern R, Steinlin Schaffner T, Marti P, Geering AH. Peri-implant mucosal aspects of ITI implants supporting overdentures: A five-year longitudinal study. *Clin Oral Implants Res* 1994;5(1):9-18.
11. Langer B, Sullivan DY. Osseointegration: Its impact on the interrelationship of periodontics and restorative dentistry (Part I). *Int J Periodontics Restorative Dent* 1989;9:84-105.
12. Langer B, Langer L. Overlapped flap: A surgical modification for implant fixture installation. *Int J Periodontics Restorative Dent* 1990;10:208-15.
13. Landi L, Sabatucci D. Plastic surgery at the time of membrane removal around mandibular endosseous implants: A modified technique for implant uncovering. *Int J Periodontics Restorative Dent* 2001;21:280-87.
14. Lang NP, Loe H. The relationship between the width of keratinized gingiva and gingival health. *J Periodontol* 1972;43:623-27.
15. de Trey E, Bernimoulin JP. Influence of free gingival grafts on the health of the marginal gingiva. *J Clin Periodontol* 1980;7:381-93.
16. Hall WB. Present status of soft tissue grafting. *J Periodontol* 1977;48:587-97.
17. Wennstrom JL, Bengazi F, Lekholm U. The influence of the masticatory mucosa on the peri-implant soft tissue condition. *Clin Oral Implants Res* 1994;5:1-8.
18. Bengazi F, Wennstrom JL, Lekholm U. Recession of the soft tissue margin at oral implants: A 2-year longitudinal prospective study. *Clin Oral Implants Res* 1996;7:303-10.
19. Chung DM, Oh TJ, Shotwell JL, Misch CE, Wang HL. Significance of keratinized mucosa in maintenance of dental implants with different surfaces. *J Periodontol* Aug 2006;77(8):1410-20.
20. Bouri A Jr, Bissada N, Al-Zahrani MS, Faddoul F, Nouneh I. Width of keratinized gingiva and the health status of the supporting tissues around dental implants. *Int J Oral Maxillofac Implants* Mar-Apr 2008;23(2):323-26.
21. Park JC, Yang KB, Choi Y, Kim YT, Jung UW, Kim CS, Cho KS, Chai JK, Kim CK, Choi SH. A simple approach to preserve keratinized mucosa around implants using a pre-fabricated implant-retained stent: A report of two cases. *J Periodontal Implant Sci* August 2010;40(4):194-200.