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Short Communication

The perspectives of a novel operative procedure for free gingival graft

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Abstract Graft shrinkage, epithelial disintegration, and even necrosis are the well-known clinical complications during initial healing stage of free gingival graft (FGG) procedure. This article presented a novel operative prodecure for FGG in a dental implant with insufficient keratinized tissue over a 3-year follow-up period. Briefly, donor site for FGG harvested from maxillary tuberosity would minimize the volume of graft shrinkage. The new periosteum suture technique could secure FGG firmly adapted on the recipient site. With 1 mm gap between FGG and muco-gingival junction may improve plasmatic circulation and revascularization. The clinical findings of case report demonstrated that this novel operative procedure may provide a viable therapeutic alternative for FGG.

Introduction

Free gingival graft (FGG) is the classical clinical operation for augmenting peri-implant soft tissue defects and increasing keratinized tissue (KT) width.[1] At least 2 mm of KT around the implant is required to maintain peri-implant tissue health.[2,3] Many complications were reported during FGG operative procedure, including bleeding, graft necrosis, long operation time, post-operative pain, and patient's morbidity.[4,5]

Graft shrinkage is a well-known clinical phenomenon that could interfere with the progress of treatment.[4,6] In this article, the authors have established a novel operative procedure for FGG to improve the disadvantages of current mucogingival surgery. This novel FGG procedure can be concluded with 3 main components. (1) The donor graft was harvested from maxilliary tuberosity. (2) A new periosteum

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suture was designed by the first author Dr. Liao to stabilizes the graft firmly into the recipient bed by penetrating and passing through the periosteum (Fig. 1A). (3) A distance of 1 mm gap between FGG and muco-gingival junction (MGJ) was created to avoid graft overlapping resulted in dead space formation (Fig. 1B). In addition, this might enhance FGG with plasmatic circulation and revascularization.

In this article, a case report was also demonstrated with three year follow-up period. The results showed that this novel operative procedure for FGG could effectively reduce graft shrinkage and gain KT thickness.

Materials and methods

A 34-year-old woman with insufficient KT overlying tooth #36 was recruited in a dental clinic for implant placement. This patient claimed that she had no smoking habit and any systemic diseases. Implant placement of tooth #36 with simultaneous FGG was planned with patient's informed consent. This novel operative procedure for FGG was approved by the Institutional Review Board, Chung Shan Medical University Hospital, Taichung, Taiwan (CSMUH No: CS2-22117).

The patient was rinsed for 1 min with a 0.2% chlorhexidine solution immediately before surgery. Local anesthesia (Ubistesin™ Forte, 4% articaine with 1:100,000 adrenaline, 3M/ESPE, Seefeld, Germany) was administered at the donor and recipient sites. After an implant (5 × 10 mm) placement in tooth #36, apical positioned flap was elevated to deepen the buccal vestibular depth and dissipate the frenulum pulled. The recipient bed was exposed with the periosteum for FGG. A split flap was reflected and excised the superficial releasing flap. FGG was harvested from the left tuberosity by gingivectomy. Then, graft was placement 1 mm away from MGJ. The series of new periosteum sutures for the fixation of FGG were illustrated in Fig. 1B. It is crucial to avoiding mechanical or thermal stimulation in the surgical areas for two weeks. There was no surgical dressing applied at the recipient site to prevent the interference of wound healing.

Results

A series clinical documents of this case report were illustrated in Fig. 2. The pre-operative view of tooth #36 was shown in Fig. 2A. The images 2B, 2C, 2D were doucmented as immediately postoperative, day 1, and day 2, respectively. The wound healing was uneventful during the initial phase of healing. The second healing intention was found over the gap areas. The sitiches were removed after 2 weeks (Fig. 2E). The FGG follow-up images were doucmented in 10 weeks, 4 months, 1 year, and 3 years, respectively (Figure F-I). Creeping attachment was also noted in the buccal aspect of implant #36. Taken together, the three year follow-up revealed that this novel novel operative procedure for FGG could prove more effective in reducing graft shrinkage as well as gaining KT.

Discussion

FGG is used as an effective method to increase the width of KT around peri-implant tissue to faciliate soft tissue health.[2,3] In this case report, the new operative procedure for FGG was uneventful during wound healing period. FGG was well adapted to surrounding tissues with the increased volume of KT after three year follow-up period. The critical factors for this novel operative procedure for FGG may be due to the following reasons.

First, the donor graft was obtained from maxilliary tuberosity. A previous study has reported that gingival thickness of the healed tuberosity donor graft was greater than of the palatal donor grafts.[7] In addition, the less postoperative pain was also noted.[7] Therfore, the donor site form maxilliary tuberosity is the key element for this technique. Taken together, FGG harvested from tuberosity site might provide a better option and less postoperative pain.

Second, the new periosteum suture procedure by the placement of stitch under periosteum could directly secure FGG over the recipient bed (Fig. 1A). During healing and revascularization of FGG, cellular nutrition was reported to

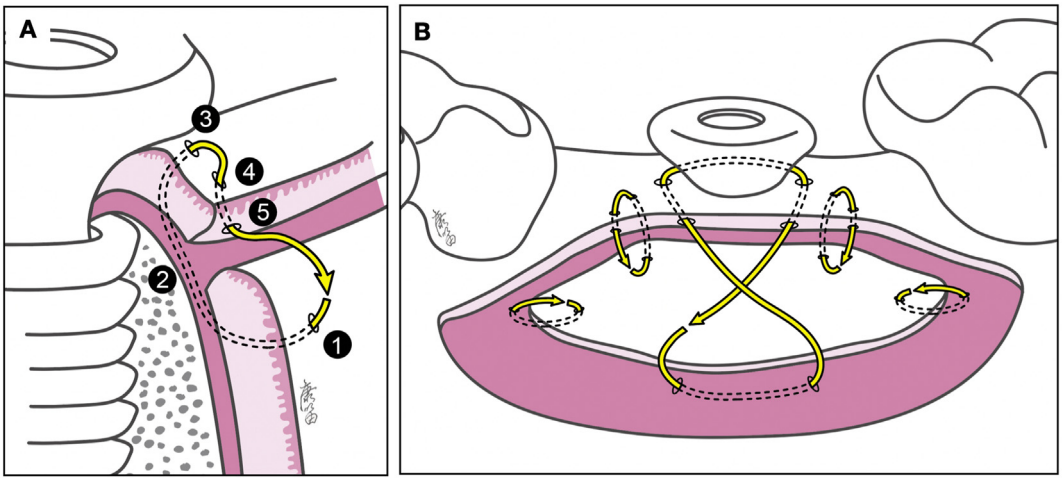

Figure 1 (A) The new periosteum suture to secure free gingival graft, periosteum, and gingival tissue is illustrated from the steps 1 to 5. (B) The schematic illustration of this novel operative procedure for free gingival graft.

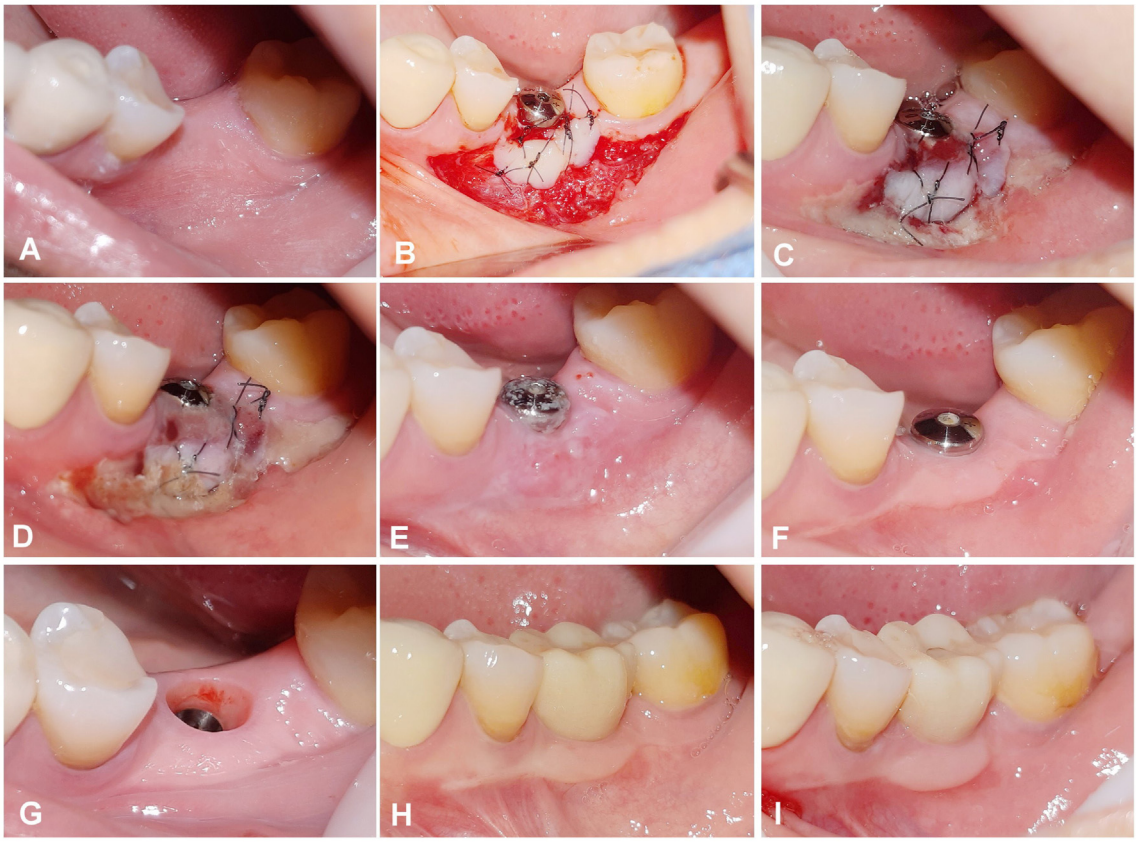

Figure 2 Clinical images of this case report: (A) Preoperative clinical photograph of tooth #36. (B) Immediately postoperative image of this novel operative procedure for free gingival graft. Postoperative clinical photographs in day 1 (C), day 2 (D), day 14 for stitches removal (E), 10 weeks (F), 4 months (G), 1 year (H), and 3 years (I), respectively.

maintain for the first few days by a "plasmatic" circulation.[8] This new periosteum suture technique may enhance blood circulation and improve stability between FGG and periosteum. Taken together, periosteum suture is curical to ensure FGG for early angiogenesis during the initial healing phase.

Third, FGG was placed with a distance of 1 mm gap between graft and MGJ. Oliver et al.[8] reported that revascularization of FGG occurred initially by anastomoses between vessels of the graft bed and pre-existing vessels in the graft. This new way of FGG placement might be helpful to improve plasmatic circulation and revascularization from surrounding periosteum. In addition, the second healing intention would benefit for less epithelial disintegration and desquamation during the initial healing stage. This would also avoid the graft overlapping beyond MGJ as compared with traditional FGG operative procedure.

However, some limitations of this FGG procedure should be addressed. First, the anatomic consideration of maxilliary tuberosity may limit the amount of donor graft harvested. Second, the new periosteum suture is difficult, almost impossible to perform in the thin biotype gingival tissues. Third, the histologic evaluation is warranted to support the aforementioned perspectives.

In conclusion, this case report showed that the novel operative procedure for FGG could prove to be more effective therapeutic outcomes during three-year follow-up period. However, relatively large-sized, multicentered, and comparative studies are required in the near future.

Declaration of competing interest

The authors declare no conflicts of interest relevant to this article.

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