Connective Tissue Graft (CTG): A Saviour to Regain Smile Following Complication of Modified Whale’s Tail Technique

Sachin S. Deshmukh 1, Sandeep G. Patel 1, Motilal R Jangid 1, Ujjwala Makne Shelke 1, Bhagyashree More 1, Sandhya Rathod Chavan 1, Abhishek Singh Nayyar 1

1 Department of Periodontology and Oral Implantology, Saraswati-Dhanwantari Dental College and Hospital and Post-Graduate Research Institute, Parbhani, Maharashtra, India
2 Department of Oral Medicine and Radiology, Saraswati-Dhanwantari Dental College and Hospital and Post-Graduate Research Institute, Parbhani, Maharashtra, India

Corresponding author e-mail: singhabhishheknds@gmail.com

International Journal of Clinical Case Reports 2017, Vol.7, No.2 doi: 10.5376/ijccr.2017.07.0002

Revised: 21 Mar., 2017
Accepted: 24 Apr., 2017
Published: 05 May, 2017

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Preferred citation for this article:
Deshmukh S.S., Patel S.G., Jangid M.R., Shelke U.M., More B., Chavan S.R., and Nayyar A.S., 2017, Connective Tissue Graft (CTG): A saviour to regain smile following complication of modified Whale’s tail technique, International Journal of Clinical Case Reports, 7(2): 4-8 (doi: 10.5376/ijccr.2017.07.0002)

Abstract The etiology of gingival recession is multi-factorial while the treatment of gingival recession is based on the assessment of etiological factors and the amount of tissue involved. Modified Whale’s tail technique can be used to access the intra-bony defect following the placement of the required graft to achieve closure of the defect. The purpose of this case report is to describe the complication following modified Whale’s tail technique to achieve primary closure and thereby, leading to gingival recession in relation to right central incisor and its management with connective tissue graft (CTG) by creating a pouch in the interdental region of maxillary central incisors.

Keywords Connective Tissue Graft (CTG); Gingival recession; Modified Whale’s Tail Technique

Background

The purpose of this case report is to describe the complication following modified Whale’s tail technique to achieve primary closure and thereby, leading to gingival recession in relation to right central incisor and its management with connective tissue graft (CTG) by creating a pouch in the interdental region of maxillary central incisors. This case study includes the newer treatment modality used to access the vertical bony defect in the interdental region of maxillary central incisors. Modified Whale’s tail technique was used to access the intra-bony defect following which DFDBA graft was placed. This technique failed to show proper healing leading to recession along the incision margin of right central incisor. Connective tissue graft was placed by creating a pouch beyond the mucogingival junction for root coverage. Recently, a new surgical technique the “Whale’s tail” technique was described to regenerate wide intra-bony defects in the anterior region where esthetic is the prime concern (Bianchi and Bassetti, 2009). The incisions were placed in such a manner that a large buccal flap was elevated with its base attached to the palatal side for access to intra-bony defect in interdental area. Such type of flap was created to perform guided tissue regeneration (GTR) while preserving the interdental tissues over the graft material.

1 Gingival Recession

Gingival recession is defined as the exposure of root surface resulting from the migration of the gingival margin apical to the cementoenamel junction (CEJ). It can be seen in association with one or, more teeth and may be localized or, generalized (Kassab and Cohen, 2003).

The etiology of gingival recession is:

- Plaque- induce inflammation;
- Calculus and iatrogenic restorations;
- Improper oral hygiene practice causing trauma;
Gingival recession is, also, commonly seen as an outcome of various periodontal therapies delivered to treat periodontal disease. The treatment of gingival recession is based on the assessment of etiological factors and the amount of tissue involved. The removal of etiological factors should be the preliminary part of management of patient with gingival recession. Re-examination of gingival status has to be done before proceeding with surgical root coverage procedure. Surgical root coverage procedure is indicated in the anterior region where esthetics is the prime concern. Gingival recession can be of two types; generalized, usually seen in patients with poor oral hygiene and localized, related to traumatic factors involving only few teeth and/or, a group of teeth. Generalized recession may be seen involving interproximal areas where as the localized type is usually seen involving buccal areas (Miller, 1987; Maynard, 2004). Miller proposed a classification for recession defects based on the position of gingival margin to the mucogingival junction and the height of interdental papilla and interdental bone adjacent to the site of defect. (Table 1) (Miller, 1985) Depending upon this classification the treatment planning can be decided (Maynard, 2004).

Table 1 Miller’s classification of gingival recession defects (1985)

| Class | Description |
|-------|-------------|
| Class I | Recession within attached gingiva. No loss of interdental bone and soft tissue papillae covering interdental bone at full height. |
| Class II | Recession extending to and/or, beyond the mucogingival junction. No loss of interdental bone and soft tissue papillae covering interdental bone at full height. |
| Class III | Recession extending to and/or, beyond the mucogingival junction. Loss of interdental bone but interdental bone height coronal to apical extent of recession defect. Reduction in height of the soft tissue papillae covering interdental bone. |
| Class IV | Recession extending to and/or, beyond the mucogingival junction. Loss of interdental bone apically to the recession defect. Gross flattening of interdental papillae. |

2 Case Reports

A 28 years old male patient reported to the Department with the complaint of spacing between his upper front teeth which was increasing since last 5-6 months. While performing intraoral examination, a midline diastema of about 5 mm was noticed and 11 mm periodontal pocket was seen in relation to the mesiobuccal aspect of the maxillary right central incisor (Figure 1). There were no signs of trauma from occlusion but the tooth was Grade I mobile. The overall oral hygiene of the patient was good without any periodontal destruction of other teeth. The radiographic examination with intra-oral periapical radiograph (IOPAR) revealed vertical bone loss in relation to the mesial aspect of maxillary right central incisor (Figure 2). After a detailed history and clinical examination, the case was diagnosed as chronic localized periodontitis. After phase I therapy of scaling and root planning, surgical management was planned. After anesthetizing the region adequately, two semilunar incisions were placed in continuation on both the central incisors (Figure 3). The incisions were continued as crevicular incisions from buccal to the palatal aspect of the central incisors and the flap along with the interdental papilla was reflected towards the palatal surface with its base attached to the palatal mucosa (Figure 4). The exposed root surface was thoroughly planed and the intra-osseous defect was curetted. After complete debridement of the root surface, the defect was filled with a DFDBA graft material and covered by resorbable GTR membrane (Figure 5). The flap was sutured with 3-0 silk suture material (Figure 6) and covered with a periodontal dressing. Post-operative instructions were given along with suitable medications. Sutures were removed after 1 week of surgery. At 2 month post-operative review, it was observed that the area showed gingival recession of about 5mm along the right central incisor extending up to mucogingival junction (Figure 7). On the selected day after establishing adequate anesthesia, the gingival margin in relation to the left central incisor was de-epithelialized. Later, a pouch was created in the region with defect up to the mucogingival junction for the placement of connective tissue graft (CTG). The exposed root surface was smoothened to remove any irregularities and necrotic cementum while root
surface conditioning was not done. Right palatal vault was selected as the donor site. After establishing adequate anesthesia, 2 horizontal incisions were placed at about 3 mm and 5 mm from the margin of the gingiva with the first incision placed at 5 mm from the margin of the gingiva extending from first molar to the first premolar region undermining a thin partial thickness flap in such a way that sufficient thickness of connective tissue graft (1.5-2mm) could be obtained. The mesiodistal dimension of incisions was from first molar to the first premolar region and the depth was such that sufficient thickness of palatal flap was maintained. The second incision was carried-out parallel to the previous incision but at a distance of 3 mm from the margin of the gingiva keeping the blade very close to the periosteum. It was extended apically up to the same depth as first incision (Figure 8). Following this, two vertical releasing incisions were placed at the mesial and distal extensions of the horizontal incisions to harvest the graft tissue. The graft was stored in moistened gauze (Figure 9). The donor site was sutured with 3-0 silk suture material to control bleeding and to achieve healing by primary intention. The patient was recalled at weekly intervals for follow-up and the healing was found to be uneventful. Suture removal was done after two weeks. Root coverage of 4mm was achieved at the end of 3 months which improved the esthetics of the patient (Figure 10). Patient was pleased with the outcome of re-treatment done to manage the complications of the initial therapy.
3 Discussion

In the modified Whale’s tail technique proposed originally by Biyanchi AE and Bassetti A, two incisions were made on the buccal surface from mucogingival junction to the distal line angle of the tooth adjacent to the defect in such a way that the mucoperiosteal flap could be elevated. These vertical incisions were joined by a horizontal incision and were continued as crevicular incisions from the buccal to the palatal aspects of the defect-associated tooth (Bianchi and Bassetti, 2009). In the present case, two semilunar incisions were made below the mucogingival line on the buccal surface instead of the distinct horizontal and vertical incisions. The use of incision closer to the osseous defect might have resulted in flap dehiscence and thereby, placement of sutures closer to the defect might had increased the chance of bacterial colonization of the healing osseous defect. To overcome the negative results, root coverage procedure was performed. Various methods have been proposed to achieve surgical root coverage including pedicle gingival grafts, lateral pedicle flaps, free gingival grafts and connective tissue grafts. All these methods are used based on their advantages and disadvantages as well as the surgeon’s preference. Previously, free gingival grafts were used only to achieve increase in the width of keratinized gingiva and not to cover the exposed root surface. The explanation to this might be due to less coverage gained limited to around 3 mm width and 3 mm depth. Also, the blood supply to graft was insufficient for its survival. Hence this method was not recommended for root coverage of wide and deep gingival recessions. However, a series of different procedural methods were proposed by Miller, Holbrook and Ochsenbein to achieve successful root coverage using free gingival grafts (Holbrook and Ochsenbein, 1983). The use of sub-epithelial connective tissue grafts for root coverage was introduced by Langer and Langer (Langer and Langer, 1985). Satisfactory results were achieved with this technique to cover wide and deep gingival recession and also, multiple teeth with recession. On an average, 80% of root coverage was achieved by the connective tissue grafting
procedures performed by Raetzke (Raetzke, 1985). Nelson performed root coverage of areas with extreme gingival recession using sub-epithelial connective tissue grafts where he found an average 88% of root coverage (Nelson, 1987). The comparative analysis of root coverage achieved by Jahnke et al compared the use of gingival grafts and connective tissue grafts in the same patient and found that the amount of coverage and rate of complete coverage to be better with the use of connective tissue grafts (Jahnke et al., 1993). Hence, due to high success rate of connective tissue grafts, it is usually preferred over other procedures for root coverage. Also, the donor site is covered by a partial thickness flap leading to comparatively less post-operative pain and associated co-morbidities. Also, the placement of connective tissue graft within the pouch maintains its vascularity and graft survival becomes easier with successful outcomes.

4 Conclusion
The choice of surgical technique depends upon the advantages and disadvantages of different procedures. The failure to determine a 3-dimensional (3-D) vertical bony defect and placement of incision closer to defect might have resulted in the negative outcome attained with the modified Whale’s tail technique with DFDBA graft in the present case. Connective tissue graft (CTG) used to overcome this failure led to achievement of satisfying clinical results. The pouch creation technique resulted in quick healing along with better esthetics obtained due to its minimal invasive approach.

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