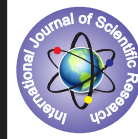


Riding the Whale's Tail in periodontal plastic surgery- a report of two cases



Dental Science

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Regeneration is defined as the biologic process by which the architecture and function of lost tissues are restored. Over the past two decades, various materials and techniques have been used in an attempt to achieve periodontal regeneration. The 1996 World Workshop in Periodontics defined three regenerative procedures - defect debridement by flap curettage, bone grafting and guided tissue regeneration (GTR).

Guided Tissue Regeneration has been introduced into dental practice soon after Melcher (1970,1976), followed by Karring et al. 1980 and Nyman et al. 1980, presented its basic principles to the professional community. To ensure predictable results, primary closure of the osseous defect is essential, or it may compromise clinical attachment gain. The flap design should be in such a way that maximum amount of gingival tissue is preserved to obtain complete coverage of the regenerative material.

Specific surgical approaches have been reported to obtain primary flap closure and to preserve interdental tissue. Takei et al pioneered the papilla preservation flap for interproximal regenerative procedures while Cortellini et al later published a modification of this technique as a new approach, called the modified papilla preservation flap^[1,2] Interproximal tissue maintenance surgery was created by Murphy in which a triangular-shaped palatal flap was rolled to the buccal surface, allowing treatment of the defect with a GTR barrier while maintaining interproximal tissue.^[3]

A new surgical technique to regenerate wide intrabony defects in esthetic zone was described by Bianchi AE et al in 2009 the "Whale's tail" technique^[4] It involved elevation of a large flap from the buccal to the palatal side to allow access and visualization of the intrabony defect, especially to perform guided tissue regeneration while maintaining interdental tissues over the grafting material. A modified technique was recently published which included two semilunar incisions instead of the vertical joining incisions to manage the accompanying aberrant frenal attachment.^[5] (figure1)

This clinical report presents two cases, one on the whale's tail technique and another using the modification, attempted to achieve primary closure and thereby aid in regeneration of an interdental osseous defect between maxillary central incisors.

Case report 1

A 37-year-old male patient reported with the complaint of spacing between his upper front teeth, which was gradually increasing since six months. Dual crowns were given for 11 from a private dental clinic (figure2). Grade I mobility and a 7 mm periodontal pocket with a radiographic evidence of vertical bone loss in the mesial aspect of 11 was detected. As we failed to get clearance for fixed orthodontic therapy, patient was suggested to undergo six units fixed prostheses from 13 to 23. Patient was unwilling for proposed treatment plan and wanted only a replacement of existing crown. It was decided to

surgically access the area for the management of the osseous defect using the Whale's tail technique.

Surgical procedure

Two vertical full-thickness incisions were traced from the mucogingival line to the distal margin of the tooth neighbouring the defect on the buccal surface. A horizontal incision joined the apical margins of the first two incisions, and the coronal margins of the vertical incision were continued intrasulcularly to palatal aspects (Figure3) allowing the elevation of a buccal flap to palatal side. (figure4 and 5) After thorough debridement, defect was filled with β -tricalcium phosphate particulate graft (Ossify, Equinox Medical technologies, Netherlands) and a bioresorbable collagen membrane (ProGide, Equinox Medical technologies, Netherlands) was adapted and positioned to cover the defect. (figure6 and 7) The flap was repositioned from the palatal to the buccal side, and margins sutured without tension, away from the biomaterials. (figure8) The sutures were removed 14 days after surgery.

Patients were instructed to rinse with 0.2% Chlorhexidine gluconate twice daily until the fourth postoperative week. Reduction in pocket depth and maintenance of a stable interdental tissue profile was appreciated during the 6 months healing period. Radiographic bone fill in the mesial aspect 11 was noted at the end of 9 months. (figure9) Full ceramic crown of appropriate dimensions was delivered. (figure10)

Case report 2

A 35-year-old male patient was referred from the Department of Orthodontics for periodontal evaluation. The patient initially reported with the complaint of spacing between his upper front teeth, which was noticed 1 year back and increasing since then. On clinical examination, a midline diastema about 4 mm was noticed. Mesio buccal aspect of the 11 presented with 7mm probing depth and with vertical bone loss. (figure11) The tooth exhibited no mobility. An aberrant frenum with a positive pull on the interdental papilla was noted. After the initial phase of the therapy, it was decided to surgically access the area for the management of the osseous defect using the modified whale's tail technique.

Surgical procedure

After adequate anesthesia, two semilunar incisions were made on both sides of the frenum. The medial extensions of both the semilunar incisions excised only the base of the frenal attachment, preserving the continuity of the flap as well as accomplishing the required frenotomy. (figures12) The distal extensions of the incision were continued as intrasulcular incisions along the central incisors, separating the flap from the buccal attached gingiva and allowing the separation of a thick, broad papilla-preserving flap to the palatal aspect. (figure13 and 14) The defect was thoroughly curetted and root planed. After root bio modification with tetracycline hydrochloride,

the defect was filled with granules of β -tricalcium phosphate particulate graft and a bioresorbable collagen membrane was adapted and positioned. (figure15and16) The flap was approximated and sutured and was covered with a periodontal dressing. (figure17) No membrane exposure was observed during postoperative period. Sutures were removed 10 days after surgery. At the 6-month review, it was observed that the site was free of inflammation with complete elimination of the periodontal pocket without any gingival recession and obvious radiographic evidence of bone fill. (figure18and 19)

Discussion

Various biomaterials have been used to achieve periodontal regeneration. The biological barriers are used to prevent the gingival tissue from contacting the root during healing and ensure a stable clot aggregation close to the root surface. To ensure predictable results, these barrier membranes require primary closure as the exposed membranes can result in the reduction of clinical attachment levels (CAL).^[6,7]

Soft tissue healing depends upon factors such as the surgical technique, flap design, soft tissues management during surgery, root preparation, patient compliance etc. The Whale's tail technique was designed to specifically regenerate wide intrabony defects in the esthetic zone. The surgical procedure included elevation of a large flap from the buccal to the palatal side to allow access and visualization of the intrabony defect and to perform GTR while maintaining interdental tissue over the grafting material and achieving good primary closure.

The use of incisions away from the osseous defect reduced the chance of flap dehiscence. The papillae preserving flap design helped to achieve good primary closure of the grafting material and allowed preservation of vasculature of the buccal flap. The placement of perimeter sutures to stabilize the flap and having to place no sutures at the papillae level might minimize the chance of the 'wicking' effect of suture material.^[4] This positioning of incisions far from the interdental area and placement of sutures distant from the regenerated defects prevents bacterial colonization of the biomaterials, which is often responsible for regenerative failures and recession.

Root biomodification of 11,21 using tetracycline is said to remove smear layer of bacterial endotoxins, help in stabilization of clot and thus preventing epithelial migration at the root surface. Tetracycline stimulates fibroblast attachment and growth, while suppressing epithelial cell attachment.^[8]

Radiographic evidence of bone fill and significant improvement of clinical parameters was appreciated in both the cases. Clinical findings obtained with these techniques in terms of CAL gain was 3mm and 4mm respectively and PPD reduction was 4 mm, which were comparable with the results obtained with other clinical studies in which GTR barriers were used.^[2,3,9]

The careful mobilization of the interdental papilla allowed preservation of vascular supply to the buccal flap. The systematic use of incisions distant from the defects and biomaterial margins drastically reduced the percentage of flap dehiscence.^[10] Primary closure of the interdental space after surgery and during the follow-up period was achieved. No membrane exposure was observed during the postoperative appointments, performed weekly for 2 months. The relocation of the frenum in the modified whale's technique also allowed for a tensionless flap closure and reduced chances for flap dehiscence during healing.

Patient compliance and infection control during the postsurgical period have also been seen as important factors in the outcome of regenerative procedures. The application of the "whale's tail" flap has indeed lead to clinically significant improvement of hard and soft tissue conditions of wide intrabony defects there by creating a functional attachment with esthetic results.

Figure legends

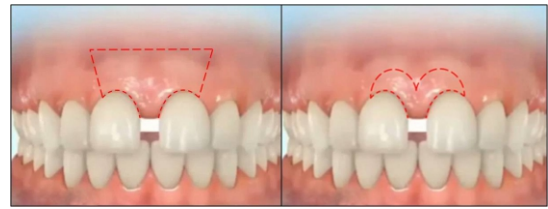


Figure 1: schematic representation of the incisions



Figure 2: preoperative photograph



Figure 3: incisions given

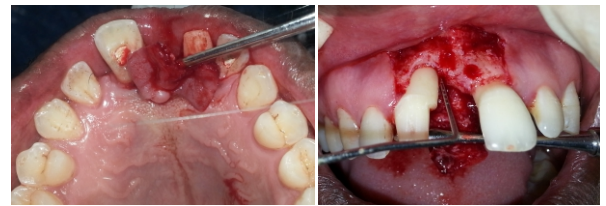


Figure 4 and 5: flap reflected palatally

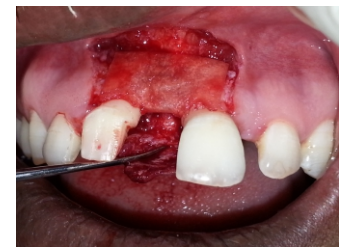


Figure 6: membrane adapted

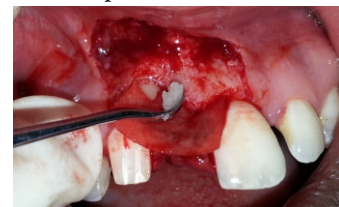


Figure 7: placement of bone graft



Figure 8: flap sutured

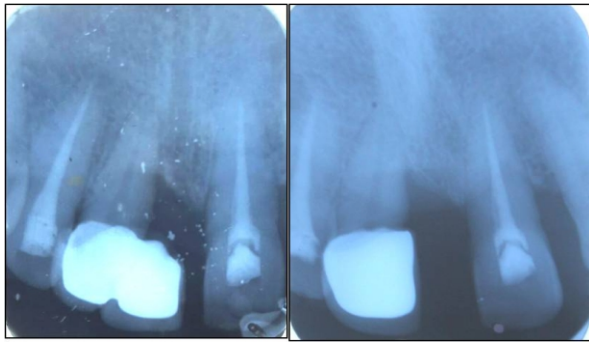


Figure 9: preoperative and 9 months postoperative radiograph



Figure 10: full ceramic crown delivered



Figure 11: preoperative photograph



Figure 12: modified incisions given



Figure 13 and 14: flap reflected palatally



Figure 15: membrane adapted



Figure 16: bone graft placed



Figure 17: flap sutured



Figure 18: 6 months postoperative photograph

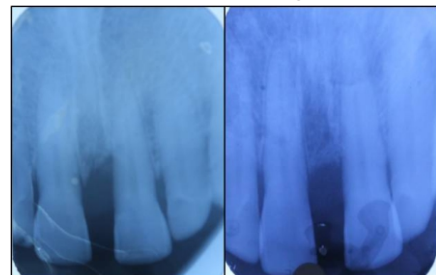


Figure 19: preoperative and 6 months postoperative radiograph

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