Tunnel Technique for Anterior Interdental Papillary Reconstruction with Amniotic Membrane and PRF Membrane: A case report

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Abstract

Aesthetics play a crucial role in enhancing the outlook and self-assurance of a person.Loss of interdental papilla which occurs in the anterior maxillary region, usually known as the "black triangle" is one of the demanding missions to take in hand as it requires precise and meticulous handling of tissues in the interdental area thereby posing a great challenge inperiodontal plastic surgical procedures. Various non-surgical and surgical techniques have been recommended with varied success rates for its management. The present case report presents a tunnel technique for interdental papillary reconstruction procedure using platelet-rich fibrin and amniotic membrane.

Keywords: *Papillary recession, black triangle, amniotic membrane, PRF.*

Introduction

The space between two adjacent teeth is occupied by interdental papilla which protects the underlying periodontal tissue thereby acting as a physical barrier against microbial invasion and plaque accumulation as well as improving the aesthetics and self-maintenance by the patient. Improper tooth brushing habits, abnormal position of the tooth,extension of inflammation from gingiva to periodontal tissues, parafunctional habit, faulty orthodontic and restorative procedures are factors leading to interdental papillary loss. The interdental papillary loss have been classified by Nordland and Tarnow classification in 1982[1], taking interdental contact point,facial and interproximal cemento-enamel junction into consideration.

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Papillary reconstruction has been one of the most difficult periodontal plastic surgical procedures to master and has a very low success rate. Forced eruption, use of gingival and porcelain veneers are some of the non-surgical techniques which have been used with a successful outcome. However, managing the lost interdental papilla surgically is critical as the only source of blood supply in the narrow space at the base of the papilla. Various surgical techniques such as Beagle's technique[2], Modified Beagle's technique[3], Robert Azzi technique[4], Han and Takei technique[5] and surgical reconstruction using connective tissue graft and also regenerative materials have been carried out so far.

In recent years, platelet-rich fibrin (PRF) has gained a lot of popularity as a predictable regenerative material in the treatment of osseous and gingival recession defect because of the abundance of growth factors which are slowly released from the fibrin matrix and hasten wound healing process[6,7]. Few studies have also been reported the use of Amniotic Membrane (AM)in the reconstruction of anterior papillary recession. However, the adaptation of such membranes is quite difficult during surgery. Therefore, the present case report presents a novel tunnel technique for anterior interdental papillary reconstruction.

Case Report: A 25-year-old healthy female patient reported to the Department of Periodontology and Oral Implantology, Institute of Dental Sciences, Bhubaneswar with the chief complaint of receding gums between the upper anterior teeth. She was concerned about her look since the increased space was visible during smiling. She reported that the unaesthetic gap persisted since last one year and had slightly increased recently. Clinical examination revealed class I papillary loss between maxillary central incisors (Figure 1). There was no evidence of periodontal pocket and no bone loss was revealed radiographically. A plan for surgical reconstruction of the lost papilla was made and explained to the patient. A written patient consent was taken for the same. Routine blood investigations did not reveal any deviation from normal health.

Surgical Procedure: After performing intraoral asepsis with 0.2% chlorhexidine digluconate rinse for 30 seconds,local anesthesia (2% lignocaine) was administered in the region of #11 and #21. The distance from the contact point to the bone crest was evaluated by transgingival probing, using the UNC15 periodontal probe which was found to be 5 mm. A small horizontal slit incision was made apical to the mucogingival junction in the interdental region of #11 and #21. This was followed by a crevicular incision with the central incisors without splitting the interdental papilla.A pouch in the interdental area was created with the help of the tunneling instrument to relievethe gingivopapillary from its periosteal attachment (Figure 2a). A similar slit incision was made on the palatal aspect and using an Orban's knife the entire papillary complex was relieved from its base(Figure 2b).

Platelet-rich fibrin[8] membrane was prepared by following the standard procedure of withdrawing 10 ml of patient whole blood intravenously and centrifuging for 10 min at 3000 rpm. The amniotic membrane was procured from the tissue bank of Tata Memorial Hospital, Mumbai. Amniotic membrane was then inserted from the facial slit incision (Figure 3a) and pushed horizontally so that a portion could be pulled from the palatal aspect and manipulated to remove any folds (Figure 3b). The prepared PRF membrane was then inserted underneath the Amniotic membrane so that it lay interdentally pushing the entire papillary complex coronally. The amniotic membrane was then tucked internally, adapted and sutured on the facial (Figure 3c) and palatal side (Figure 3d). The coronally advanced papillary complex was stabilized with 4-0 vicryl sutures, secured on the labial surface of the tooth followed by placement of periodontal dressing (Barricaid)at surgical site. Suitable post-operative medications were prescribed and instructions were explained. Suture removal was done after 10 days and followed till 6 months (Figure 4). Fig 5 (a-d) shows the schematic diagram of the proposed technique.

Figure 1: Preoperative view showing loss of interdental papillae in 11 and 21

Figure 2a: Papillary complex was relieved from its base using a tunneling instrument; Figure 2b: Horizontal slit incision given on the palatal side and relieved

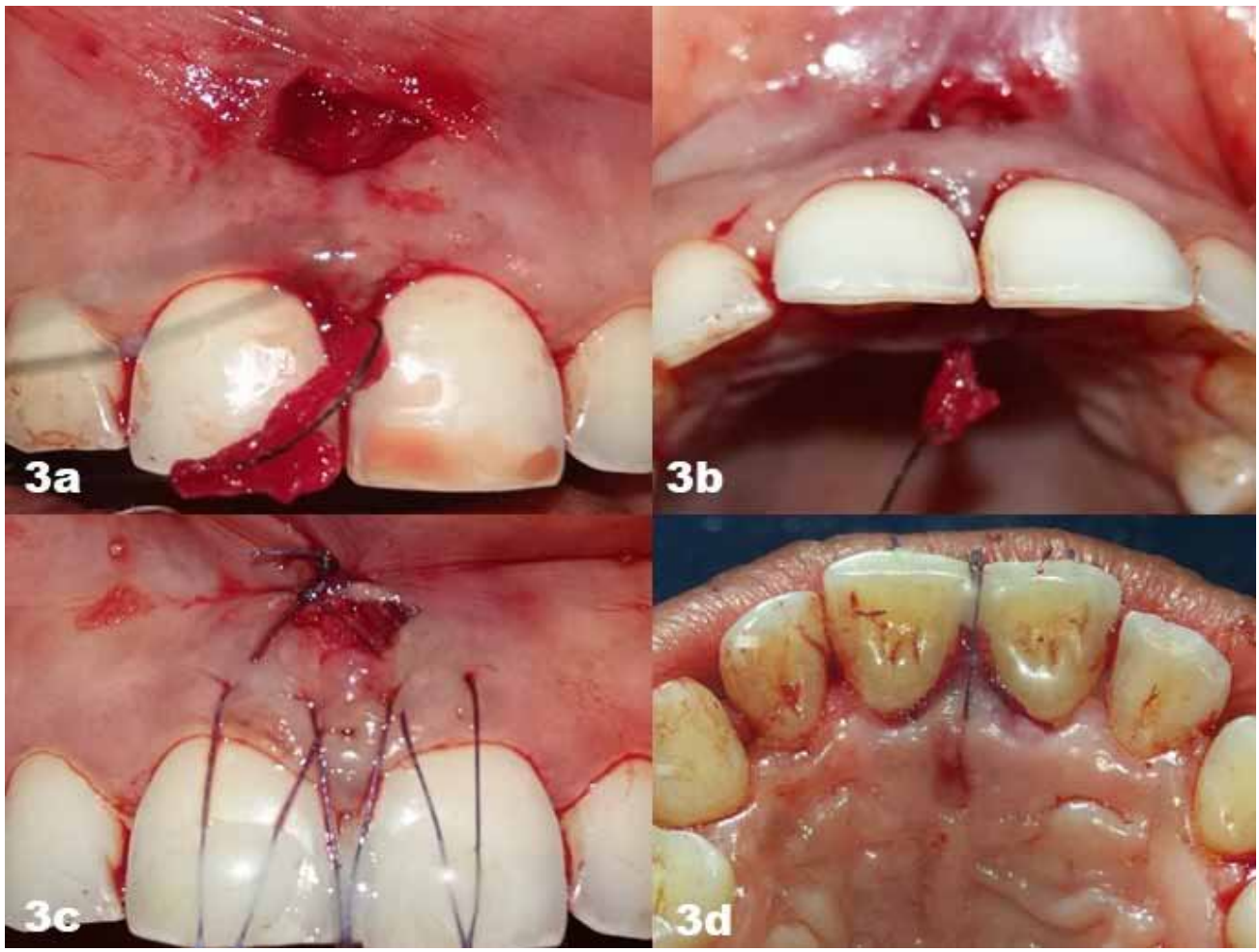

Figure 3a: AM being tucked into the pouch created and passed through the interdental area; Figure 3b: AM emerging from the palatal aspect; Figure 3c: Incisions closed with 4-0 vicryl sutures on the buccal aspect after placement of PRF; Figure 3d: Incisions closed with 4-0 vicryl sutures on the palatal aspect

Figure 4: Postoperative view after 6 months

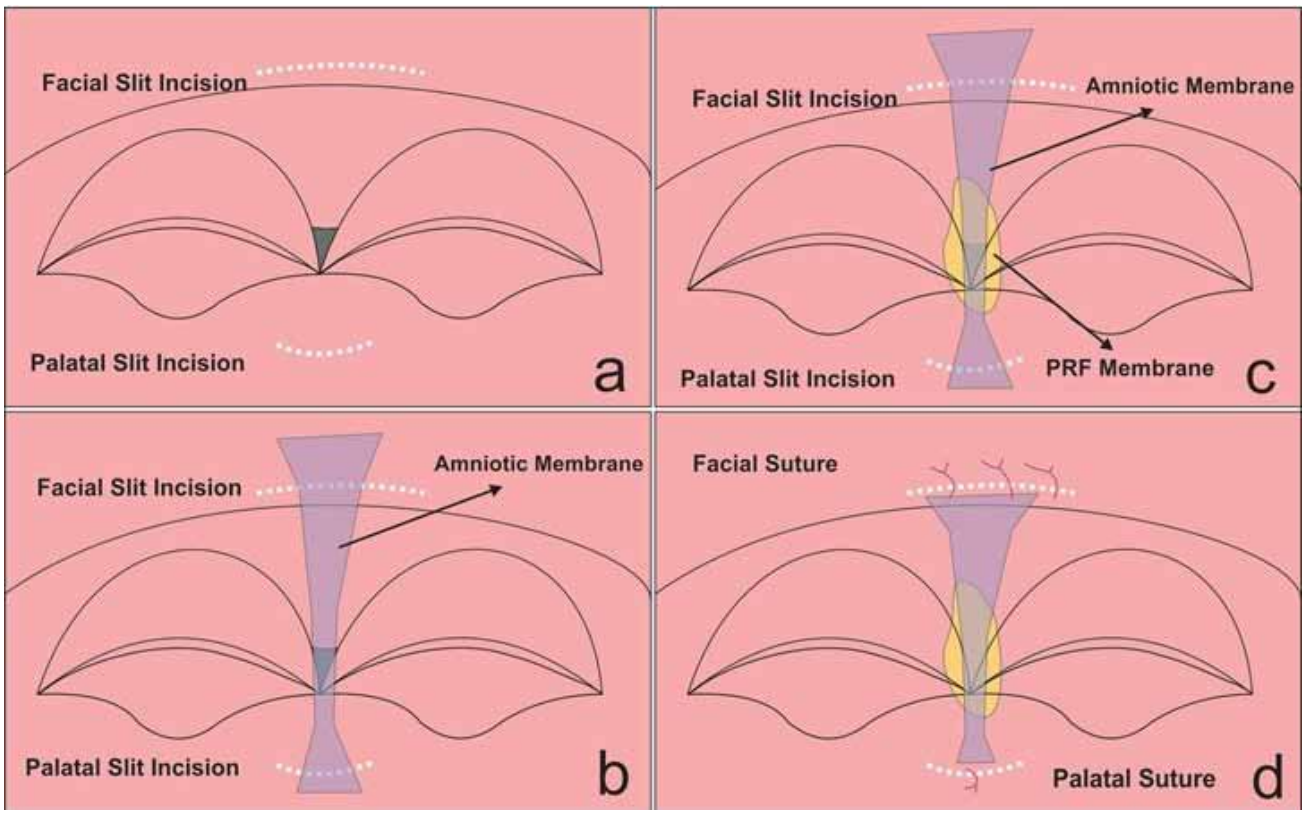

Figure 5. Schematic diagram of the technique (a-d)

Discussion

The enhancement of lost interdental papillae is however one of the most difficult periodontal plastic surgical procedures as the interdental papilla is an end-organ that is deprived of its blood supply. Many techniques have been employed for its reconstruction but no predictable absolute surgical procedures advocated for its reconstruction are present currently. The shape of the interdental papillae depends on a variety of factors such as contact point between two adjacent teeth, presence or absence of degree of recession, and width of proximal tooth surfaces.

The tunneling approach used by us is a step further which has been used earlier where the approach was restricted to the facial side only, in that there was an addition of palatal window. This technique is particularly

beneficial in cases where a barrier membrane is used. The palatal window makes the manipulation of the membrane very easy especially when an additional regenerative component such as PRF is used in conjunction with the membrane.

As suggested by Tarnow et al[9],if the distance from the contact point to the bone crest is 5 mm, there will be complete fill of the interproximal embrasures of the various techniques put forth for the amplification of the lost interdental papillae, placement of connective tissue graft under the flap showed statistically significant results inthe improvement of both papilla presence index score and papillary height when observed for a period of 12 months[10]. Due to the small, restricted space interdentally, any form of free grafting cannot be utilized since the surface area for blood supply to the donor tissue is minimal. Patient morbidity,post-operative discomfort and involvement of the second surgical site are the demerits associated with soft tissue grafting[11]. To overcome this, Arunachalam et al [12], used PRF in the reconstruction of papillae and stated that papilla regenerated was structurally stable in its new positionwhen reviewed at 6 months postoperatively.

Amnion tissue is a potent source of stem cells that helps in the stimulation of growth of the fibroblast,formation of granulation tissue and neovascularization. In addition, the stem cells found within tissue enhance clinical outcomes[13]. It also possessesan ability to form an early physiologic "seal" with the host tissue precluding bacterial contamination[14] and various studies also support its potential to reduce the host immunologic response [15].Sharma et al in 2015[16] in a study reported that amniotic membrane provides an effective alternative to autograft tissue as the self-adherent nature of the amniotic membrane significantly reduced surgical time and it is also easier to perform thus making it membrane of choice. Shetty etal[17] studied bilateral multiple recession coverage with platelet-rich fibrin (PRF) in comparison with amniotic membrane and found that the clinical outcome of the surgical procedure accounted for 100% root coverage, an enhanced gingival biotype, with both the membranes.

However, in this study we obtained a partial coverage of the papillary recession which could be attributed to various factors such as lack of following a standardized protocol, use of microsurgical instruments and evaluation of biologic width.

Conclusion

Thus, at the end,it could be concluded that the surgical technique evaluated for reconstruction of interdental papilla using PRF and AM was fairly successful. Although many refined approaches showing good clinical results, have been proposed to restore interdental papilla, use of PRF and amniotic membrane may be the solution for interdental papilla augmentation. To confirm the use of amniotic membrane as a good alternative for the treatment of papillary recession, more longitudinal studies are required in this field of periodontal plastic surgery.

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Ethical Permission: Approved

References

1. Nordland WP, Tarnow DP. A classification system for loss of papillary height. Journal of periodontology. 1998;69(10):1124-6.
2. Beagle JR. Surgical reconstruction of the interdental papilla: case report. The International journal of periodontics & restorative dentistry. 1992;12(2):145-51.
3. Chhavia S, Sandeep JN. Interdisciplinary approach to reconstruct papilla in esthetic zone: A case series. Journal of Interdisciplinary Dentistry. 2017;7(3):117.
4. Shruthi S, Gujjari S, Mallya K. Comparison of two surgical techniques for the reconstruction of interdental papilla. Journal of Interdisciplinary Dentistry. 2015;5(1):17.
5. Shenoy B S, Punj A, Ramesh A, Talwar A. Salvaging the Lost Pink Triangle: A Case Series of Papilla Reconstruction. Case Reports in Dentistry. 2020;2020:1-7.
6. Del Fabbro M, Lolato A, Panda S, Corbella S, Satpathy A, Das AC, et al. Methodological Quality Assessment of Systematic Reviews on Autologous Platelet Concentrates for the Treatment of Periodontal Defects. The journal of evidence-based dental practice. 2017;17(3):239-55.
7. Panda S, Karanxha L, Goker F, Satpathy A, Taschieri S, Francetti L, et al. Autologous Platelet Concentrates in Treatment of Furcation Defects-A Systematic Review and Meta-Analysis.

International journal of molecular sciences. 2019;20(6).

8. Dohan DM, Choukroun J, Diss A, Dohan SL, Dohan AJ, Mouhyi J, et al. Platelet-rich fibrin (PRF): a second-generation platelet concentrate. Part II: platelet-related biologic features. Oral surgery, oral medicine, oral pathology, oral radiology, and endodontics. 2006;101(3):e45-50.
9. Tarnow DP, Magner AW, Fletcher P. The effect of the distance from the contact point to the crest of bone on the presence or absence of the interproximal dental papilla. Journal of periodontology. 1992;63(12):995-6.
10. Han TJ, Takei HH. Progress in gingival papilla reconstruction. Periodontology 2000. 1996;11:65-8.
11. Harris RJ. Root coverage with a connective tissue with partial thickness double pedicle graft and an acellular dermal matrix graft: a clinical and histological evaluation of a case report. Journal of periodontology. 1998;69(11):1305-11.
12. Arunachalam LT, Merugu S, Sudhakar U. A novel surgical procedure for papilla reconstruction using platelet rich fibrin. Contemporary clinical dentistry. 2012;3(4):467-70.
13. Toda A, Okabe M, Yoshida T, Nikaido T. The potential of amniotic membrane/amnion-derived cells for regeneration of various tissues. Journal of pharmacological sciences. 2007;105(3):215-28.
14. Talmi YP, Sigler L, Inge E, Finkelstein Y, Zohar Y. Antibacterial properties of human amniotic membranes. Placenta. 1991;12(3):285-8.
15. Hao Y, Ma DH, Hwang DG, Kim WS, Zhang F. Identification of antiangiogenic and antiinflammatory proteins in human amniotic membrane. Cornea. 2000;19(3):348-52.
16. Sharma A, Yadav K. Amniotic membrane - A Novel material for the root coverage: A case series. Journal of Indian Society of Periodontology. 2015;19(4):444-8.
17. Shetty S, Chatterjee A, Bose S. Bilateral multiple recession coverage with platelet-rich fibrin in comparison with amniotic membrane. Journal of Indian Society of Periodontology. 2014; 18(1):102-6.