

Full Anterior Papilla Restoration: Combining PRF-Assisted Tunneling and Modified Beagle’s Technique for Superior Aesthetic Results

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Abstract

Background: Interdental papilla loss can be also referred to as “Black triangles”. Black triangles are present as a aesthetic concerns especially in the anterior region. Reconstruction of which is quite challenging due to limited vascularity in that area. Papilla reconstruction using PRF (Platelet Rich Fibrin) by tunneling procedure which is minimally invasive and combines Modified Beagles technique have shown promising results for reconstruction of the entire anterior segment. A photographic analysis with the pre-operative and post-operative photographs was done using ImageJ software which also showed a significant papillary gain.

Case Presentation

Management and Outcome: This case report describes an unusual approach with promising results combining two procedures by tunneling in the incisor region and augmented using an autogenous graft that is PRF along

with Modified Beagle’s technique in the interdental area between lateral- canine region. This combines hybrid technique which gave a promising increase in papillary gain in the whole anterior region.

Conclusion: The 3 month follow up of this technique combing two procedures in the anterior maxilla showed excellent results in the whole of the anterior segment by complete elimination of black triangle on the anterior segment.

Keywords: Interdental papilla, Black triangle, PRF, tunneling technique, Beagle’s technique, aesthetics, anterior maxilla

Introduction

Maintaining dental aesthetics is now being a concern among the people especially when it comes to anterior region. The ultimate concern of this generation remains the same. The primary goal of a dentist is to achieve both “white aesthetics” which is the natural teeth or

restoration of teeth using dental material's and "pink aesthetics" which refers to the surrounding hard and soft tissues which is of higher aesthetic concern.¹ The contour of the interdental papilla plays a major role in anterior region in regard to aesthetic concerns, since anterior teeth is regarded as the key aesthetic component.² Loss of interdental papilla creates a hollow space in the anterior region which is aesthetically unpleasing this is termed as "Black triangle".³ Management of this black triangle's has been a quite a challenge among most of the dental practitioner's in achieving good aesthetic outcome. The aetiology of interdental papilla may be due to – attachment loss due to periodontal disease, patients age, Gingiva biotype, after orthodontic treatment. Abnormal tooth morphology and shape and Abnormal tooth contact position.⁴ The first of the interdental papilla was given by Norland and Tarnow in the year 1998 this was based on reference points, three reference points was considered the contact point between two teeth, buccal apical extent of the cemento-enamel junction (CEJ) and the interproximal CEJ.

The following is the classification given by Norland and Tarnow

Normal: the interdental papilla fills the embrasure space to the apical extent of the interdental contact point/area

Class I: the tip of the interdental papilla lies between the interdental contact point and the most coronal extent of the CEJ

Class II: the tip of the interdental papilla lies at/or apical to the interdental CEJ but coronal to the apical extent of the facial CEJ

Class III: the tip of the interdental papilla lies level with or apical to the facial CEJ'⁵

Platelet rich fibrin (PRF) is a form of platelet gel. It has a matrix of autologous fibrin, which is easy to prepare and cost-effective. It has properties which help in promoting

wound healing, wound sealing, and haemostasis. It is widely used in various soft tissue augmentation in periodontic aesthetic surgeries.⁶

Beagles' technique is a surgical technique used for papilla reconstruction nevertheless this less hods few disadvantages such as damage to the palatal nerves so, to overcome this Modified Beagles technique has been used in this case report.⁷

Case Presentation

A male patient of age 35years reported to the department of Periodontology and Implantology, Sree Balaji Dental College and Hospital Pallikaranai, Chennai, with a chief complaint of deposits in the upper and lower teeth region. Patient had heavy calculus deposits especially in the upper anterior region. On through scaling Anterior Black observed in the interdental regions of the upper anterior teeth (13-23). After explaining the consequences of papillary loss patient was kept under maintenance phase for 4 weeks. The papillary loss was measured by applying Norland and Tarnow classification. The papillary height was measured from the base of the papilla to the interdental contact point by using a UNC15 Probe. After the initial measurements the patient was categorised under Class II Norland and Tarnow. Other periodontal parameters such as PPD, Cal, plaque score was measured on the day of Phase 1 therapy. Blood investigations were made prior to the surgical procedure.

Treatment Procedure and Follow-Up

A proper written informed consent was obtained from the patient prior to commencing the procedure. The whole of the maxillary anterior segment was anaesthetised by local infiltration using 1:80000 adrenalin local anaesthesia. The surgical procedure was started by giving incisions were given with #15C Blade, at the adjacent line angles between the interdental papilla, of right and left maxillary lateral and canine (12-13 and 22-23) These vertical

incisions were connected by a horizontal incision at the apical end. A partial thickness pedicle flap was elevated. The papillary unit was carefully dissected from the teeth and the interdental area so that the papillary unit can be mobilized freely. The pedicle graft is then advanced coronally to completely obliterate the black triangle space. The flap was then sutured coronally to the adjacent tissues, with a 5-0 vicryl sutures.

In the region confining the central incisors a minimally invasive tunnelling procedure was carried out using a specialised tunnelling instrument. PRF membrane was prepared by obtaining patients own blood according to the protocol given by Choukron *et al*⁸. After which PRF membrane was carefully placed into the tunnelled space in the interdental region of the central incisors extending till the interdental area between the lateral and central incisors the flap was then coronally advanced and sutured with 5-0 Vicryl sutures. Patient was recalled on 3rd day, 7th day, one-month post-operative to check the papillary gain. Both pre-operative and post-operative photographs were taken to assess the papillary gain as well as to educate the patient regarding the positive outcome of the reconstruction procedure.

Image Analysis

Using pre-operative and post-operative clinical photographs the objective improvement of interdental papilla was done using ImageJ software (National Institutes of Health, Bethesda, MD, USA). The average mesiodistal width of the maxillary central incisor (8.5 mm) was used as a reference for scale calibration. Based on the measured pixel width of the incisor in the images, a conversion factor of approximately 20 pixels per millimetre was applied.

Using this scale, the papillary height in the treated region increased from 0.8 mm (16 pixels) pre-operatively to 8.4 mm (168 pixels) post-operatively. This substantial

increase in papillary height objectively confirms the clinical success of the combined tunnelling and Modified Beagle's technique for full anterior papilla reconstruction.

Discussion

Interdental papilla is a part of the gingiva which occupies the interdental space between two adjacent teeth. It was first described morphologically by Cohen in 1959. Earlier it was considered as a pyramidal part of the gingiva which acts as a barrier against food accumulation, but the significance of interdental papilla has been understood by its aesthetic concern's and also acts as a biologic barrier by protecting the periodontal structures.⁹ When there a loss of interdental papilla it leads to a hallow space which is called as the "Black triangle". The management of black triangle in periodontal aesthetic surgery has been one of the most challenging ones with a very less success rate¹⁰, due to the small area occupied and vey less blood supply to the interdental area.¹¹ There are numerous surgical procedures for the management of interdental papilla According to Tarnow et al who stated that the distance from the base of the contact area to the crest of bone can be correlated with the presence or absence of the interproximal papilla. If the interdental papilla is 5mm or less the papilla could be reconstructed 100% surgically.¹² This is accordance to our case where we have effectively managed the interdental papillary loss. Tomar et.al have used PRF membrane and surgically managed the interdental papilla loss.¹³, similarly gadi.et al have done papillary reconstruction by tunnelling using PRF and CTG and have showed favourable outcomes.¹⁴. Singh et.al have reported that with modified beagle's technique there has been a considerable amount of papillary gain since the papilla acts as a pedicle for blood supply.³ Pravin et.al have done a comparative study with beagles

and modified beagles' technique for papillary reconstruction and by which they have concluded that modified beagle's technique is easy and more effective when compared to the conventional beagle's technique.¹⁵ Platelet-rich fibrin (PRF) is a promising matrix which aids in the differentiation of precursor cells for the regeneration of interdental papilla. It is also involved in tissue regeneration as well it is also involved neo-angiogenesis which could reduce necrosis and shrinkage of tissue.¹⁶ PRF also promotes wound healing and haemostasis.¹³ In this case report we have used both tunnelling procedure which is one of the minimally invasive procedures incorporating a PRF membrane itself is a autogenous membrane which aids in tissue growth. Modified beagles' technique which is much easier and effective than other surgical techniques have shown remarkably good results in management on interdental papilla in the lateral incisor and canine region. The photographic ImageJ analysis of the per-operative and post-operative photographs also showed a increase in papillary gain. This case report shows an excellent result in reconstruction of interdental papilla in the entire maxillary anterior segment with the use of minimally invasive techniques.

Conclusion

Interdental papilla reconstruction has been a challenge in periodontal aesthetic surgery. Although the use of extensive surgical procedures and use of CTG and FGG show good results. In the case report we have shown that with the use of proper surgical technique and minimally invasive procedure we could achieve superior and favourable outcomes for not only to a confied area but for a whole anterior segment

Patient Consent

“Written informed consent was obtained from the patient for publication of this case report and accompanying images.”



Figure 1: Pre-operative picture



Figure 2: Modified beagle's technique (vertical and horizontal incisions given)



Figure 3: Papilla pushed to the interdental area



Figure 4: Tunneling done in the central and lateral incisor region and PRF membrane placed



Figure 5: 3rd day post-operative view with sutures



Figure 6: Two-month post-operative view

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