

Simulated Tissue Contouring Using an Ovate Pontic Design: A Case Report

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ABSTRACT

Background: It is vital to preserve and maintain the edentulous ridge and normal gingival architecture, which often collapses after tooth extraction. Interproximal tissue contour preservation and the prevention of alveolar bone collapse have never been as desirable as they are in today's esthetic dentistry. Whether it is implant or Fixed partial denture, soft and hard tissue recession after the removal of an anterior tooth is one of the most challenging issues in a patient's treatment plan.

Keywords: Ovate, Pontic, Aesthetic Dentistry.

INTRODUCTION

As patient's esthetic demands increase, dentists face the difficult challenge of replacing missing teeth with maximum esthetics without compromising overall function and health. As clinicians, we must have multiple techniques available to preserve or restore the function and esthetics when teeth are unrestorable. When a fixed partial denture is the choice in the anterior esthetic zone, the Ovate Pontic should be the most desirable option. According to I. Ahmad¹, In the tissue hierarchy the teeth, influence the contour of the soft tissue and underlying osseous architecture. The iconic study by Tarnow, states that: When the distance from the contact point to the interproximal osseous crest is 5 mm or less, there is complete fill of the gingival embrasures with an interdental papilla. For every 1 mm above 5 mm, the chance of complete fill is progressively reduced by 50%. For square-shaped teeth with wide contact points, the chances of 'black triangles' is minimal compared with triangular teeth having narrow, more incisally positioned contact points.

The existence of the interdental papilla is dependent on the presence or absence of teeth. No teeth, no papillae; a scenario, which is evident in edentulous ridges where papillae are absent. Hence

after extraction it is necessary to gain the "pseudo gingival contour" of the natural teeth by proper tooth contact through proper pontic design and also gain the necessary emergence profile to achieve "pink aesthetics" and eliminate the black triangles. Research² has shown an average distance from the free gingival margin on the facial bone to the interproximal tissue is 4.5 to 5.5 mm. The distance of gingival scallop from the crest of the alveolar bone to free gingival margin facially is 3 mm in height. This means that there is 1.5 to 2.5 mm of increased gingival tissue height interproximal. It appears that the presence of the adjacent tooth attachment and the size of the gingival embrasure formed by these teeth are responsible for the presence and height of the papilla. When the tooth is extracted, the interproximal papilla recedes over the alveolar bone. This recession is almost 3 mm after the extraction. To prevent the recession of the interproximal tissue after the extraction of an anterior tooth, the extracted socket must be preserved in the same shape and location as the pre-extracted shape. The Ovate Pontic is one such modality to achieve this shape.

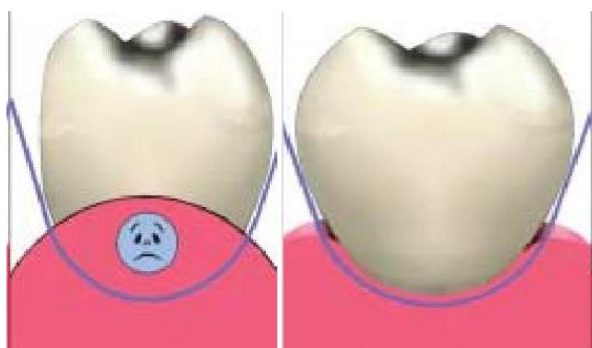
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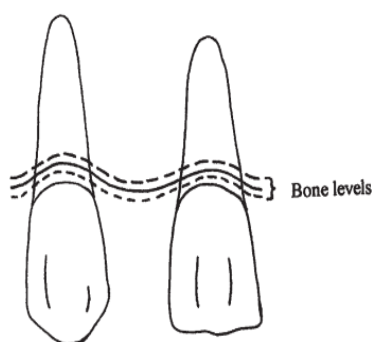
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The ovate pontic was developed by Abrams in 1980³. Instead of a concave shape at the tissue surface, the ovate pontic was created with a convex shape to overcome the disadvantage of the ridge lap or modified ridge lap. As a result, this pontic is easier to clean. The convex nature of the ovate pontic was created to develop the correct emergence profile.



The Dentogingival complex consists of ⁴:

1. Normal bone crest
 2. High bone crest
 3. Low bone crest
- Determined by gauging tissue to bone with a Periodontal probe.



High crest of bone can have less pontic depth, whereas low crest of bone require greater tissue support, both laterally and facioloingually, hence the pontic should be slightly apically extended.



It is reported that when the pontic depth was excessively long, healing of the apical tissue was prolonged up to 2 years. At Immediate extraction site a length of 3 mm from the most cervical tissue ridge to the pontic apex is appropriate to ensure a healthy, esthetic and stable Dentogingival complex. After extraction during the process of healing the primary step is formation of fibrin clot which results in epithelization. The scientific information lent credence to the theory that a highly polished ovate pontic can act as a matrix for formation of stratified squamous epithelium.

Cervical repair is dictated by the level of the fibrin clot that can be dictated by the apical pontic height at any level. Based on a pilot study which was to histologically evaluate the healing of gingival tissues in contact with 2 types of provisional ovate pontics i.e. one in acrylic resin, with an ovate shell made of low-fusing ceramic (Duceram LFC); the other made completely of the same acrylic resin(control) after 2 weeks⁵. No evident clinical advantages were seen after 2 weeks of ovate pontic provisional restoration in 3 patients, since the sites treated with LFC were clinically similar to those receiving an acrylic resin pontic⁵.

Researchers described a technique for the improvement of esthetics with conditioning of the tissue beneath the pontics, by displacing tissue adding pressure gradually on it⁶. Recently published data have shown that a well-controlled hyper pressure applied with a convex and highly polished pontic, associated with plaque control, resulted in only a thinning of the epithelium and shortening of rete pegs, without inflammation. Researchers have stressed that when a patient does not floss beneath the pontics, an inflammatory process will follow hyper pressure.

In another study the clinical and histological characteristics of the human alveolar ridge mucosa adjacent to an ovate pontic–designed restoration was examined⁷. Within the limitations of the study, it was concluded that restoring an edentulous space with an ovate pontic supported by adequate oral hygiene measures was not associated with overt clinical signs of inflammation. Histological, however, this pontic design was associated with a thinner keratin layer and with changes in the composition of the connective tissue compartment subjacent to the epithelium.

Indications of ovate pontic:

- i. Anterior teeth where root piece extraction is indicated.
- ii. When the gingival contour of the tooth is preserved after recent extraction.
- iii. High smile line.
- iv. Unwilling patients for implant therapy.
- v. Contraindications :
- vi. Thin knife edge ridge. (Siebert's ridge defect)
- vii. Patients with poor oral hygiene.

Advantages :

- i. Excellent esthetics and emergence profile.
- ii. Easier to floss than modified ridge lap pontic.
- iii. Effective air seal for speech than modified ridge lap pontic.
- iv. The ovate pontic also has improved function because it does not allow air or saliva to pass through, when properly designed.
- v. Creates an illusion of gingival margin and papilla thus minimizing black triangles.

Disadvantages:

- i. Ridge augmentation surgery needed in case of ridge collapse.
- ii. Time consuming.
- iii. Regular flossing and maintenance required to maintain tissue health.

CASE REPORT

A 25 year-old male patient reported to the Department of Prosthetic Dentistry with a chief complaint of replacement of missing teeth in upper front region. On further examination patient gave a h/o fall 20 days back, causing traumatic injury to his anterior teeth.



Fig 1: Preoperative photograph.

- i. Radiographic examination revealed, Lesions associated with 11,21,22 , rendering the teeth non – vital.
- ii. Grade 1 mobility with 11 and 22
- iii. Submerged root stump w.r.t 21
- iv. Incisal fracture with 11 and 22
- v. High smile line.
- vi. Patient being young and in a front desk manager was inclined towards achieving best esthetic results but with economical constraints.

Treatment Plan:

- i. Implant supported prosthesis was ruled out due to the patient's lack of interest.
- ii. Considering the patient's demand of maximum esthetics and economical constraints a 3 unit Fixed partial denture using Porcelain-fused-to-metal with an ovate pontic design was planned for the patient along with immediate temporization.
- iii. Patient was explained the prolonged treatment duration due to the type of pontic selected and the periodic visits associated with it and the need for maintenance of the pontic, to which the patient complied.
- iv. After the extraction a provisional restoration was planned that was used as a template to preserve the tissue contour.
- v. 21 root piece was non restorable and indicated for extraction followed by an immediate temporary restoration.
- vi. Here the temporary restoration would also act as a splint for the mobile abutments.
- vii. Hence a shallow chamfer margin was prepared capable of receiving a temporary without any premature contacts.



Fig 2: Socket after extraction of root piece



Fig 3: Tooth preparation after root canal treatment



Fig 4: Temporization

Evaluation Phase

- i. Patient was recalled in the intervals of 7 days to check for the accommodation of the tissue beneath the pontic.
- ii. After removal of the provisional restoration, a new layer of acrylic resin was added to continue the tissue conditioning.
- iii. The amount of resin to be added was judged through an analysis of the shape of tissue and esthetics.
- iv. After adding the acrylic resin, the provisional restoration was polished and recemented.
- v. Also the adapted tissue was evaluated for any signs of inflammation.
- vi. Signs of any plaque deposition.
- vii. Fit of the provisional restoration after applying pressure.
- viii. Here the guide for the amount of tissue to be contoured is taken from the gingival apex of the adjacent central incisor.



Fig 5: Evaluation after 1 week



Fig 6: Evaluation after 2 weeks



Fig 7: Evaluation after 3 weeks

Final Tooth Preparation:

- i. Crown cutting was carried out after the mobility of the abutments reduced and adequate tissue depth was achieved for the pontic.
- ii. Deep chamfer margin was prepared and impression was taken with gingival retraction.



Fig 8: Final tooth preparation

Impression Technique⁸:

- i. During impression making the materials, may alter the shape of the sculpted tissue due to the density of the impression material.
- ii. This may provide inaccurate information to the dental laboratory technician with respect to the tissue contours.

- iii. Additionally, the shape of the alveolar mucosa may be distorted during the impression making due to tissue collapse caused by the removal of the provisional FPD.
- iv. After tissue sculpting, make a complete arch impression and pour a cast in type iv dental stone for fixed partial denture frame-work fabrication.
- v. With the provisional FPD in position (without provisional cement) make a transfer impression of the FPD, using a heavy-body vinyl polysiloxane material.
- vi. Remove the impression from the mouth, ensuring that the provisional restoration remains in the impression.
- vii. Isolate the impression and the provisional restoration with petroleum jelly.



Fig 9: One step putty wash impression



Fig 10: Transfer impression of putty with provisional restoration in place



Fig 11: Medium- body material poured in to putty impression

- i. Inject a medium-body vinyl polysiloxane impression material into the impression to obtain a silicone cast (silicone allows the cast to be made as quickly as possible, while the patient is waiting).
- ii. After the impression material polymerizes, remove the silicone cast from the impression.
- iii. Adapt the FPD metal framework on the silicone cast.
- iv. Place acrylic resin beneath the pontic, until contact with the pontic site of the silicone cast is obtained. Note that the gingival surface of the provisional pontic is reproduced by the acrylic resin and will remain joined to the framework pontic .
- v. Note that the soft tissue cast material used in the pontic site to avoid fracture of thin plaster margins in this area allows the dental technician to fabricate a pontic with contours identical to those of the provisional pontic.



Fig 12: Final Pfm Prosthesis

CONCLUSION

Ovate pontics are an excellent option for the esthetically minded patient and dentist. Unlike what was previously believed, it is possible to maintain oral health with ovate pontics as long as they are properly designed and well maintained . They allow for maximum esthetics, are functional, and maintain tissue health. Their drawback is that they are laborious and their need for multiple appointments.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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