Incorporating modified ovate pontic design for anterior tooth replacement: A report of two cases

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ABSTRACT

Pontic is the raison d’etre of a fixed partial denture. The design of the prosthetic tooth will be dictated by aesthetics, function, ease of cleaning, maintenance of healthy tissue on the edentulous ridge and patient comfort. Proper design is more important for hygiene and good tissue health than the choice of material. An ovate pontic has been recommended to fulfill both aesthetic and functional requirements. The convex design of this pontic was intended to form a concave soft tissue outline in the site of the alveolar ridge mucosa. Clinically healthy conditions can be established at pontic sites if appropriate plaque control is performed. As the ovate pontic suffers from certain disadvantages, the modified ovate pontic design was developed to circumvent the problems encountered with the ovate pontic. A report of two cases will be presented where the modified ovate pontic design was employed for replacing upper anterior teeth.

KEY WORDS: Aesthetic restoration, modified ovate pontic, ovate pontic, ridge preservation

INTRODUCTION

Pontic design is important and should be determined prior to fixed partial denture construction. Four basic types of pontics have been used over the years: sanitary (hygienic), ridge lap (full ridge lap, total ridge lap), modified ridge lap, and ovate. The sanitary pontic is nonaesthetic and not for use in the cosmetic zone. Total ridge lap pontic has reasonably good aesthetics, but concave tissue surface acts as a food trap and is contributory to tissue inflammation. Modified ridge lap promotes easier cleansing than total ridge lap, but there is not enough air seal for speech. Saliva may be forced through this space during speech and food gets trapped at lingual triangle open area. The ovate pontic was developed by Abrams[1] in 1980. Instead of a concave shape at the tissue surface, it was created with a convex shape to overcome the disadvantage of the ridge lap or modified ridge lap pontics. It is indicated for anterior and posterior teeth. It combines excellent aesthetics with emergence profile. The pontic is easier to clean than the modified ridge lap pontic. However, the height of contour of the convex surface was designed close to the center of the base, and sometimes floss cannot pass through the center of pontic, especially in thin scalloped periodontium, in which there is a longer distance from the top of the papilla to the labial gingival margin. The convex nature of the ovate pontic was created to develop the correct emergence profile. However, in contrast to the requirements for pontics, which suggest the importance of pressure-free contact over a small area, the ovate pontic comes into contact with a larger area of the underlying soft tissue and applies very light pressure. Its major disadvantage is that it requires a sufficient faciolingual width and apicocoronal thickness to house the ovate pontic within the edentulous ridge. The modified ovate pontic design was developed and described by Liu[2] in 2003. It meets all the requirements that one desires in a pontic, where as the other types of pontics may not.

The modification of the ovate pontic involves moving...
the height of contour at the tissue surface from the
center of the base to a more labial position. It does
not require as much faciolingual soft tissue thickness
to create an emergence profile. It is much easier to
clean compared with the ovate pontic owing to the
less convex design. Its major advantage over the ovate
type is that often there is little or no need for surgical
augmentation of the ridge. The height of contour at
the tissue surface of the pontic is 1 to 1.5 mm apical
and palatal to the labial gingival margin. Dental floss
can be used to push the labial gingival margin away
and cleanse the tissue surface without any difficulty,
in contrast with other pontic types. The labial gingival
margin rebounds after the dental floss is removed. The
tissue surface of the modified pontic is less convex than
that of the ovate pontic. It is indicated in anterior and
posterior teeth, with high smile line (Table 1).

Of all the available ridge-management techniques\(^2\)
to aesthetically enhance restorations, the ‘immediate
pontic technique’ suggested by Spear\(^3\) maintains the
interdental papilla following anterior tooth removal.
The provisional fixed dental prosthesis is modified to
prevent the socket from collapsing and to imitate the
natural emergence profile. It can be employed when
the dentist is presented with the opportunity of restoring
a hopeless tooth in the cosmetic zone.

The cases presented employ the immediate modified
ovate pontic design as a technique for ridge management.

**CASE REPORTS**

**Case 1**
- A middle aged male patient came to the Department
of Prosthodontics with the chief complaint of mobile
upper right central incisor. He had a history of road
traffic accident six years back, when the upper
central incisor was subluxated and splinted to the
adjacent teeth followed by root canal treatment
and an acrylic jacket crown (Figure 1). Radiograph
revealed external resorption and insufficient
bone support. Pulp vitality test revealed that
abutment teeth 12 and 21 were vital. Thorough oral
prophylaxis and hygiene instructions were given.
- Alginate impressions (Tropicalgin, Zhermack Spa,
Badia, Polosine (Ro) Italy) were made.
- Arbitrary tooth preparation was done on the
obtained cast.
- Ovate pontic site was defined after removing 11 on
the cast (Figures 2 and 3).
- Provisional acrylic fixed dental prosthesis (FDP)
(Crown material, DPI heat cure acrylic, DPI dental
products, India) with modified ovate pontic was
prepared with the help of a putty external surface
form.
- Tooth preparation was done on the abutment teeth
followed by atraumatic extraction of 11.
- Provisional FDP was cemented with temporary
luting cement (Zinc oxide eugenol, DPI products,
India) after necessary adjustment (Figure 4).
- Patient was dismissed after thorough oral hygiene
instructions.
- Recall visits were planned on the next day, after
one week, and one month later
- After one and a half months, healing of the site was
found to be satisfactory (Figure 5).
- Modifications were done to the abutment teeth
and final impressions made with Addition silicone
(Reprosil light and heavy body, Dentsply Caulk,
Milford, USA) taking care to record the ovate pontic
site using overt pontic circumferential index as
described by Dylina.\(^4\)
- Master casts was poured in die stone (Kalrock,
Kalabhai karson Pvt Ltd, India) and pattern
fabrication, investing, and casting was done with
a base metal alloy (Wiron 99).
- Metal try in (Figure 6) and shade selection was as done
followed by porcelain application (VMK 95 Metall
Keramik, vita Zahnfabrik, Bad sackingen, Germany).
- Definitive prosthesis was cemented with provisional
cement for one month followed by permanent
cementation with type I glass ionomer cement (Fuji
1, GC, USA) (Figures 7-9).
- Oral hygiene instructions were reinforced at each
clinical visit.

| Table 1: Characteristics of ovate and modified ovate pontics designs |
|-----------------------------|-----------------------------|-----------------------------|
| **Characteristic** | **Ovate, Abrams\(^{1}\) (1980)** | **Modified ovate, Liu\(^{2}\) (2003)** |
| Indication | Anterior and posterior teeth, high smile line | Anterior and posterior teeth, high smile line |
| Contraindication | A thin, knife edge ridge | - |
| Esthetic concern | Excellent esthetics and emergence profile | Excellent esthetics and emergence profile |
| Tissue surface of pontic | Convex | Convex |
| Hygiene | Easier than modified ridge lap; sometimes floss cannot pass in center of pontic | Easiest to floss and maintain hygiene |
| Disadvantages | Ridge augmentation surgery needed if ridge collapsed | May leave shadow in apical area of tooth-gingival margin in Class I ridge defect and high smile line |
| Advantages | Creates illusion of free gingival margin and papilla | Creates illusion of free gingival margin and papilla |
| | Minimizes “black triangles” | Minimizes “black triangles” |
| | Requires less ridge augmentation surgery than ovate pontic | |
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Figure 1: Preoperative case 1

Figure 2: Diagnostic cast

Figure 3: Ovate pontic site preparation on diagnostic cast

Figure 4: Provisional fixed dental prosthesis

Figure 5: Modified ovate pontic site

Figure 6: Metal try in

Figure 7: Definitive prosthesis

Figure 8: Definitive prosthesis partially seated
A middle aged male patient reported to the department when he accidentally fractured his root canal treated upper right central incisor [Figure 10]. Radiograph revealed insufficient obturation and the fractured tooth was tender on percussion with insufficient remaining crown structure [Figure 11]. Immediate interim fixed dental prosthesis was planned following extraction of fractured 11 as adjacent teeth required restorations.

- Diagnostic wax up of the fractured tooth was done and a putty external surface form (Reprosil, Dentsply Caulk, Milford, USA) was fabricated which was later used for interim FDP fabrication.

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**Case 2**

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**Figure 9:** Postoperative view

**Figure 10:** Case 2 preoperative

**Figure 11:** Preoperative radiograph

**Figure 12:** Provisional fixed dental prosthesis case 2

**Figure 13:** Healed modified ovate pontic site

**Figure 14:** Definitive prosthesis

**Figure 15:** Post operative view
• Tooth preparation was done followed by atraumatic extraction of fractured tooth 11.
• Provisional FDP incorporating the modified ovate pontic design was cemented with temporary luting agent [Figure 12].
• Patient was dismissed after thorough oral hygiene instructions.
• Definitive prosthesis was fabricated as described for Case 1 [Figures 13-15].

DISCUSSION

Socket-preservation techniques should be performed at the time of extraction to create the tissue recess from which the ovate pontic form will emerge. For a pre-existing residual ridge, soft tissue surgical augmentation is typically required. In either case, meticulous attention to the contour of the pontic of the provisional restoration is essential when conditioning and shaping the residual ridge.

Pontics of fixed partial dentures have to fulfill esthetic, functional, and hygienic requirements. For years, controversy has existed regarding the pontic surface abutting the tissue. With the use of the ridge lap pontic, alveolar ridge deficiencies were accommodated, but oral hygiene was difficult because of the concave pontic design. The sanitary pontic and the modified ridge lap pontic were developed to avoid or minimize any contact between the pontic and edentulous ridge mucosa, but they did not satisfy the esthetic requirements. The ovate pontic was developed to fulfill esthetic and functional requirements. Its convex pontic design was intended to fabricate a concave soft tissue outline in the edentulous ridge mucosa. However, at times floss cannot pass through the center of pontic, especially in anterior teeth area, where the distance from the top of papilla to the labial gingival margin is longer than in posterior teeth area. The cementoenamel junction is more curved in anterior teeth, and there is more convexity as compared with posterior teeth area. The modified ovate pontic was developed to circumvent this problem. This pontic is less convex and often requires little or no ridge augmentation. Some investigators have reported that soft tissue-contacting pontics have been associated with clinical signs of inflammation such as swelling, edema, and histologic changes. Oral hygiene was not the main concern of these investigators; their primary concerns were the composition and surface texture of the pontic material, the design of the pontic, and the degree of pressure placed on the edentulous ridge mucosa by the pontic.

Zitzmann and colleagues' study on premolars and molars noted that an edentulous space with an ovate pontic supported by adequate oral hygiene was not associated with overt clinical signs of inflammation. Histologically, the ovate pontic design was associated with a thinner keratin layer and with changes in the composition of the connective tissue component subjacent to the epithelium.

Silness and colleagues reported that clinically healthy conditions can be established at pontic sites if appropriate plaque control with dental floss and/or super floss is performed.

The modified ovate pontic has less soft tissue-contacting surface and less curvature than the ovate pontic. This modified pontic fulfills not only the esthetic and functional demands but also the hygienic requirements. It is much easier to clean than the ovate pontic.

The modified ovate pontic design and its proposed advantages over ovate pontic design have been outlined. Two cases where immediate ridge management technique utilizing interim fixed dental prosthesis using modified ovate pontic, followed by definitive prosthesis have been described.

REFERENCES