



## Restoration of maxillary anterior bridges with ovate pontics design: A case report

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### Abstract

The restoration of maxillary anterior teeth using bridges with an ovate pontic design is made to achieve esthetic bridges and gingiva that look like natural teeth as much as possible. The contours of the gingiva at the ovate pontic can be adjusted by adding composite resin at the bases of pontics of provisional restorations to create ovate shapes. The provisional restoration is placed in the mouth for 6 months in order to achieve esthetic and natural gingival contours. Then an impression is taken to simulate the contours of the gingiva for the final restorations. The use of an ovate pontic resulted in esthetic gingiva and final restorations which were similar to natural teeth. The gingiva under the bases of the ovate pontics was healthy. In addition, the patient was more satisfied and confident while talking and smiling. This treatment method can be used effectively for patients who have high esthetic demands for a maxillary anterior bridge because it can achieve the most esthetic and natural appearances of the gingiva and final restorations.

**Key words:** contour, esthetic, final restoration, gingiva, natural, ovate pontic, provisional restoration

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## Introduction

The loss of a permanent tooth in the oral cavity will result in a change of the bone and the alveolar ridge that supports the tooth. Resorption of the bone supporting the original tooth may occur either by horizontal (buccolingual) or vertical (apicocoronal) bone loss. Seibert<sup>1</sup> and Abrams<sup>2</sup> categorized the edentulous ridge into four classes: Class 0, no loss of supporting bone and tissue in both the height and thickness of the edentulous ridge; Class I, loss of supporting bone and tissue in the buccolingual direction; Class II, loss of supporting bone and tissue in the apicocoronal direction; and Class III, loss of supporting bone and tissue in both the height and thickness of the edentulous ridge. If a bridge restoration should be made to close the space, a missing tooth can be substituted with a pontic. There are several types of pontic designs, each with different advantages and disadvantages. These designs include: sanitary or hygienic pontic, conical pontic, saddle ridge-lap pontic, modified ridge-lap pontic, and ovate pontic.

A sanitary or hygienic pontic is designed that the base of the pontic does not come in contact with the gingiva; this is accomplished by raising it approximately 2 mm over the gingiva. This is helpful for easy cleaning, and eliminates areas where food residues can be trapped. The disadvantage is that it does not look like a natural tooth. This type of pontic is, therefore, suitable for use in the area of the posterior teeth where esthetics is not a critical requirement, and would be indicated for a patient who may have a problem in cleaning the oral cavity.

A conical pontic has a small round tip designed to fit in and perfectly contact the edentulous ridge without any heavy depression, making it easier for a patient to be able to thoroughly clean it. Although it looks nicer than a sanitary or hygienic pontic, a conical pontic

does not have the esthetic appeal of a natural tooth. Hence, it is suitable for use in the area of the posterior teeth, and would be recommended for a patient who may have a problem in cleaning the oral cavity.

A saddle ridge-lap pontic is the pontic mentioned in many textbooks on making dental bridges. However, it is no longer commonly used because the form of this type of pontic poses a problem for the patient when cleaning the teeth. The pontic has a curved shape in accordance with the edentulous ridge. The size of the pontic is comparatively equal to the size of the tooth, thus causing the base of the pontic to be concave inward so the patient is unable to clean underneath the base.

A modified ridge-lap pontic has been modified by making an adjustment at the lingual/palatal surface of the base of the pontic so it has a convex base, making it easier to clean the teeth and preventing food from being trapped underneath the pontic. In addition, this type of pontic looks nicer because the part that contacts the buccal gingiva has a shape that looks identical to a natural tooth. Therefore, it is suitable to be adopted for use in both the posterior and anterior teeth where the beauty of the teeth is important. This form of pontic is, therefore, a popular selection for a bridge in most cases.

An ovate pontic is a highly beautiful pontic that looks like a natural tooth emerging from the gingiva. It is popularly used in the area of the upper anterior bridge in patients with a high lip smile line. Food residues cannot be trapped under the pontic base, thus allowing for easier cleaning. This ovate pontic is the same size as the missing natural teeth, but it has a curvy, egg-shaped base depressing on the gingiva making the tooth socket. However, this type of pontic cannot be used in patient with great bone resorption and thin gingival tissue. When creating a pontic base and gingival socket,

the ridge must be prepared by gingival surgery, using a large-size round bur or electrosurgery to condition the gingiva. The pontic base of the provisional restoration is then adjusted little by little to form an ovate shape pressing on the edentulous ridge. The base of the pontic must not create too much pressure on the gingiva, which may cause an ischemic condition of the gingiva. Material should gradually be added to the ovate pontic base in order to obtain a satisfactory gingival contour. The creation of gingival tissue typically takes as long as 1 to 2 months to prepare sufficient gingival tissue of the interdental papillae or so-called pseudopapillae.

An ovate pontic made on the edentulous ridge of a long-lost tooth is called a “delayed condition ovate pontic”, while an ovate pontic made on a patient who needs a provisional restoration immediately after tooth extraction is called an “immediate condition ovate pontic”.

It is rather difficult to forecast the results of treatment in making an ovate pontic immediately after tooth extraction because of subsequent bone resorption. In the case where there is good supporting periodontal tissue, a provisional ovate pontic design is inserted into the socket of the extracted tooth, with the pontic base extending approximately 2.5 mm into the socket. The temporary bridge will be cemented with temporary cement and remain in place for approximately 4 to 6 weeks.<sup>3,4</sup> The ovate pontic will help model the edentulous ridge during wound healing after tooth extraction, making the form in accordance with the base of the ovate pontic while maintaining the level of the gingiva, including the interdental papilla. Tooth extraction should be carefully performed. Excessive force should not be applied to the gingiva and bone in order to prevent substantial bone resorption. The edentulous ridge should undergo minimal changes in scale to maintain stable gingival

levels.<sup>5</sup> The osseous crest must be preserved during tooth extraction, especially buccal and interproximal bone. Proper maintenance of the gingival margin outline will create the illusion that the restoration is emerging as if it was supported by a root, while in fact there is none.<sup>6</sup> In order to achieve a good result, the volume of the pontic base must be equal to the extracted tooth.<sup>7</sup> After 4 to 6 weeks, the provisional restoration will be removed. The pontic should fit in the position of the extracted tooth, with the level of gingival depression at a depth of approximately 1 mm into the gingiva.

After the edentulous ridge has achieved a good shape, the gingiva at the convex shape of the pontic base can be cleaned using Super Floss in order to prevent the gingiva from becoming inflamed.<sup>8,9</sup> The final restoration can be fabricated and permanently cemented after the gingival tissue is consistent, which takes approximately 6 to 12 months; the pontic base is set at a depth of approximately 0.5 mm.<sup>10</sup> Moreover, a design can be made on the labial part of the ovate pontic base to make it slightly round in order to attain the most beautiful final result. In this respect, this part of the ovate pontic will create a tooth emergence profile with a more natural look and resembling the neighboring teeth as much as possible.<sup>11</sup>

Subsequent to tooth extraction, the supporting bone and periodontal tissue of the edentulous ridge will change and cause the loss of the appearance of the crest in both apicocoronal and buccolingual directions. Such loss of beauty can be partially mitigated by immediate conditioning of the edentulous area with a temporary restoration with an ovate pontic design. However, the technique in making the ovate pontic may not be able to maintain the condition of the outline of the gingival margin, but it can help maintain the interdental papilla even though the interdental

papilla level may not be equal to the original level.<sup>11</sup>

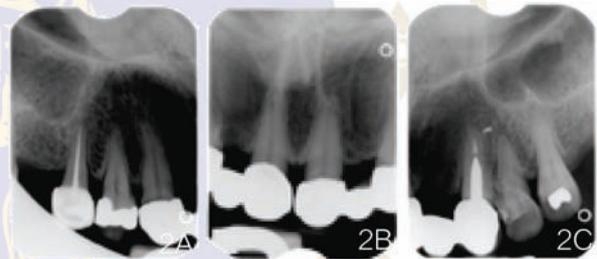
This article describes a patient who in need of having new anterior bridges made. The ovate pontics can be considered for a patient with long-lost teeth in order to create more esthetic and natural restorations.

## Clinical report

A 46-year-old Thai female patient arrived seeking treatment at the Esthetics Restorative and Implant Dentistry Clinic, Faculty of Dentistry, Chulalongkorn University. She desired to replace her anterior bridges that had been used approximately 18 years with new bridges made for beauty and good usability. She was not satisfied her anterior bridges that had black margins at cervical areas at labial surfaces of teeth 11 and 21 and had black triangles at the interdental papillae between abutments and pontics. An intraoral examination revealed that the bridges of teeth 13 to 11 and 21 to 23 were porcelain fused to metal; the labial porcelain at the crown margins of teeth 11 and 21 was partially chipped (Fig. 1A and B). Traumatic occlusion was not detected. Radiographic examination showed that teeth 13, 11 and 21 had no periapical lesions. However, tooth 23 had undergone root canal treatment; a piece of gutta-percha was found at the apical root, with a metal post in the root canal (Fig. 2A–C). A percussion test showed a negative response,

indicating that endodontic re-treatment would not be required. Upper and lower arch impressions were taken and poured with stone to make study models. The relationship of the jaws and face was recorded using facebow transfer and mounting in an articulator. The interarch relationship was used to fabricate a custom incisal guide table mimicking the anterior guidance of the patient's existing porcelain fused to metal bridges which had already been adjusted.

Wax-up models of the bridges of teeth 13 to 11 and 21 to 23 were created by referring to anterior guidance from a custom incisal guide table. Provisional bridges were fabricated according to the wax-up models using acrylic resin (UNIFAST Trad; GC America, USA) (Fig. 3A and B).



**Fig. 2** Radiographic examination before treatment revealed 4 abutment teeth which were no periapical lesion (2A,2B and 2C). However, abutment teeth 23 was found some part of gutta percha at apical root and endodontic treatment was short. Metal post in root canal had good integrity(2C).



**Fig. 1** Before treatment : frontal view when biting (1A) and occlusal view of upper teeth (1B). **Fig. 1A** showed chipping of porcelain at margins of crowns 11 and 21.



**Fig. 3** Photographs of provisional restorations of teeth 13 to 11 and 21 to 23; frontal view when biting (3A) and occlusal view of upper anterior teeth (3B).

After removing the existing bridges, it was found that the edentulous ridges at missing teeth 12 and 22 had no tissue loss, both in the buccolingual and apicocoronal directions, by considering thickness of ridges and levels of labial gingival of teeth 13, 11, 21 and 23 as references and that the thickness of the connective tissue was sufficient (Fig. 4). The tissues in these areas were prepared for the ovate pontics using a diameter 2.30 mm. round diamond bur (Intensiv No. 400S; Intensiv, Switzerland) to grind the edentulous ridges to a depth of approximately 1 mm. and modify the tissues to get concave forms. Some bleeding was observed at the base positions of the edentulous ridge pontics (Fig. 5A and B). The bleeding was stopped using electrosurgery and the provisional bridges in the area of teeth 12 and 22 were prepared by adding with flowable composite resin at the pontic bases to achieve ovate shapes (Fig. 6A–F). Initially, the gingiva in these areas was depressed and found to be a

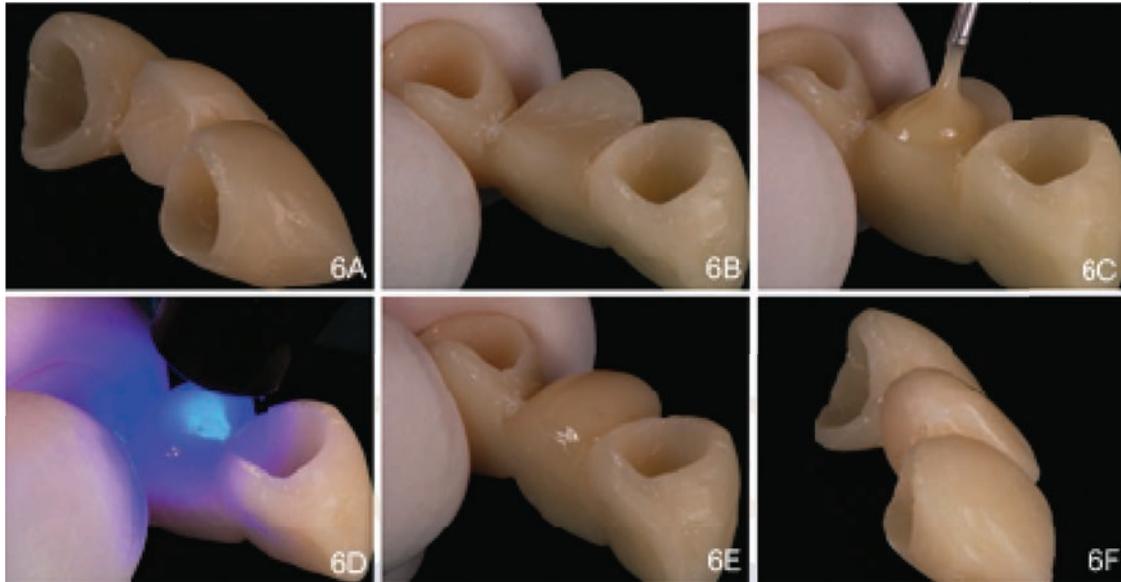


**Fig. 4** The intraoral examination of edentulous areas, that teeth 12 and 22 were lost, found no tissue loss in all dimensions and adequate soft tissue thickness.

slightly pale white color, but after approximately 5 min the gingiva returned to a normal light pink color. If the gingiva found still to be a pale white color after 5 min, the bases of the pontic should be ground down a little bit to reduce the contours at the pontic bases. The provisional bridges with ovate pontic were cemented using temporary cement (TempBond



**Fig. 5** The edentulous area were already modified; frontal view of upper anterior teeth (5A) and occlusal view of upper teeth (5B) after modification of tissue.



**Fig. 6** The bases of pontics were concave (6A and 6B). Ovate pontics were prepared by adding flowable composite resin at the pontic bases to get the ovate shapes (6C) and then light-curing (6D). Photographs showed proper contours of ovate pontics (6E and 6F).

NE; Kerr, USA). The patient was asked to come back in approximately 2 weeks. Inflammation, swelling or infection can be prevented by instructing the patient on how to properly clean the area under the pontics using Super Floss. The first week of temporization, the patient should not be allowed to clean the area under the temporary ovate pontics because such cleaning will possibly interfere with wound healing under the pontics. These temporary bridges should be used continuously for a period of not less than 1 month. If the pontic then still poses a problem, i.e. excessive gingival depression and disfiguring of the gingival contour, the area under the pontic can be altered to achieve a good appearance of the gingiva. After the patient was satisfied with the overall appearance and beauty of the teeth, and had acquired the gingival appearance of the pseudopapillae, impressions were taken using polyvinyl siloxane (Flexitime; Heraeus Kulzer, Germany). Tooth color of the porcelain fused to metal bridges of teeth 13 to 11 and teeth 21 to 23 was selected using the Vita

Classic Shade Guide; the color chosen was A3.5. Upper provisional bridge impressions were taken using alginate to make tooth models which were then mounted on an articulator. Then a custom incisal guide table was fabricated from the provisional bridges (Fig. 7). After the final bridges with ovate pontic were made, they were tried in the patient's mouth to see the overall result. The bridges were checked for marginal integrity, proximal contact, occlusion and the patient was asked about



**Fig. 7** Custom incisal guide table was fabricated in order to imitate the anterior guidance of the patient from provisional restorations.

satisfaction with the color and appearance of the teeth. Once all the prerequisites had been completely checked and any corrections made, the final bridges were cemented using temporary cement (TempBond NE; Kerr, USA) (Fig. 8A and B). The patient was allowed to use the final bridges until she felt satisfied and could make good use of them. For 10 months of temporization, the patient complained about slightly bleeding when using dental floss under the ovate pontic of tooth 12 and having little black triangles at interdental palillae of the pontic of tooth 22 when came for follow up. Therefore, the ovate pontic base of tooth 12 was ground down slightly for a proper form and the final bridge of teeth 21 to 23 was removed and the ovate pontic base of tooth 22 was added with porcelain in order to correct little black triangles. After temporary cementation for 10 months, bleeding when using dental floss under ovate pontic of tooth 12 and little black triangles at the ovate pontic of tooth 22 were

not found. After that, the final bridges were continuously cemented using temporary cement (TempBond NE; Kerr, USA) for 11 months until the gingival tissue was consistent and the patient felt totally satisfied. If any abnormality should be found, the contour could be adjusted for a better form and the patient would be allowed to continue using the final bridges until the ridge was found to have no change (Fig. 9A and B).The final bridges would then be cemented with permanent cement and dental appointments scheduled for continuous checks every month.

After 11 months, the patient felt generally satisfied. The dental bridges were therefore permanently cemented with self-cured dental adhesive resin cement (Super-Bond C&B, shade radiopaque; Sun Medical, Japan). The porcelain margins (Fig. 10) were prepared by etching with 4% hydrofluoric acid gel (Porcelain Etchant; Bisco, USA) for 4 min, cleaning with water and then drying. V-Primer (Sun Medical, Japan) was

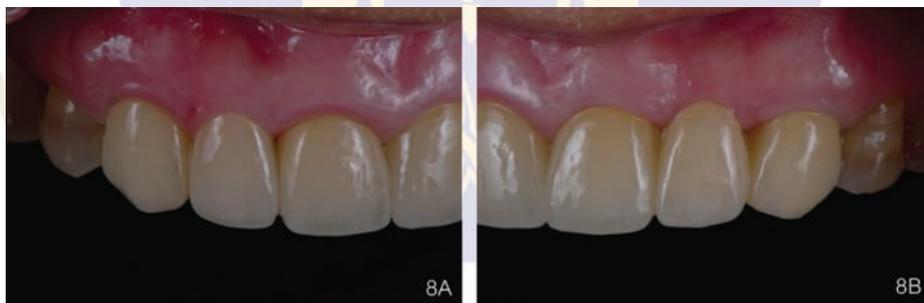


Fig. 8 Porcelain fused to metal bridges of teeth 13 to 11 and 21 to 23 were cemented with temporary cement (8A and 8B).

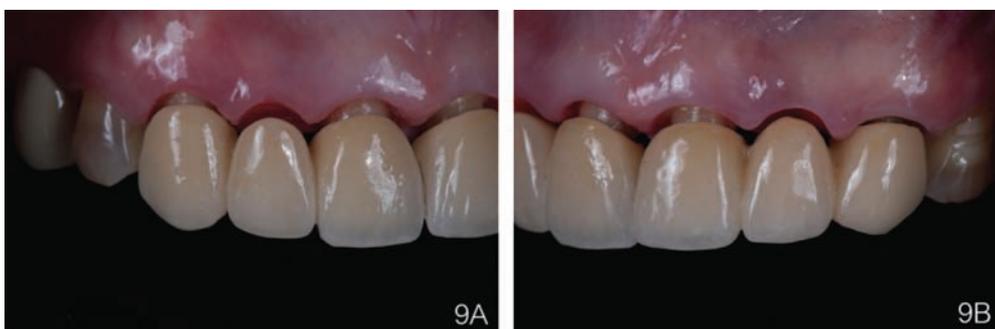


Fig. 9 The edentulous ridges had esthetic contours and stable gingival levels (9A and 9B).



**Fig. 10** Porcelain fused to metal bridges of teeth 13 to 11 and 21 to 23 were designed with porcelain margins and ovate pontics.

painted on all metal parts of the final bridges; this was followed by permanent cementation of the final bridges with resin cement. Excess resin cement was removed. The occlusion was repeatedly checked to ensure that the bridges were perfectly and tightly cemented.

After cementation of the final bridges, a dental appointment was scheduled for follow-up in 2 weeks to check the occlusion and gingival condition after cementation. Succeeding checks and follow-ups would also be made after 1 month, 3 months and 6 months, respectively (Figs. 11A-E, 12A and B, and 13A and B).



**Fig. 11** Follow up 1 month after permanent cementation porcelain fused to metal bridges. The gingiva around bridges was healthy and ovate pontics revealed beautifully natural appearances (11A). Occlusal view of bridges showed normal occlusion after check with articulating paper (11B). Radiographic examination demonstrated properly marginal integrity of bridges and no excess resin cement (11C, 11D and 11E).



**Fig. 12** Photographs of patient before and after treatment (12A and 12B). After treatment, patient had the beautiful smile and felt more confident when smiling (12B).



**Fig. 13** Follow up 2 months after permanent cementation porcelain fused to metal bridges. The gingiva and bridges remained in good and natural appearances (13A and 13B).

## Discussion

It is necessary to select a suitable patient in order to utilize a bridge with an ovate pontic design. The patient must have a Class 0 edentulous ridge; resorption of the edentulous ridge after tooth extraction in both apicocoronal and buccolingual directions must be minimal. Moreover, the thickness of the connective tissue at the pontic area which the pontic will depress must not be less than 3.0 mm. The dentist must lay out the treatment steps in a systematic order, and the patient must give exceptionally good cooperation. It is necessary to formulate a long-term plan, allowing a sufficient length of time to prepare the gingival tissue underneath the pontic. The patient must be aware of the need for frequent treatments and follow-ups. Also, the patient must comply with the instructions of the dentist in maintaining good oral hygiene in order to achieve the optimum treatment outcome.

After tooth extraction, socket preservation should be performed by various methods, such as insertion of artificial bone or substitute biomaterial in the socket, in order to prevent bone resorption as much as possible and to create esthetic supporting connective tissue with a form in accordance with the emerging ovate pontic.<sup>11</sup>

For a patient whose tooth had been extracted many years prior, the connective tissue of the edentulous ridge may not be perfect; in this instance, the dentist can perform

soft tissue surgical augmentation in order to increase the volume of the connective tissue.<sup>12</sup>

The provisional bridge plays an important role in the adjustment of the soft tissue and in giving data in relation to occlusion and esthetics. In this connection, the provisional bridge can adjust to the shape of the gingival tissue without any requirement for surgery. This is a method which is not harmful to the gingiva and can be successfully accomplished by simply making a minor adjustment. The tissue adjustment may be made in the area of the edentulous ridge at one or several positions in order to create a natural bridge by making an ovate pontic.<sup>13</sup> However, in this case, the patient had thick gingival tissues at the edentulous ridges so the tissues were prepared for ovate pontics by both grinding the tissues and adjusting the shapes of the tissues using provisional bridges with ovate pontics for 6 months of temporization.

A suitable gingival tissue adjustment should be done in a way that allows at least 2 mm of gingival tissue to remain between the pontic base and bone crest in order to avoid excessive depressive force on the gingiva. Too little thickness of the remaining gingival tissue will result in the gingiva being weak and unable to cope with the depressive force; this will eventually result in easy inflammation of the gingiva, and may cause chronic bone inflammation and osteolysis.<sup>13</sup>

The interdental papilla is an important component that gives the bridge a more natural appearance. The interdental papilla can be created during the preparation of the ovate pontic base, pushing the gingiva and changing its appearance until the gingival embrasures are completely filled with the adjustment. Acrylic resin may be added many times to support the gingival soft tissue in maintaining the form of esthetic interdental papilla. This can be successfully achieved by having a proper provisional bridge, where the distance between the interproximal point of contact and the bone crest should be less than or equal to 5 mm, in order to ensure a reliable result.<sup>14</sup>

Connective tissue augmentation can be performed by creating a subperiosteal tunnel under the soft tissue of the deficient edentulous ridge and then placing a connective tissue graft into the tunnel in order to increase the thickness in the area.<sup>15</sup> However, epithelial connective tissue grafts or other methods of adding thickness to the connective tissue in order to correct a deficiency of the edentulous ridge will result in inconsistent gingival volume after treatment. The volume of the gingiva has been found to be reduced by approximately 25% to 45% because of gingival contraction, depending on the thickness of the graft made.<sup>16</sup> This change will mostly occur during the first 4 to 6 months.<sup>17</sup> The connective tissue used for the graft can be acquired from an area of the palate distant from the deficient ridge; this is known as “free connective tissue augmentation”. In the case where the tissue is acquired from the area next to the deficient ridge, it is called “connective tissue roll augmentation”. This method of attempting to correct a deficient ridge by internal augmentation can be used for a deficient ridge with occlusoapical, buccolingual or papillary defects. The pontic of the provisional bridge must be adjusted to be 1 to 2 mm. away from the area of surgery during the period of

wound healing (6 to 8 weeks) in order to compensate for swelling of the tissue after surgery.<sup>15</sup>

An edentulous ridge with apicocoronal and buccolingual defects can be remedied by a bone graft in order to augment the bone. Synthetic bone graft material can be placed under the deficient edentulous ridge in order to increase the volume of bone. The bone graft material will function as a scaffold for bone and connective tissue ingrowth, but it is not designed to have a new bone created.<sup>15</sup>

An ovate pontic with proper appearance can automatically create interdental papillae with filled embrasures, thus eliminating interdental black triangles. Excess saliva production and indistinct speech can often be reduced as well.<sup>15</sup>

The advantage of an ovate pontic is that it is both beautiful and strong. Its broad, convex shape is much stronger than a modified ridge-lap pontic, which has thin porcelain without support at the gingivofacial extent of the pontic. Dental floss can be used for thorough cleaning because the tissue surface of the ovate pontic is characteristically convex in all dimensions. However, special attention to oral hygiene is necessary to prevent tissue inflammation because of the large-sized area that comes in contact with the tissue.<sup>12</sup>

The disadvantage of an ovate pontic is that it is necessary to condition the gingival tissue underneath, which involves additional expense. Furthermore, additional appointments for evaluations are generally required in order to achieve an esthetic outcome. The socket depression, which has pseudopapillae, must have a provisional ovate pontic for support, and will collapse when the provisional ovate pontic is removed before an impression is taken. In order to compensate for the change in socket appearance during the impression, it is necessary to scrape the cast in this area to

ensure that a good contact area with the gingiva is acquired and that the pseudopapilla is supported with a reliable pontic.<sup>12</sup>

Although the ovate pontic must have positive tissue contact in order to support the pseudopapillae, maintaining a good condition of the mucosa can be achieved by having tight contact with the mucosa, but without any compression, so that the gingival part of the pontic can be cleaned as normal.<sup>18</sup> Well-controlled hyperpressure, good pontic polishing, a pontic with a convex contour, and strict plaque control will only cause thin epithelium and short rete pegs, without any inflammation.<sup>19,20</sup>

The base of the provisional restoration will be relined with acrylic, which will fill in the gingival depression. The gingiva in this area will heal and return to normal by epithelialization around the pontic. The final restoration will have tight contact of the ovate pontic with the gingival depression. This esthetic pontic creates the appearance of a natural tooth emerging from the gingival sulcus. The contour of the pontic in the gingival area is round, without any acute or sharp margins, and it is easy to clean under the pontic using dental floss.<sup>15</sup>

After treatment, the patient should be advised to brush and clean the oral cavity thoroughly, particularly the area under the pontic which should be cleaned regularly using dental floss in order to prevent tissue inflammation. The bridges in the area of the anterior teeth should not be used to bite hard food or should not be otherwise misused in order to prevent the bridges from being broken. The patient should be instructed to visit the dentist on a regular basis, i.e. every 6 months, in order to follow up the results of treatment. This will enable the patient to have esthetic bridges and maintain healthy gingiva in the area of the anterior teeth for as long as possible.

Treatment of a patient in the area of the anterior teeth can be successfully accomplished

by using an esthetic bridge with an ovate pontic design. A more beautiful result can be expected compared with other types of pontic because of the pseudopapillae, which give the pontic a natural appearance of emerging from the gingiva. This will build confidence in the patient, and perhaps result in a more outgoing personality, because the patient will no longer be reluctant to speak and smile broadly. If the contour of the pontic is well designed and polished and the patient can thoroughly clean the area under the ovate pontic using dental floss, gingival inflammation can be prevented. This ovate pontic design is particularly suitable for treatment of a patient in the area of the anterior teeth, where beauty is a primary requirement, in order to achieve the best esthetic result.

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