



ORIGINAL RESEARCH PAPER

Prosthodontics

PONTICS – PAST TO PRESENT: A REVIEW.

KEY WORDS: Pontic, pontic design, esthetics, hygienic pontic, modified ridge lap pontic.

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ABSTRACT Favourable outcome of fixed Prosthodontics is partly dependent on the type of pontic design which is one of the key factors in the outcome of the treatment. At present, there are many different pontic designs and materials available in the market. For some patients, one pontic may have some advantages over another and the choice is purely a matter of preference by the operator. It is recognized that clinical circumstances will require infinite variations. Hence, the present article reviews the different pontic designs that are within easy reach.

INTRODUCTION

Pontic is the component part of a fixed partial denture which replaces the lost natural tooth along with its function [1]. The term pontic is derived from the Latin word Pons, meaning Bridge [2]. According to GPT-8, it is an artificial tooth on a fixed partial denture that replaces a missing natural tooth to restore its function [3].

Thayer K has stated its functions as: it must reinstate the function, should be hygienically maintainable, biologically & esthetically acceptable and comfortable [4]. Johnston enumerated its functions as mastication, phonetics, maintenance of tooth relationship and esthetics [5].

Requirements of a pontic:

As per Tylman, pontic should: restore function, impart esthetics and comfort, also enable effective oral hygiene, biologically tolerable and protect underlying residual mucosa [1]. Whereas Rosensteil SF et al., [6,7] has enumerated the requirements under three headings:

1. Biologic: The tissue surface of the pontic should be easily cleansable, edentulous ridge should be free of occlusal pressures.
2. Mechanical: Pontic should be firm and connectors should be tough to avert fracture.
3. Esthetic: Pontic must provide natural appearance [6].

According to Bernard Smith strength, appearance and cleansability are the ideal requirements of a pontic [8].

Classification:

According to Tylman [1]:

Based on the shape of the pontic contacting the tissues:

- Saddle pontic
- Modified ridge lap pontic
- Hygienic pontic
- Conical pontic
- Ovate pontic

Based on materials used:

- All metal- Gold, cobalt-chromium, nickel- chromium etc.
- Non metallic – Porcelain
- Combination –Metal and porcelain, metal and resin

Based on design by the manufacturer or prefabricated pontics:

- Flatbacks
- Trupontics
- Long-pin facings
- Pontips
- Reverse pin facings

According to Rosensteil [6]:

- Mucosal contact – Ridge lap, modified ridge lap, ovate, conical.
- No mucosal contact – Sanitary (hygienic), modified sanitary (hygienic)

According to Oswal [9]:

- Conventional – commonly used pontic designs are ridge lap pontic, modified ridge lap pontic, sanitary, conical and ovate pontic.
- Unconventional – modified ovate, modified sanitary pontic, occlusal bar, Stein pontic, spheroidal, hollow, inzoma, split pontic, cross pin and wing.

The selection of the pontic varies with the situation and the individual pontics are described below.

Sanitary or Hygienic pontic:

The edentulous ridge is not in contact with this pontic. It is cleansable as the residual ridge is clear of the tissue surface. It is used in the posterior teeth region; especially in mandibular 1st molar region. As it is used in posterior region, esthetics is not of concern and only metal can be used. The width of the pontic should not be less than 3.0 mm occlusogingivally.

This pontic often has an overall convex design faciolingually and mesiodistally and been described as a "fish belly".

The disadvantage with this pontic is that it may cause tongue habits which may irritate the patient, as food lodgment is seen. It is less "tooth like" configuration and therefore used only in the non-appearance zone [1,6,9].

Saddle or ridge lap pontic:

The saddle pontic has a concave suitable surface that extends over the residual ridge buccolingually. As it overlaps the lingual and facial sides of the ridge, it is also known as "ridge lap".

The disadvantage of this pontic is, it is not possible for cleaning with dental floss, may cause deposition of plaque. This design also results in tissue inflammation. [1,6,9].

Modified ridge lap pontic:

The modified ridge lap pontic unites the prime attributes of the hygienic and saddle pontic designs, merging esthetics with cleansability. Though the design overlaps the facial residual ridge, stays clear off the lingual ridge. The surface of the pontic towards gingival must not have downturn or hollow, to permit maximum plaque control. Lingually, the ridge should not contact the midline of the edentulous ridge, even on posterior teeth.

The contact of the pontic to the tissue should be similar to a letter T, whose vertical arm terminates at the summit of the ridge. The most frequently used pontic design in both maxilla and mandible where esthetics play an important role [1,6,9].

Conical pontic:

Often called as, egg-shaped, bullet-shaped or heart-shaped. Though the pontic is round and cleansable, the tip is small when compared to the overall dimensions of the pontic and should be as convex as possible with center of the ridge contacting only single point.

It is indicated for thin mandibular ridges. If used with flat ridge, results in huge triangular embrasure gaps around the tissue contact, creating areas food lodgment [1,6,9].

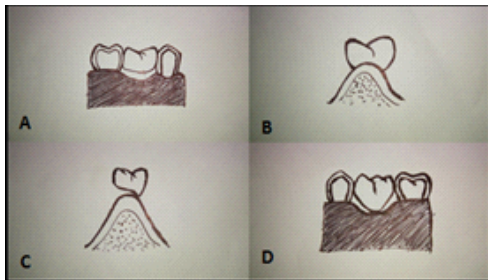


Figure 1: [A.Sanitary pontic; B.Saddle pontic; C. Modified ridge lap pontic; D.Conical pontic]

Ovate pontic:

Esthetically most pleasing pontic configuration is ovate pontic. The tissue surface is convex and rests in a soft tissue concavity or hollow in the residual ridge, thus giving a natural appearance, like a tooth is emerging from the gingiva. The required step for favorable results is attentive treatment planning.

The portion of the ovate pontic that is tissue contacting is rounded, and it is placed into a depression in the ridge. A temporary fixed partial denture with the pontic crossing one - quarter of the way into the socket soon after the tooth extraction, can be placed to create concavity.

Its advantages are its rigidity, esthetics, can be easily flossed, not liable to food lodgment and the broad convex configuration is stronger when compared to that of the modified ridge lap pontic. The disadvantages are diligent oral hygiene is required to avoid tissue inflammation causing due to large area of tissue contact and tissue management surgically is needed [1,6,9].

Modified Ovate pontic

Liu in 2003 proposed this design, was evolved to overcome the difficulties experienced with the ovate pontic. The height of contour of this pontic at the tissue surface is shifted from the centre of the base to a more labial position. The faciolingual dimensions of this pontic to create an emergence profile is thinner and contrast to the ovate pontic, this can be easily maintained clean, as the configuration is less convex. The prime advantage relative to that of ovate type is that the surgical augmentation of the ridge is either not required or very less.

The height of contour at the tissue surface of the pontic is 1-1.5

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 ovate pontic is less convex than that of the ovate pontic. It has more effective air seal for better speech than modified ridge lap.

The disadvantage is that if Class I defect and high smile line is present a shadow may be left in the apical area of the tooth at the gingival margin. For modified ovate pontic, dental floss can be brought into intimate contact with the tissue contacting surface. Chun-Lin Steeve has stated that the following advantages may be seen with modified ovate pontic:

1. Superb esthetics as it has a natural emergence profile
2. Satisfied functional essentials
3. Ease of cleansing
4. Potent air seal, eliminating air or saliva leakage
5. The appearance of a free gingival margin and interdental papilla
6. "Black triangle" between the teeth either minimized or eliminated.
7. Surgical augmentation of the ridge is either not required or very less [9,10].

Modified sanitary pontic, Arc-fixed partial denture, or a "Perel pontic"

For the mandibular posterior missing teeth, a new idea of sanitary "arc-fixed partial denture" was introduced by Tjan in 1983. The pontic and connector design reproduced anatomic contours of a certain portion of the buccal and lingual surfaces. This design is easy to keep clean which led to wider acceptance among dentist and dental technicians. Its gingival portion is shaped as an archway between the retainers as in Figure 7. It is also less susceptible to tissue proliferation that can occur when a pontic is too close to the residual ridge.

Indications for perel pontic include – severe alveolar ridge resorption, less vestibular depth, previous periodontal surgery or treatment, high frenal or muscle attachments and less or no attached gingiva [6,9,11].



Figure 2: A.Ovate pontic; B.Modified ovate pontic; C.Modified sanitary pontic.

Occlusal bar

The edentulous ridge is not in contact with this type of pontic. It is predominantly utilised used when the edentulous space is small mesiodistally, large occlusocervically, or both. This kind of pontic enables bulk of food to enter in the space between the pontic and soft tissue which is irritating to the patient. However, the food can be removed simply by swishing fluids through the larger space [9,12].

Stein pontic

It is a variant of modified ridge lap pontic. It is indicated in sharp edentulous ridges, displays least tissue contact, and provides acceptable esthetics. It cannot be used in edentulous ridges with broad buccolingual proportions [9,13].

Spheroidal pontic

The pontic touches the edentulous ridge without pressure. Based

on the relationship of the edentulous ridge and the opposing occlusion, either crest of the ridge or buccal surface is in contact with the tip only [6,9].

Hollow pontic

This custom designed hollow pontics reduces the price of the metal-based ceramic pontics. The other advantages are:

- Reduction in metal porosity as there was less metal in the pontic
- Easier soldering when necessary, due to the absence of large heat sinks
- Potential improvement in strength due to the sandwich of porcelain-metal, it presents high resistance to tensile force
- The technique involves carving a solid pontic in wax and then hollowing the centre of the wax pontic from underneath. Porcelain application involves filling the hollow centre with porcelain firing two or more times [9, 14].

Inzoma pontic

It is an innovative approach toward pontic design, given by Malone and Koth, Alton. In this design, the horizontal ridges were added. In a posterior inzomapontic, the buccal and lingual ridges are added on abutments for porcelain support. In an anterior inzoma pontic, the labial horizontal ridges are added to prevent flaw migration [9, 15].

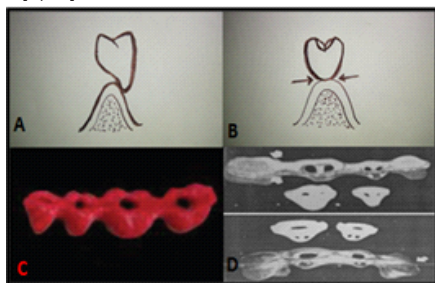


Figure 3: A.Stein pontic; B.Spheroidal pontic; C.Hollow pontic; D.Inzoma pontic

Split pontic

This is an attachment that is placed entirely within the pontic. It is particularly used in tilted abutment cases. The wax pattern for the anterior 3 unit segment is fabricated first with a distal arm attached to the pier abutment. Invest, burn out and cast the mesial half, finish it, and seat it on the cast. Place the plastic pattern down into it, wax the distal retainer and the disto-occlusal two-thirds of the pontic pattern.

Cement the mesial segment first followed immediately by the distal segment [fig 4A]. No cement should be placed between the two segments of the pontic [2,9].

Cross-pin and wing

This is a two piece pontic system. It permits the two sections to be fixed strong after the retainers have been cemented. The distal retainer which is having a wing is cemented first and the mesial retainer with the pontic is placed next [fig 4B]. Later, a tapered pin is passed through the pontic, the wing and back through the pontic.

It is a variety of non rigid connector and can be used in pier abutments or in cases where there is no single path of insertion [1,9].

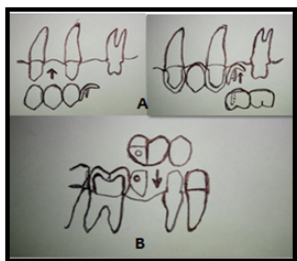


Figure 4: A.Split pontic - mesial half to be cemented first and

then the distal half having the pontic; B.Cross pin and wing - distal retainer with the wing, the mesial retainer with the pontic, will be stabilized with a cross pin;]

CONCLUSION

Pontics act as an essential component of a fixed partial denture. The favourable outcome of fixed partial prosthesis depends on proper designing of pontic, which includes assessment of pontic space, retainers to be used, esthetics, ridge outline and quality, patients' oral hygiene and occlusion.

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