

A New Design for Anterior Porcelain Fused to Metal Fixed Prosthetic Restorations; PTU Type III

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Abstract:

A new design for anterior fixed-partial denture (FPD) and crown is described. This article presents its advantages, disadvantages, indications and contraindications. The new design which has been exercised for 8 years provides esthetics and high strength for the restorations and the results have been satisfactory.

Key Words: Anterior bridge; Porcelain bridge; Esthetic bridge

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INTRODUCTION

Metal ceramic crowns are primarily used to restore damaged teeth. Due to the simplicity of the technique and acceptable marginal fit, these restorations offer an excellent treatment option with a wide range of indications. However, the specular reflection from the facial surface and the dark shadow of the cervical collar can be considered as disadvantages. The light that is reflected by the opaque porcelain can cause an unnatural appearance of the crown. Despite the advances that have been made to simulate tooth color in porcelain, perfect esthetics is still far behind [1]. The use of porcelain laminate veneers has been well established in the treatment of anterior teeth [2-4]. One of the most considerable advantages of porcelain laminate veneer is its lustrous appearance which imparts a close-to-natural-color to the crown. Light reflection from the underlying dentin is responsible for this natural appearance.

This article tries to describe a new design for metal porcelain crowns and bridges. The use of the newly proposed restorations is

suggested in cases where implants are contraindicated or the abutment teeth are short and PTU type I is inadvisable. This design is also suitable for correction of the shape and color of abutment teeth and when esthetics is a main concern. On the other hand, PTU type III is contraindicated when function is to be restored.

MATERIALS AND METHODS

Patient Selection:

All anterior teeth, especially missing central or lateral incisors with a need for full coverage restorations can be selected for this type of crown placement.

Several factors may influence case selection such as carious lesions on the abutment teeth, previous preparation for the bridge, and when esthetics is the main concern. The abutment teeth must be periodontally healthy and they should also be evaluated for vitality, mobility and adequate crown length. In occlusal examination, cases with excessive incisal contact in protrusive movements should be avoided.

Diagnostic cast:

A diagnostic cast should be obtained and mounted on a semi-adjustable articulator as an adjunct to clinical examination.

Tooth Preparation:

A labial shoulder or deep chamfer should be prepared, using a cylindrical flat-end bur or a chamfer diamond point. Considering that the final restoration consists of a metal collar in the lingual margin, a chamfer preparation should be applied for the lingual finishing line. In order to provide ideal esthetics and retention, a 1.5 mm incisal reduction should be prepared on the teeth.

Impression:

An accurate impression material such as additional silicon is recommended for making the final impression. Using a chemical impregnated cord, the gingiva should be retracted to obtain an ideal impression of the finishing line.

Laboratory Procedure:

The impression is poured twice, once with die stone and the other with a refractory material. In this specific design, the metal framework only covers the lingual surfaces and incisal edges; but the labial surface is covered only by porcelain (Fig. 1). The lingual surface is the same as the classic lingual coverage of porcelain fused to metal (PFM) crowns. The metal should extend to the proximal area but the care should be exerted that the lingual



Fig. 1: New metal ceramic design for anterior fixed-partial denture and crown

collar does not encroach into the proximal space by more than it is needed for strength. Proximal extension of the metal framework should end just short of the proximal contact area, for esthetic reasons. The lingual metal framework also should extend to the incisal area so that it reaches the incisal edge, but does not cover the labial surface (Fig. 2).

Following fabrication, the metal framework (base metal alloy) is tried in the mouth to ensure accurate fitness. The framework is seated on the refractory mold in the laboratory and porcelain (Excel co, Excel co Company VNPTM) is baked on the labial, lingual and proximal surfaces. The porcelain bridge or crown is seated in the mouth and the margins, shape and color are checked. The crown or bridge is sent back to the laboratory for the final coloring, shade and glaze (Fig. 3).



Fig.2: Metal framework of the crown; A: labial view, and B: lingual view.

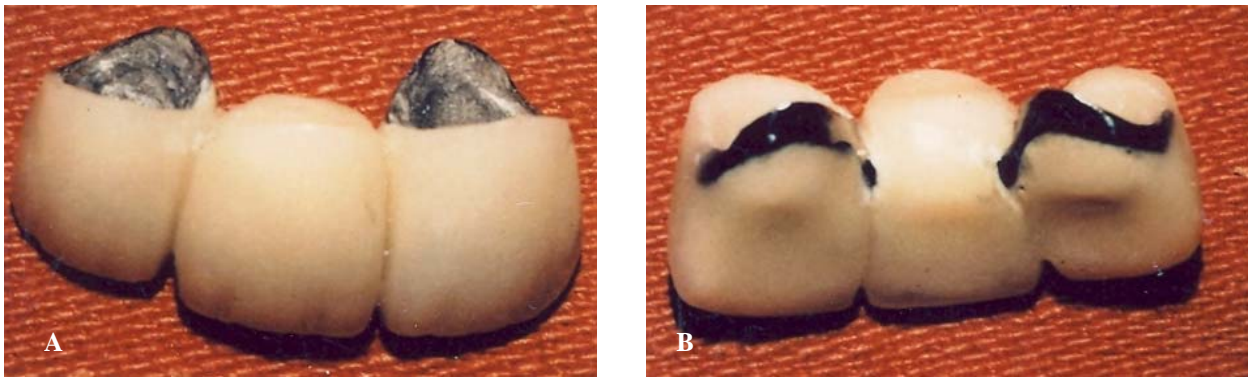


Fig. 3: Three unit bridge before final coloring, shade and glaze; A: labial view, and B: palatal view.

Etching:

The internal surfaces of the metal portions of the restorations are etched with a metal etchant (Ceramic Etch Gel, CDI, Cosmetex) and the porcelain surfaces are etched with 7.5% hydrofluoric acid for 20 minutes.

Cementation:

The use of a rubber dam is suggested in order to prevent salivary contamination during cementation. The dentin surface is etched with 37% phosphoric acid etching solution for 5 seconds. The teeth are rinsed and dried and a dentin bonding agent is used followed by application of a dual cure resin cement for cementation (Fig. 4).

DISCUSSION

In recent years with the introduction of enamel and dentin bonding agents, esthetics and conservation of tooth structure are the major concerns in restorative dentistry. Full coverage of the teeth traditionally is restricted to the metal ceramic and porcelain jacket crowns.

Esthetics, function and preservation of tooth structure are equal concerns for patients and practitioners when restoring the anterior dentition. Full coverage of the teeth has been traditionally performed using metal ceramic and porcelain jacket crowns. Modern concepts in restorative dentistry have brought new solutions through bonded porcelain veneers that are stress distributors and involve the crown of the tooth as a whole in supporting

occlusal force and masticatory function.

An esthetic restorative material should simulate the appearance of the tooth in color, translucency, and texture. It should also have adequate strength, good fitting and biocompatibility [2-4]. With the introduction of porcelain laminate veneers and a variety of dentin bonding and coupling agents, bonding of porcelain to enamel and dentin with luting has become a well established concept [5-9].

Restoration of missing anterior teeth is a main issue in dentistry. In replacing a missing tooth different methods have been advocated such as fixed bridgeworks of acid-etch retained bridges and even removable partial dentures [10-12].

Acid etched metal bridges require sufficient space between the maxillary and mandibular incisors to allow for the metal work. The fixed bridge-work seems to be a radical procedure and the result cannot be quite natural and satisfactory especially in anterior teeth that esthetics is the main concerned. PTU type I is used when some enamel still exists, and the crown length is suitable [13]. When the remaining enamel is not enough or the crown length is inadequate and conservation is one of the main concerns, this design (PTU III) can be indicated. The PTU III crown could also be applied when heavy occlusion or abrasion of the teeth contraindicates the use of all-ceramic crowns.

The advantages of this new design are:

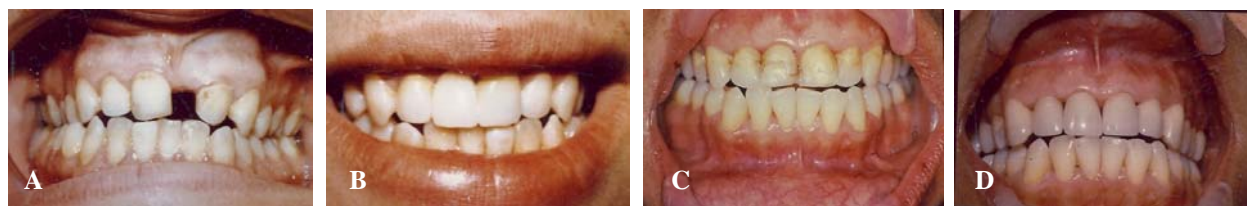


Fig. 4: Finished restorations of PTU type III (B & C) in a case of missing incisal (A), and teeth discoloration (D)

1. Natural and stable color.
2. Resistance to wear and abrasion.
3. No dark shadow of the cervical collar.
4. Biocompatibility with gingival tissues.
5. Much less absorption of fluids than any other material.
6. Correction and reshaping of abutment teeth.

The only disadvantages of this procedure are difficulty in fabrication and high cost.

The new design suggested in this article, is more conservative as compared to PFM crowns and requires less tooth preparation. The porcelain veneer on the labial surface of these crowns and bridges transmit light through the body of the tooth. As a result, a greater depth of translucency exhibits less specular reflection from the facial surface and looks rather natural which the metal-ceramic crowns lack this property.

A natural look along with color stability of porcelain in addition to its biologic compatibility with gingival tissue makes the newly proposed crown and bridge quite satisfactory.

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