

# Management of Failed Long-span Single-piece Fixed Prosthesis with Metal–Ceramic Crowns and Cantilever Bridge with Predictable Esthetic Outcome

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## ABSTRACT

Although there have been a lot of advances in the field of esthetic and cosmetic restorative dentistry, metal–ceramic restorations stand apart in the race to achieve superior esthetics with its strong points of strength and accuracy of cast metal and esthetics of porcelain. To achieve superior esthetic restorations operators are compelled to narrow down their search to all ceramic restorations which are highly expensive. At most times, its use is not rightly justified. A case of a 53-year-old female patient, who reported to the Department of Prosthodontics and Crown & Bridge, Manipal College of Dental Sciences, Manipal, is presented here where simple and economic restorative techniques and principles are undertaken to achieve predictable esthetic results.

**Keywords:** Ball clasp, Cantilever, Esthetic, Metal–Ceramic.

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## INTRODUCTION

Metal–ceramic restorations combine the strength and accuracy of cast metal and esthetics of porcelain. Although there have been a lot of advances in the field of esthetic metal-free restorations, metal–ceramic restorations still provide a reliable treatment option for restoration of partially edentulous arches especially in long-span conditions with predictable esthetics.<sup>1</sup> This case report presents the clinical and laboratory steps in the management of failed long-span single-piece fixed prosthesis with metal–ceramic crowns and cantilever bridge and acrylic partial denture with ball clasps.

## CASE REPORT

A female patient aged 53 years reported to the Department of Prosthodontics, Manipal College of Dental Sciences, Manipal with the chief complaints of bulky dark artificial upper teeth with a broken tooth in the front area, frequent episodes of pain for front teeth, and inability to chew with back teeth (Fig. 1A).

Intraoral examination revealed the following findings with respect to maxillary arch: A long-span fixed single-piece metal–ceramic bridge from 12 to 26 (8 units) and a metal–ceramic bridge with respect to 13 to 15. Ceramic facing was fractured with respect to 23. Missing teeth were 14, 16, 24, and 25. Teeth 11, 12, 21, 22, and 23 were tender on percussion (Figs 1B to D). The mandibular arch was partially edentulous with missing 35, 36, 37, 38, 45, 46, 47, and root canal treated 44. The tooth 48 was restored with silver amalgam. A series of intraoral periapical radiographs with respect to the prosthesis were taken for treatment planning (Figs 2A and B). The patient was healthy with no systemic health problems.

## TREATMENT PROTOCOL

Diagnostic casts were prepared and mounted on a semi-adjustable Arcon articulator Hanau Wide-View using centric relation records. The occlusion was inspected intraorally and on the articulator. The treatment planning involved removal of existing 8-unit long-span single-piece metal–ceramic bridge extending from 12 to 26 and the 3-unit bridge extending from 13 to 15 from the maxillary arch followed by evaluation of abutments and endodontic treatment of prospective abutments. After correction of occlusal plane by coronoplasty, single metal–ceramic crowns were planned for 11, 12, 21, and 22 following endodontic treatment. Metal–ceramic bridge was planned in relation to 23 to 26 and 13 to 16 with 16 as cantilever. Rehabilitation of partially edentulous mandibular arch was planned with removable prosthesis or implant-supported prosthesis. The patient was unwilling to undergo implant treatment. Hence, removable prosthesis was the choice. The patient was not willing for cast partial denture due to economic reasons. Hence, it was decided to fabricate acrylic partial denture with retentive mechanism by means of ball clasps.<sup>2</sup> A metal–ceramic

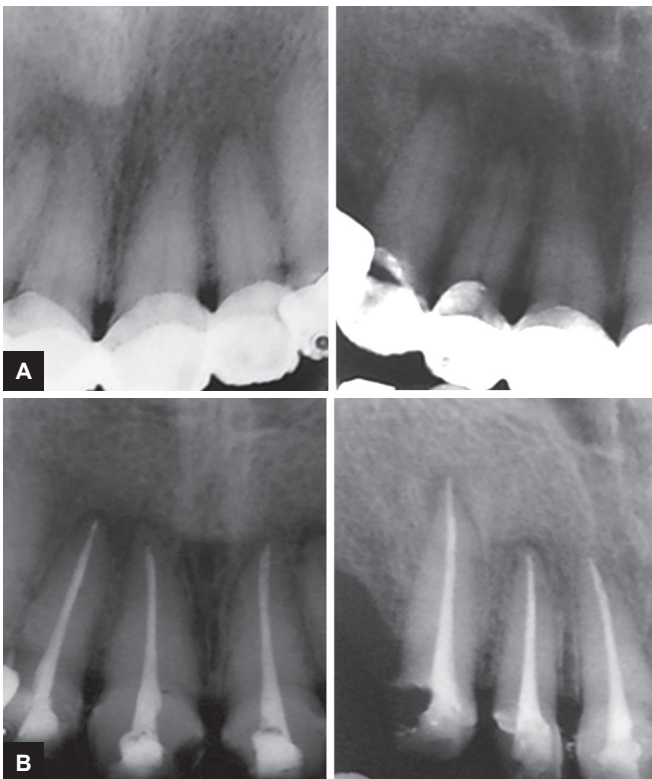
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**Figs 1A to D:** (A) Extraoral preoperative; (B) intraoral occlusion; (C) long-span bridge; and (D) bridge after removal



**Figs 2A and B:** (A) Preoperative radiographs; and (B) postoperative radiographs

crown was planned for 44 which was root canal treated. The bridges were removed with the bridge remover with extreme care so as to avoid damage to the abutments (Fig. 1D). Root canal treatment was carried out on 11, 12, 21, 22, and 23 (Figs 2A and B).

Restorative procedures were carried out after excavating caries and the abutment preparations were redefined with re-establishment of acceptable gingival finish lines (Fig. 3A). The maxillary arch crown preparations were recorded with poly vinyl siloxane elastomeric impression material medium body relined with wash impression of light body using a special tray. Mandibular edentulous arch was recorded with zinc oxide eugenol impression paste using a border molded special tray followed by irreversible hydrocolloid impression of the entire arch using a stock metallic tray to record the anatomic form of the remaining teeth (Fig. 3B).<sup>3</sup>

Master casts were poured and mounted on Hanau Wide-View semi-adjustable articulator using Hanau spring bow transfer and bite registration records.<sup>4,5</sup> Temporary record base with modeling wax occlusal rims was used in the mandibular arch. The articulator was programmed to horizontal condylar guidance of 25° with Bennett angle of 15° as per the instruction manual.<sup>5</sup> Anterior guidance



**Figs 3A to D:** (A) Crown preparation; (B) mandibular pick-up impression; (C) provisionalization; and (D) Mandibular removable partial denture try-in

was set to 10° to provide acceptable esthetics. Provisional restorations were fabricated and cemented (Fig. 3C).

Temporary partial denture with respect to mandibular arch was tried (Fig. 3D). Working and nonworking side contacts and interferences were checked and corrected. Wax patterns of proposed crowns and bridges were fabricated on working cast with separate dies with shallow cuspal inclination with a cut back provided for ceramic facing (Fig. 4A).

The wax patterns were evaluated again for working and balancing side contacts on the articulator followed by casting finishing and polishing. Metal try-in was carried out along with mandibular removable partial denture trial (Fig. 4B). Once the occlusal contacts were re-evaluated it was decided to proceed with permanent restoration of maxillary and mandibular arches.

Ceramic facing was added and fired (Fig. 4C). Acrylic partial denture was fabricated simultaneously with ball clasps for retention in mandibular arch. All crowns and bridges were carefully seated and cemented temporarily with provisional luting agent followed by correction of interferences in excursive movements. Removable

partial denture was inserted in the mandibular arch and clasps were adjusted to engage the gingival embrasure (Fig. 4D). After confirming an uneventful postcementation period, the provisional cement was then replaced with glass ionomer luting cement within a week. The patient was motivated to improve the esthetic appearance of lower anterior teeth either by bleaching or composite veneering or laminates, which she refused because of economic reasons.

Postinsertion instructions were provided to the patient and postrestorative checkup was scheduled and carried out (Figs 5A and B).

## DISCUSSION

In routine clinical practice we often stumble upon extensive preparation and restoration of almost all teeth with long span fused crowns and bridges. This kind of treatment protocol is devised with the sole justification of improving esthetics but at most times fails to do so. It destroys the harmonious function of the stomatognathic system. Subsequently, the patient presents early signs of disintegration of the temporomandibular joint functions



**Figs 4A to D:** (A) Crown and bridge wax-up; (B) metal try-in; (C) metal–ceramic restoration; and (D) after cementation



**Figs 5A and B:** (A) Occlusal view of crowns and bridge; and (B) postoperative

as well as teeth. Even the masticatory mechanism gets affected by unstable contacts and interferences.

It is deemed necessary to formulate the treatment plan when extensive restorative procedures are undertaken with the use of semi-adjustable articulators and accurate face bow records.

Shade holds a major component when it comes to esthetics. In the case presented lower anterior teeth were not worked upon as it was masked by lower lips. It is possible to achieve predictable esthetics and function with simple restorative procedures by the right choice of techniques and materials.

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