**Abstract**

The posterior design of the implant superstructure (the ceramometal crown) was classified into four categories: a ceramometal crown with an access hole on top; a cemented ceramometal crown; a ceramometal crown retained with a lingual screw; and a telescopic ceramometal crown. Cemented ceramometal crowns and telescopic ceramometal crowns are considered simpler, more aesthetic, and more resistant to fracture among the four models. (Quintessence Int 1997;28:117-120.)

**Clinical relevance**

Accurate and passive adaptation of implant restorations with ceramometal crown (CMC) is required because the micromovement of the CMC often results in porcelain fracture. The esthetic problem of an access hole, which is exposed on the occlusal surface of some restorations, can be resolved with the cemented CMC, the CMC retained with a lingual screw, or a telescopic CMC.

**Introduction**

As implant prostheses develop, the esthetic requirements of the patient are increasing. In cases involving posterior restorations an increasing number of patients desire a ceramometal crown (CMC) similar to natural tooth.¹-⁵ The authors often select the fixed-removable prosthesis because it allows removal for future maintenance and improvements. However, this design yields the problem of treating the access hole, which is exposed on the occlusal surface of the restoration.⁶

The design of the CMC implant superstructure can be classified into four types (Fig 1): a CMC with an access hole on the top, a cemented CMC, a CMC retained with a lingual screw, and a telescopic CMC.

**Classification of the implant superstructure**

**Type 1: Occlusal screw-retained CMC, for fixed-removable restoration**

The design of the access hole should be strong and reliable enough to protect the porcelain, but it does not appear similar to the natural tooth because of the metallic line exposed on the occlusal surface (Fig 2). Figure 3[b] shows another access hole design, which does not result in an exposed metallic line. The metallic hole can be concealed with resin, making its appearance more esthetically pleasing. There is, however, a possibility of fracture at the edge of the porcelain, as shown in Fig 3[b]. Figure 3[a], which has a thinner metallic line exposed at the occlusal surface, is a better solution for this type of restoration.

**Type 2: Cemented CMC, for fixed restoration**

This design is easy and simple and is indicated when there is a short clearance between the implant abutment and the opposing teeth. However, in the case of a submerged two-staged implant, it is difficult to completely remove the cement overflow from the peri-implant sulcus. Moreover, there is some possibility that cement will be retained in the peri-implant sulcus, resulting in peri-implantitis. If temporary cement is
Various designs of implant restorations: (a) Ceramometal crown with access hole on top; (b) cemented CMC; (c) lingual screw-retained CMC, with threads in the inner crown; (d) lingual screw-retained CMC, without threads in the inner crown; (e) telescopic CMC.

Fig 2 Mirrored occlusal view of a Type 1 CMC, showing the occlusal screw with metallic line.

Fig 3 Two patterns of metallic frame on the top of the access hole. (a) Improved thinner metallic line; (b) the edge of the porcelain (arrows) with metal support.

used, this crown can act as a fixed-removable type of restoration. The UCLA abutment is used to connect directly with the implant fixture.

The UCLA abutment is available for single-tooth restoration of a two-staged implant as either a cementable custom abutment or a screw-retained crown. There might be some problems, however, if the restoration is made of dental casting alloy instead of titanium. Soft tissue should not touch the surface of dental casting alloy, and the use of the UCLA abutment sometimes results in the presence of deep peri-implant pocket and the absence of biologic seal.

Type 3: Lingual screw-retained CMC, for fixed-removable restoration

The design of Type 3 CMCs requires laboratory skills and adequate time for precise and delicate fabrication (Figs 4a to 4c). In this case, we have had some problems with unscrewing of the occlusal screw,
Fig 4a  Inner crowns splinted with a tapered bar. Two of the three inner crowns have a lingual dimple for retention.

Fig 4b  Completed CMC.

Fig 4c  Mirrored occlusal view of the restoration retained with lingual screw.

Fig 5a  Fractured porcelain (arrows) 2 weeks after loading. (Same restoration as in Figs 4a to 4c.)

Fig 5b  Food debris adhered to the inner surface of the outer crown. (Same restoration as in Figs 4a to 4c.)

An interim denture is used temporarily between the extractions of partially edentulous upper and lower arches of teeth. A CMC was selected for the treatment. Porcelain fracture (Fig 5a), and accumulation of debris in the space between the outer crown and inner crown (Fig 5b). However, we have not found any evidence of unscrewing of the lingual screw.

Possible reasons for these problems are the presence of a space between the inner crown and the outer crown; the deformation of the metal framework during soldering and the thin framework of the connection; deformation and the deflection during porcelain fusion; and the lack of threads in the inner crown. These four factors might have caused micromovements of the outer crown during chewing, resulting in the unscrewing of the occlusal screw and the invasion by plaque. The lack of threads in the inner crown was especially responsible for allowing movement of the outer crown. If threads were created in the inner crown (see Fig 1c), we could have avoided these problems. A CMC
designed in a double-crown system requires a strict relationship between the inner crown and outer crown.

**Type 4: Telescopic CMC, for removable restoration**

Type 4 CMCs are designed to have a separate, single crown (Figs 6a and 6b) and underwent three improvements from type 3: a decrease in space between the inner crown and the outer crown compared to the previous design; a thick, rigid metal frame forming the outer crown connecting each abutment; and a thick metal frame to prevent deformation. These three changes resolved the three problems arising from design Type 3. We know that use of a double-crown system requires a strict relationship between the inner crown and the outer crown, and the designs of the Konus telescope and the Riegel telescope are useful for implant prostheses. However, the Type 4 design also has the disadvantage of having a metal line at the cervix.

**Conclusion**

For ceramometal crowns of implant prostheses, the accurate and passive adaptation of implant restoration to the abutment is required to prevent the unscrewing of the retention screw and the problems caused by micromovement. Types 2 and 4 are considered simpler and more esthetic among four CMC models. In addition, Type 3 CMC with threads in the inner crown is useful for fixed-removable restorations, in spite of its complexities.

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**References**