An esthetic comparison of a metal ceramic crown and cast metal abutment with an all-ceramic crown and zirconia abutment: A clinical report

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This clinical report compares the esthetic outcome of replacing the same left maxillary central incisor with 2 types of implant-supported restorations, a zirconia abutment with a Procera crown and a custom metal abutment with metal ceramic crown. There were only subtle differences noted and both restorations yielded a satisfactory result. (J Prosthet Dent 2004;91:215-8.)

All-ceramic restorations have become popular for restoring teeth that require an esthetic result.1 The translucency provided by the restoration allows light transmission through to the underlying tooth, which minimizes gingival shadowing and yields an appearance of vitality.2 Metal ceramic restorations can achieve a similar result, but the process takes more time and expertise.

Dental implants have been restored with all-ceramic restorations in the hopes that a superior esthetic outcome will result, compared with a metal ceramic restoration. This may not be true if a highly translucent restoration is placed over a metal abutment.3 All-ceramic abutments have been produced in an effort to solve this esthetic problem.4 Two commonly used materials for these abutments are alumina (CerAdapt; Nobel Biocare, Yorba Linda, Calif) and zirconia, (ZiReal; Implant Innovations, Inc, Palm Beach Gardens, Fla or Zirconia Abutment; Astra Tech Inc-USA, Lexington, Mass). Unfortunately the published longitudinal trials to determine the clinical life span of these abutments are limited in the length of follow-up and indicate that alumina abutments have a slightly higher failure rate than prefabricated metal abutments.5,6 The reported failure mode was abutment fracture. Propagation of cracks, created during abutment preparation, has been suggested as the reason for fracture.7 There have been no direct comparisons of esthetic outcome. The aim of this clinical report was to present a comparison of the esthetic result of a metal ceramic crown on a cast metal abutment and an all-ceramic crown on a ceramic abutment replacing the same maxillary left central incisor.

CLINICAL REPORT

A 55-year-old woman reported to the graduate prosthodontic clinic at the University of Iowa College of Dentistry. The patient had suffered trauma to the maxillary left central incisor, which was extracted 6 months before presentation. The patient was wearing an interim acrylic resin removable partial denture that was not, in the patient’s opinion, satisfactory. The medical history was noncontributory, and the rest of her dentition was intact (Fig. 1). After a comprehensive examination, an implant-supported crown to replace the missing tooth was treatment planned. A trial tooth arrangement was performed to determine her expectations and establish what constituted an acceptable esthetic result. A diastema was planned for the distal aspect of the tooth, and the inclination of the maxillary occlusal plane was considered.

A root form endosseous dental implant (4.5 ST; Astra Tech Inc-USA) was placed with expansion of the alveolar ridge to compensate for the buccal ridge deficiency. The implant was submerged and left for 6 months to osseointegrate.

The implant was subsequently uncovered and a healing abutment (4.5 mm zebra abutment; Astra Tech Inc-USA) was placed. One month after the second-stage surgery, a screw-retained (Temporary abutment 4.5 ST; Astra Tech Inc-USA) provisional restoration (Jet; Lang, Wheeling Ill) was fabricated and inserted. The gingival tissue was then allowed to heal for an additional 2 months.

An implant level impression was made with an impression coping (Pick-up ST; Astra Tech Inc-USA). Additionally, an impression of the esthetically acceptable provisional restoration in place was made to guide definitive restoration fabrication. Tooth shade was determined with a standard shade guide (3-D Master; VITA Zahnfabrik, Bad Sackingen, Germany) and a dental spectrophotometer (SpectroShade; MHT Optic Research AG, Niederhasli, Switzerland).

A silicone matrix (Exaflex Putty; GC America Inc, Alsip, Ill) was made from the cast of the provisional restoration to aid in developing the appropriate contours of the definitive restoration. Two abutments were prepared, a custom cast-to-abutment (Astra Tech Inc-USA) and a zirconia abutment (Astra Tech Inc-USA). The finish line was placed 1 mm subgingival for

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all surfaces except for the palatal surface where the margin was placed at the level of the gingival margin. A conventional金属陶瓷冠 was made to fit the cast-to-abutment. An all-ceramic coping (Procera; Nobel Biocare) was formed with the double scan technique, according to the manufacturer’s recommendation, to fit the zirconia abutment. Porcelain (Vitadur Alpha; VITA Zahnfabrik) was applied to complete the crown.

The abutments and crowns were evaluated individually (Fig. 2) and modifications were made to the crown contours. Extrinsic characterization was also accom-

Fig. 1. A, Preoperative smile. B, Frontal preoperative view in maximum intercuspation.

Fig. 2. A, Frontal view of cast metal abutment. B, Frontal view of zirconia abutment.

Fig. 3. A, Frontal view of metal-ceramic crown. B, Frontal view of all-ceramic crown.
plished before final glaze (Figs. 3 and 4). Input from the patient and spouse were sought during the evaluation phase, and a final preference was ascertained.

DISCUSSION

The patient perceived an esthetically acceptable result with both restorations. However, subtle differences between the 2 restorations were noted. When viewing the abutments intraorally, it was apparent that the metal abutment cast a grey hue at the gingival margin (Fig. 2, A) whereas the zirconia abutment did not (Fig. 2, B). For a patient with a high smile line and thin tissue, the zirconia abutment may have an esthetic advantage. The grey hue could be made less noticeable by placing the metal ceramic porcelain margin further subgingivally, but cement removal would be more complicated.

The general contours were perceived to be better for the metal ceramic crown by both the patient and the clinician. Additional contouring of the all-ceramic crown would have made it appear similar to the metal ceramic restoration. The clinician perceived that the metal ceramic crown was slightly lower in value than the adjacent natural teeth (Fig. 3, A), and the all-ceramic crown exhibited a better color match (Fig. 3, B). Interestingly, both the patient and her spouse preferred the metal ceramic restoration.

A single clinician performed all laboratory and clinical procedures. This allowed for some standardization of procedures. However, the clinician’s limited technical experience undoubtedly affected the final esthetic result. In addition, the crowns shown were the only restorations fabricated. Additional crown fabrication may have resulted in a superior esthetic outcome.

The cast metal abutment has some advantages over the zirconia abutment. The manufacturer purports that preparing a zirconia abutment is a purely subtractive process that does not allow additions to be made, and this may limit its use where an abutment requires substantial re-angulation. A cast metal abutment can be waxed to the desired final contour with very few limitations, optimizing the retention and resistance form. The cast metal abutment can also be easily waxed to replicate the emergence profile established by the provisional restoration. In addition, preparation of the zirconia abutment may create stresses that could weaken the ceramic and induce crack propagation.

Shade reproduction is also a consideration when selecting implant abutments and crown systems. In this instance the base shade of the crown was shade 3R2.5 (3-D Master shade guide; VITA Zahnfabrik), which is neither excessively high nor low in value. The zirconia abutment is stark white, and this may pose a problem when a shade of low value is required, for example shade 5M (3-D Master shade guide; VITA Zahnfabrik). A greater thickness of porcelain may be required to achieve the desired shade.

SUMMARY

This report presents a comparison between an implant-supported metal ceramic crown on a cast metal abutment with an all-ceramic crown on a zirconia abutment. Subtle differences were present in the final result. Both represented an esthetic outcome from the patient’s and dentist’s perspective.

REFERENCES


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