Short Communication

Clinical Evaluation of Procera AllCeram Crowns in the Anterior and Posterior Regions

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The aim of this prospective clinical study was to investigate the long-term survival of Procera AllCeram all-ceramic crowns in the anterior and posterior regions. Between 1997 and 2005, 155 Procera crowns with aluminum oxide cores were placed in 50 patients. Patients were recalled in 2005 for a clinical assessment. Thirty-nine patients with 135 crowns attended the recall examination. Of the 135 total crowns, 103 were located in the posterior region and 32 were located in the anterior region. The cumulative survival rate was 100% in the anterior region and 98.8% in the posterior region (1 crown fracture) after 5 and 7 years. Clinical success was achieved irrespective of the tooth position, cement used (resin composite or glass-ionomer cement), or the core design with reduced or conventional margins. Procera AllCeram seems to be a predictable technique for esthetic all-ceramic single crown restorations in the anterior and posterior regions.
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All-ceramic crowns with core reinforcements are often used in the anterior and posterior regions, but long-term studies are rather scarce.[1–3] The aim of this prospective clinical study was to investigate the long-term survival of Procera AllCeram (Nobel Biocare) all-ceramic crowns with aluminum oxide cores in the anterior and posterior regions.

Materials and Methods

Between December 1997 and May 2005 at the Clinic for Reconstructive Dentistry and Temporomandibular Disorders, University of Basel, Switzerland, 155 Procera crowns with aluminum oxide cores were placed in 50 patients who required single crown restorations and provided informed consent. Treatment was performed by undergraduate and postgraduate students, and each patient was examined to obtain clinical and technical data. Depending on the individual crown retention and the options for dry isolation, a resin composite (Panavia F, Kuraray) or glass-ionomer cement (Ketac-Cem Aplicap, 3M ESPE) was used. Patients were recalled between May and August 2005 for a clinical assessment, in which modified United States Public Health Service criteria were applied to evaluate the marginal fit and the presence of caries, mechanical complications of the restoration, and biologic complications of the abutment tooth. The cumulative survival rate was calculated using Kaplan-Meier life table analysis, taking into account any mechanical complications that required a remake of the crown.

Results

Seventy-eight percent of the patient group (39 patients with 135 crowns) attended the recall examinations between May and August 2005. The investigated crowns had been in place for a period of 1 to 92 months (mean, 55 months). Half of the crowns were in place for 60 months or longer, while three quarters were in place for at least 48 months. Almost half of the crowns were located in the molar region, while 28% were premolar crowns and 24% were anterior crowns (Figs 1a to 1d).

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Data from this clinical study were presented at the Joint Meeting of the German and Swiss societies of Reconstructive Dentistry 2006 in Basel, Switzerland.

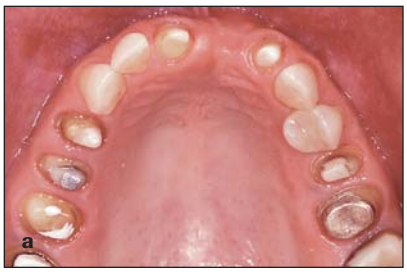
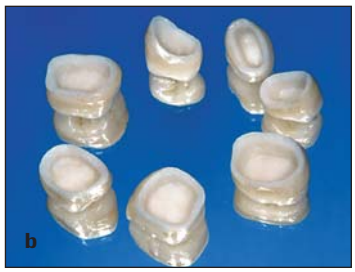
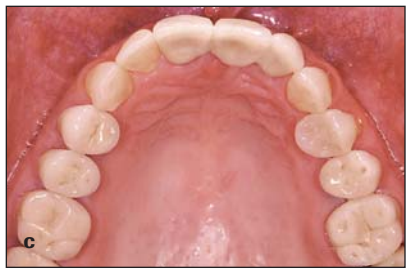
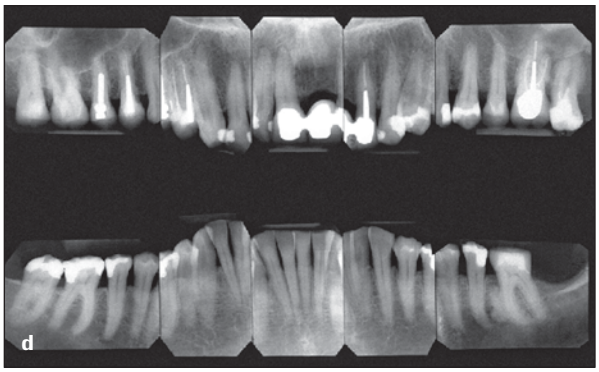

Fig 1a The abutment teeth were prepared for all-ceramic crowns.
Fig 1b Veneered aluminum oxide cores.
Fig 1c Cemented crowns at the 5-year recall.
Fig 1d Periapical radiographs at the 5-year recall.

Table 1 Distribution of Biologic Complications and Mechanical Failures in 39 Patients with 135 Procera AllCeram Crowns

Region	Biologic complication	Mechanical failure
Anterior (n = 32)	1 root fracture	–
Premolar (n = 38)	1 root fracture	–
Molar (n = 65)	4 caries lesions in exposed root dentin 1 root fracture 1 periapical lesion requiring root canal treatment	1 crown fracture

A shoulder preparation was primarily used, while a chamfer preparation was performed in 13 abutment teeth. The occlusal space ranged from less than 1.5 mm to more than 2 mm, with the majority of abutments having 1.5 to 2 mm of space available. Two thirds of the abutment teeth (n = 89, 66%) showed positive vitality. A conventional core design was selected for 76 crowns, while in more than one third of the crowns the cores were reduced in the marginal region (collarless cores) and were provided with veneering porcelain shoulders. The majority of the cores were fabricated with a coping of regular thickness (0.6 mm); 2 cores were designed with an anatomic coping (with individual core support of the cusps). In 96 crowns, resin composite cement was used, while glass-ionomer cement was applied in 39 restorations.

During the observation period, 1 crown fracture occurred on a left second molar after 38 months in function, corresponding to a cumulative survival rate of 100% in the anterior region and 98.8% in the posterior region after 5 and 7 years (Table 1). For this fractured crown, the laboratory technician indicated that a reduction of the core material was required as a result of insufficient maxillomandibular space. Small chippings of the veneering porcelain were observed on 6 crowns with the conventional core design (2 patients), and these were polished.

In addition to the 1 mechanical failure, biologic complications were observed in 8 crowns, but were not related to the otherwise intact crown. In 4 molar teeth, root caries lesions were detected. In 3 patients, 1 abutment tooth each showed root fracture and required extraction (right second molar and left second premolar after 33 months each; right lateral incisor after 70 months). During the entire period, endodontic therapy was required in 1 crown (right first molar after 65 months). This crown fractured following the application of an occlusal access opening. All other abutment teeth, which had shown positive reactions to the initial sensitivity testing, showed preserved vitality during the recall examination.

Discussion

The survival rate observed in this clinical study was achieved irrespective of the tooth position, tooth vitality, preparation design, or type of cement used. In addition, survival was not influenced by the core design with reduced or conventional margins. These results are in agreement with data from an in vitro investigation, which showed that Procera crowns with 0.6-mm aluminum oxide cores and porcelain collars had high fracture resistance.[4] In this study, the majority of the crowns were fabricated with a regular core thickness of 0.6 mm without additional core support. The manual reduction of the core thickness, however, is assumed to be the reason for the crown fracture that occurred after 3 years in function. The fact that the crown fractured following endodontic access opening indicates a loss of structural integrity, which is a general disadvantage of all-ceramic crowns compared to porcelain-fused-to-metal crowns.[5]

Other studies analyzing long-term results with Procera crowns[1–3] have reported a tendency for more failures in molar teeth; however, in the present study only 1 crown fracture occurred in the posterior region.

Conclusion

Based on the present findings, it can be concluded that Procera AllCeram seems to be a predictable technique for esthetic all-ceramic single crowns irrespective of tooth location.

References

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Literature Abstract

Nine- to 14-year follow-up of implant treatment. Part I: Implant loss and associations to various factors

The aim of this study was to evaluate the long-term result of implant therapy, using implant loss as outcome variable. A total of 218 patients with 1,057 implants (Brånemark)—524 in the maxilla and 533 in the mandible—placed from 1988 to 1992 were provided with implant-supported fixed or removable restorations. New sets of intraoral radiographs were taken at 1- and 5-year (after placement of the suprastructure) recall examinations. At the final examination, performed 9 to 14 years after suprastructure placement (from 2000 to 2002), 999 implants were available for examination. Potentially influential variables included age, gender, dentate versus edentulous, years of education, number of visits with dentist/hygienist since placement of the suprastructure, number of visits with hygienist per year, smoking status, smoking duration, pack years, medical history, total plaque score, plaque score at implants, total bleeding on probing score, bleeding score at implants, bleeding category, and bone loss ≥ 4 mm at teeth by category. The majority of the patients (65%) and implants (60%) had a follow-up of 11 years or more; 85% of the patients and 80% of the implants had a follow-up of 10 years or more. A significant relationship between smoking habits and implant loss was not found in this study: 6% of nonsmoking individuals and 12% of smokers or former smokers lost implants. The reason for the lack of statistical significance for smoking as a risk factor for implant loss in this study may be related to the small number of individuals with implant loss, thus reducing the power of statistical analyses. The only factor that showed a significant association to implant loss was the degree of periodontal bone loss in the remaining teeth before implant placement, ie, previous history of periodontal disease. Patients with many implants in the maxilla, compared to those in the mandible, had higher failure rates. However, the study does not describe the types of restorations or the opposing dentition at implant sites, which may relate to the cause of implant loss. The authors conclude that a history of periodontitis seemed to be related to implant loss.

Jansaker AMR, Lindahl C, Renvert H, Renvert S. *J Clin Periodontol* 2006;33:283–289. **References:** 19. **Reprints:** Stefan Renvert, Department of Health Sciences, Kristianstad University, 291 88 Kristianstad, Sweden. E-mail: stefan.renvert@hv.hkr.se—*Huong Nguyen, Singapore*