Does the type of implant prosthesis affect outcomes in the partially edentulous patient?

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Erratum in:

Abstract

PURPOSE: Implant restoration of the partially edentulous patient has become highly predictable. The scientific information on the specifics of restorative designs and their influence on the long-term outcome is sparse. The main objective of this systematic review was to determine what scientific evidence exists regarding the influence of prosthodontic design features on the long-term outcomes of implant therapy (implant success and survival, prosthesis success and survival) in the partially edentulous patient.

MATERIALS AND METHODS: Four questions of primary interest regarding implant prosthodontic design options were selected by the 2 reviewers: abutment type, retention type (cemented, screw-retained), support type (implant support alone versus combined implant-tooth support), and the type of restorative material. Inclusion and exclusion criteria were formulated and applied to a total of 1,720 titles. The list of titles was primarily based on a PubMed-type search provided by the State of the Science of Implant Dentistry workshop leadership. It was supplemented by a hand search of relevant journals at the Countway Library of the Harvard Medical School and of a personal collection of relevant publications of the 2 reviewers. Information on the survival and success of implants and prostheses as defined by the respective authors was retrieved from the included articles, entered into data extraction tables, and submitted for statistical analysis.

RESULTS: Seventy-four articles were selected for data extraction and analysis after critical appraisal and application of the exclusion criteria. The kappa value for reviewer agreement was 100% between the 2 reviewers. The majority of studies were in the "average" range and were published between 1995 and 2003. Only 2 "best" trials, ie, randomized controlled clinical trials, were identified. For the method of retention (screw-retained versus cemented), no differences were found in implant success or survival rates between screw-retained and cemented restorations. Prosthesis success rates showed greater variations between cemented and screw-retained restorations at the various evaluation times; however, the differences never reached statistical significance. The prosthesis success rate at the last reported examination (> 72 mo) was 93.2% for cemented and 83.4% for screw-retained
restorations (P > .05). Regarding the type of support, implant success rates at the last reported evaluation were 97.1% for implant-supported fixed partial dentures (FPDs), 94.3% for single-implant restorations, and 89.2% for implant-tooth-supported FPDs. None of the differences reached statistical significance. Implant survival at the last examination (> 72 mo) was highest for implant-supported FPDs (97.7%), followed by single-implant restorations (95.6%) and implant-tooth-supported FPDs (91.1%). Differences were not statistically significant. Prosthesis success at the last examination (> 72 mo) resulted in overall lower percentage rates than implant success or survival (89.7% for implant-supported FPDs, 87.5% for implant-tooth-supported FPDs, and 85.4% for single-implant restorations; differences not statistically significant). Insufficient extractable information was available regarding the influence of abutment type or restorative material.

CONCLUSION: The scientific evidence obtained from this review is insufficient to establish unequivocal clinical guidelines for the design of implant-supported fixed prostheses in the partially edentulous patient.

Survival and complication rates of combined tooth-implant-supported fixed partial dentures.

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Abstract

OBJECTIVES: The objective of this study has been to review the incidence of biological and technical complications in case of tooth-implant-supported fixed partial denture (FPD) treatments on the basis of survival data regarding clinical cases.

MATERIAL AND METHODS: Based on the treatment documentations of a Bundeswehr dental clinic (Cologne-Wahn German Air Force Garrison), the medical charts of 83 patients with tooth-implant-supported FPDs were completely recorded. The median follow-up time was 4.73 (time range: 2.2-8.3) years. In the process, survival curves according to Kaplan and Meier were applied in addition to frequency counts.

RESULTS: A total of 84 tooth-implant (83 patients) connected prostheses were followed (132 abutment teeth, 142 implant abutments (Branemark, Straumann). FPDs: the time-dependent illustration reveals that after 5 years, as many as 10% of the tooth-implant-supported FPDs already had to be subjected to a technical modification (renewal (n=2), reintegration (n=4), veneer fracture (n=5), fracture of frame (n=2)). In contrast to non-rigid connection of teeth and implants, technical modification measures were rarely required in case of tooth-implant-supported FPDs with a rigid connection. There was no statistical difference between technical complications and the used implant system. Abutment teeth and implants: during the observation period, none of the functionally loaded implants (n=142) had to be removed. Three of the overall 132 abutment teeth were lost because of periodontal inflammation. The time-dependent illustration reveals, that after 5 years as many as 8% of the abutment teeth already required corresponding therapeutic measures (periodontal treatment (5%), filling...
therapy (2.5%), endodontic treatment (0.5%). After as few as 3 years, the connection related complications of implant abutments (abutment or occlusal screw loosening, loss of cementation) already had to be corrected in approximately 8% of the cases. In the utilization period there was no screw or abutment fracture.

CONCLUSION: Technical complications of implant-supported FPDs are dependent on the different bridge configurations. When using rigid functional connections, similarly favourable values will be achieved as in case of solely implant-supported FPDs. In this study other characteristics like different fixation systems (screwed vs. cemented) or various implant systems had no significant effect to the rate of technical complications.

Cement-retained versus screw-retained implant restorations: a critical review.
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Abstract
This article presents a comparison of screw-retained and cement-retained implant prostheses based on the literature. The advantages, disadvantages, and limitations of the 2 different types of restorations are discussed, because it is important to understand the influence of the attachment mechanism on many clinical aspects of implant dentistry. Several factors essential to the long-term success of any implant prosthesis were reviewed with regard to both methods of fixation. These factors include: (1) ease of fabrication and cost, (2) passivity of the framework, (3) retention, (4) occlusion, (5) esthetics, (6) delivery, and (7) retrievability. (More than 50 references).

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Abstract
The causes of implant failures can be biological or mechanical. The mechanical causes include fracture of the implant, fracture of the abutment, and loosening of the abutment. Numerous studies show that abutment loosening constitutes one of the marked implant postsurgery complications requiring clinical intervention. The aim of the present study was to evaluate the incidence of the screw loosening in screwed or cemented abutments. Six adult male Beagles were used. In each dog, the first molars and 2 premolars were extracted. The sutures were removed after 7 days. After 3 months, 10 implants were placed in each dog, 5
in the right mandible and 5 in the left mandible. The abutments either were screwed in (n=30) by applying a total strength of 30 N/cm or were cemented (n=30). After 12 months, 8 (27%) loosened screws were present in screwed abutments, whereas no abutment loosening was observed in cemented abutments (P = .0001). Screwed abutments are often submitted to nonaxial loads that determine screw and abutment loosening.

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**Screw vs cement-implant-retained restorations: an experimental study in the beagle. Part 2. Immunohistochemical evaluation of the peri-implant tissues.**


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**Abstract**

Crestal bone loss has been reported to occur around dental implants. Even if the causes of this bone loss are not completely understood, the presence of a microgap between implant and abutment with a possible contamination of the internal portion of the implants has been suggested. The aim of this study was to see if there were differences in the vascular endothelial growth factor (VEGF) expression, microvessel density (MVD), proliferative activity (MIB-1), and inflammatory infiltrate in the soft tissues around implants with screwed and cemented abutments. Sandblasted and acid-etched implants were inserted in the mandibles of 6 Beagle dogs. Ten 3.5- x 10-mm root-form implants were inserted in each mandible. A total of 60 implants (30 with screwed abutments and 30 with cemented abutments) were used. After 12 months, all the bridges were removed and all abutments were checked for mobility. A total of 8 loosened screws (27%) were found in the screwed abutments, whereas no loosening was observed in cemented abutments. A gingival biopsy was performed in 8 implants with cemented abutments, in 8 implants with screwed abutments, and in 8 implants with unscrewed abutments. No statistically significant differences were found in the inflammatory infiltrate and in the MIB-1 among the different groups. No statistically significant difference was found in the MVD between screwed and cemented abutments (P = .2111), whereas there was a statistically significant difference in MVD between screwed and unscrewed abutments (P = .0277) and between cemented and unscrewed abutments (P = .0431). A low intensity of VEGF was prevalent in screwed and in cemented abutments, whereas a high intensity of VEGF was prevalent in unscrewed abutments. These facts could be explained by the effects induced, in the abutments that underwent a screw loosening, by the presence of bacteria inside the hollow portion of the implants or by enhanced reparative processes.
Cemented versus screw-retained implant-supported single-tooth crowns: a 4-year prospective clinical study.

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Abstract

PURPOSE: The purpose of this controlled prospective clinical study was to compare cemented and screw-retained implant-supported single-tooth crowns followed for 4 years following prosthetic rehabilitation with respect to peri-implant marginal bone levels, peri-implant soft tissue parameters, and prosthetic complications.

MATERIALS AND METHODS: Twelve consecutive patients were selected from a patient population attending the Implantology Department at the University of Padova. They all presented with single-tooth bilateral edentulous sites in the canine/premolar/molar region with adequate bone width, similar bone height at the implant sites, and an occlusal scheme that allowed for the establishment of identical occlusal cusp/fossa contacts. Each patient received 2 identical implants (1 in each edentulous site). One was randomly selected to be restored with a cemented implant-supported single-tooth crown, and the other was restored with a screw-retained implant-supported single-tooth crown. Data on peri-implant marginal bone levels and on soft tissue parameters were collected 4 years after implant placement and analyzed to determine whether there was a significant difference with respect to the method of retention (cemented versus screw-retained).

RESULTS: All patients completed the study. All 24 implants survived, resulting in a cumulative implant success rate of 100%. Statistical analysis revealed no significant differences between the 2 groups with respect to peri-implant marginal bone levels and soft tissue parameters.

DISCUSSION: The data obtained with this study suggested that the choice of cementation versus screw retention for single-tooth implant restorations is likely not based on clinical results but seems to be based primarily on the clinician's preference.

CONCLUSIONS: Within the limitations of this study, the results indicate that there was no evidence of different behavior of the peri-implant marginal bone and of the peri-implant soft tissue when cemented or screw-retained single-tooth implant restorations were provided for this patient population.

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Abstract

OBJECTIVE: The purpose of this prospective clinical study was to evaluate peri-implant soft-tissue conditions and esthetic fulfillment during a 3-year follow-up period following prosthetic rehabilitation.

MATERIAL AND METHODS: As part of a prospective multi-center study, 152 ITI dental implants were placed in 80 patients in the maxillary anterior region. Fifty-nine crowns (38.82%) were cement retained, while 93 (61.18%) crowns were screw retained. At loading and 3, 6, 12 and 36 months post-loading, modified plaque index (MPI), sulcus bleeding index (SBI), keratinized mucosa (KM), gingival level (GL), and esthetic fulfillment were recorded.

RESULTS: All patients completed the study and no complications were reported. While statistically not significant at all time points, cement-retained crowns seemed to present a worsening trend in MPI and SBI scores. Interestingly, screw-retained crowns seemed to present an opposite picture, their MPI and SBI scores improved over time. While plaque accumulation, prophylaxis and depth of crown margin significantly affected levels of sulcus bleeding, prophylaxis alone played a key role in reducing plaque accumulation. No soft tissue recession was observed in either cement- or screw-retained crowns up to 3 years post-loading. Esthetic fulfillment survey revealed that patients did not have a preference for crown types; however, dentists favored cement-retained over screw-retained crowns.

CONCLUSIONS: Peri-implant soft tissues responded more favorably to screw-retained crowns when compared with cement-retained crowns. However, no soft-tissue recession was observed in either type of crowns. Cement-retained crowns were preferred by dentists, while patients were equally satisfied with either type of crowns they received.
A 10-year prospective study of ITI dental implants placed in the posterior region. II: Influence of the crown-to-implant ratio and different prosthetic treatment modalities on crestal bone loss.

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Abstract

OBJECTIVE: To evaluate the influence of the crown-to-implant ratio (C/I) ratio and different implant prosthetic treatment modalities on crestal bone loss around dental implants placed in the posterior region.

MATERIAL AND METHODS: A total of 192 ITI dental implants were consecutively placed in premolars and molars of 83 partially edentulous patients. All implants were restored by means of ceramic-to-metal fused fixed partial dentures or a single crown. Patients were followed as part of a prospective longitudinal study focusing on implant success. Surgical, radiographic and clinical variables were collected at the 1-year recall after implant placement and at the most recent clinical evaluation. Radiographic parameters were evaluated on periapical radiographs taken with a standardized long-cone paralleling technique. Implant restorations were divided into three groups according to their respective clinical C/I ratios: (a) 0-0.99, (b) 1-1.99 and (c) ≥2.

RESULTS: The mean clinical C/I ratio was 1.77±0.56 mm. A total of 51 implants (26.5%) showed a clinical C/I ratio equal to or greater than 2. In this group, three implants failed, giving a cumulative survival rate of 94.1%. Crestal bone loss was -0.34±0.27 mm in group a, -0.03±0.15 mm in group b and -0.02±0.26 mm in group c. Differences among groups were statistically significant (P=0.009). Mode of retention, splinting or presence of cantilever extensions did not have an effect on crestal bone loss around ITI dental implants.

CONCLUSIONS: Implant restorations with C/I ratios between 2 and 3 may be successfully used in the posterior areas of the jaw.
**Screw versus cemented implant supported restorations.**

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**Abstract**

Implant supported restorations can be attached to implants with screws or can be cemented to abutments which are secured to implants with screws. Screw retained implant restorations are the authors’ preferred method of securing restorations to implants. This article will be written from this perspective and the advantages and disadvantages of each method of retention will be discussed under the following headings: Aesthetics, Retrievability, Retention, Implant placement, Passivity, Provisionals, Occlusion, Immediate loading, Impression procedures, Long term treatment planning.

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**Screw- versus cement-retained implant restorations: current concepts.**

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**Abstract**

The debate between screw- versus cement-retained implant prostheses has long been discussed but the best type of implant prosthesis remains controversial among practitioners. An understanding of their properties will help the clinician in selecting the ideal prosthesis for each clinical case while promoting final esthetic outcomes. With the evolving technology and knowledge, an update of the current trends is necessary. This article provides an overview of the different characteristics of screw- and cement-retained implant restorations, and how they may influence the esthetics, retrievability, retention, passivity, occlusion, accessibility, cost, and provisional restorations. Problems and complications frequently encountered are discussed and treatment solutions are proposed.
In vitro effect of load cycling on metal-ceramic cement- and screw-retained implant restorations.

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Abstract

STATEMENT OF PROBLEM: In implant prosthodontics, restorations can either be cement- or screw-retained. Aside from passivity of fit, esthetics, and retrievability, the occlusal opening of the screw-access hole (SAH) is a major difference between the 2 types of restorations. In veneered fixed partial dentures (FPDs), the SAH forms a discontinuity of the ceramic layer and may be an origin for chipping fractures.

PURPOSE: The objective of this study was to investigate whether more chipping fractures occur during dynamic loading on the occlusal surface of screw-retained ceramic-veneered implant FPDs than in cement-retained restorations.

MATERIAL AND METHODS: Ten cement-retained and 10 screw-retained ceramic veneered 5-unit FPDs were manufactured for a 3-implant situation. A masticatory simulator was used for loading the occlusal surface of the FPDs to the implant positions for 20,000 cycles with a force of 100 N applied for 1 second followed by 1 second of no loading. For analysis, 3 clinicians evaluated the FPDs using a light microscope and a dental probe. The numbers of chipping fractures found were analyzed by means of a generalized linear model with Poisson response (alpha=.05).

RESULTS: The investigators found significantly more chipping fractures in the group of screw-retained FPDs, the rate ratio of screw-retained FPDs versus cement-retained FPDs being greater than 1 with a P value of .0023.

CONCLUSION: The SAH of screw-retained implant FPDs forms a weak point of the ceramic layer.
Cement-retained versus screw-retained implant restorations: achieving optimal occlusion and esthetics in implant dentistry.

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Abstract

STATEMENT OF PROBLEM: Optimal occlusion and esthetics are goals in prosthetic treatment. Implant dentistry is no exception. PURPOSE OF ARTICLE: The purpose of this article is to discuss how the choice to use screw-retained or cement-retained implants dramatically influences the occlusion and esthetics.