Mechanical and technical risks in implant therapy.

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Abstract

PURPOSE: To systematically appraise the impact of mechanical/technical risk factors on implant-supported reconstructions.

MATERIAL AND METHODS: A MEDLINE (PubMed) database search from 1966 to April 2008 was conducted. The search strategy was a combination of MeSH terms and the key words: design, dental implant(s), risk, prosthodontics, fixed prosthodontics, fixed partial denture(s), fixed dental prosthesis (FDP), fixed reconstruction(s), oral rehabilitation, bridge(s), removable partial denture(s), overdenture(s). Randomized controlled trials, controlled trials, and prospective and retrospective cohort studies with a mean follow-up of at least 4 years were included. The material evaluated in each study had to include cases with/without exposure to the risk factor.

RESULTS: From 3,568 articles, 111 were selected for full text analysis. Of the 111 articles, 33 were included for data extraction after grouping the outcomes into 10 risk factors: type of retentive elements supporting overdentures, presence of cantilever extension(s), cemented versus screw-retained FDPs, angled/angulated abutments, bruxism, crown/implant ratio, length of the suprastructure, prosthetic materials, number of implants supporting an FDP, and history of mechanical/technical complications.

CONCLUSIONS: The absence of a metal framework in overdentures, the presence of cantilever extension(s) > 15 mm and of bruxism, the length of the reconstruction, and a history of repeated complications were associated with increased mechanical/technical complications. The type of retention, the presence of angled abutments, the crown-implant ratio, and the number of implants supporting an FDP were not associated with increased mechanical/technical complications. None of the mechanical/technical risk factors had an impact on implant survival and success rates.
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.


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Abstract

Purpose: It has been proposed that increased crown heights lead to greater crestal stresses on dental implants, crestal bone loss, and other complications. The purpose of this study was to evaluate the effect of increased crown-to-implant ratio (C/IR) on single-tooth implants.

Materials and Methods: A retrospective cohort study was conducted between July 2001 and August 2003. The cohort was composed of patients who had at least one single-tooth Bicon
implant restored with a cementless restoration and attended recall examinations in 2004, 2005, and 2007, during which several clinical and radiographic variables were documented. Descriptive statistics and univariate and multivariate mixed-effects regression models, adjusted for multiple implants in the same patient, were used. Results: The cohort was composed of 81 subjects who received 326 Bicon implants. The mean duration of follow-up was 70.7 months. Mean change in the mesiodistal crestal bone levels was -0.33 mm. The mean C/IR was 1.6 (range, 0.79 to 4.95). Forty implant restorations (16%) had a C/IR =/> 2. Implant restorations with increased C/IR were significantly more likely to have increased mesiodistal crown width, larger implant diameter, larger distance to mesial and distal adjacent structures, and deeper sulcular probings. Increased C/IR had a statistically significant effect in the loosening of maxillary anterior Integrated Abutment Crowns (Bicon) as well as a significant effect in the fracture of 2-mm-wide titanium abutment posts used to restore posterior areas. A C/IR up to 4.95 did not lead to an increased risk of crestal bone loss or to an increase in implant failures, crown failures, or crown fractures. Conclusion: Larger C/IR was associated with a significant increase in prosthetic complications but had no significant effect on crestal bone levels on single-tooth locking-taper implants.

Biomechanics/risk management (Working Group 2).

Sanz M, Naert I; Working Group 2.

Collaborators (10)


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Abstract

INTRODUCTION: The remit of this workgroup was to update the existing knowledge base in biomechanical factors, navigation systems and medications that may affect the outcome of implant therapy.

MATERIAL AND METHODS: The literature was systematically searched and critically reviewed. Five manuscripts were produced in five specific topics identified as areas where innovative approaches have been developed in biomechanical factors, navigation systems and medications that may affect the outcome of implant therapy.

RESULTS: The results and conclusions of the review process are presented in the following papers, together with the group consensus statements, clinical implications and directions for future research: * To what extent do cantilevers affect survival and complications of implant supported restorations in partially dentate patients? * To what extent does the crown-implant ratio affect survival and complications of implant supported restorations? * A systematic review on the accuracy and the clinical outcome of computer-guided template based implant dentistry. * What is the impact of systemic bisphosphonates on patients undergoing oral implant therapy? * What is the impact of anticoagulants on patients undergoing oral implant therapy?
**To what extent does the crown-implant ratio affect the survival and complications of implant-supported reconstructions? A systematic review.**

Blanes RJ.


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**Abstract**

OBJECTIVE: To evaluate the occurrence of biological and technical complications with respect to the crown-implant (C/I) ratio of implant-supported reconstructions.

MATERIAL AND METHODS: Electronic (MEDLINE) and hand searches were conducted for longitudinal prospective studies with a follow-up period of at least 4 years. One reviewer performed screening and data abstraction. The following complications were evaluated: implant survival, peri-implant crestal bone loss, implant fracture, and technical complications related to implant components and suprastructure.

RESULTS: The search provided 41 articles and abstracts, seven of which were selected for full-text analysis. Only two articles were finally included. A qualitative data analysis revealed that the survival rate of implant-supported reconstructions with a C/I ratio of more than 2 was 94.1%. In addition, peri-implant crestal bone loss seemed not to be influenced by the C/I ratio of the implant rehabilitation, except in one study, which noted greater crestal bone loss with lower (<1) compared with higher (>2) C/I ratios. Technical complications related to implant components and suprastructure according to different C/I ratios were not found in any of the studies.

CONCLUSIONS: Despite the diversity among studies with respect to data collection and study design, the current literature shows that the C/I ratios of implant-supported reconstructions do not influence peri-implant crestal bone loss.

**Clinical experience with one-stage, non-submerged dental implants.**

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**Abstract**

This review article describes the scientific documentation of one-stage, non-submerged dental implants. In the past 25 years, numerous in vivo studies have demonstrated that non-submerged titanium implants achieve osseointegration as predictable as that of submerged titanium implants. This observation was confirmed in prospective clinical studies, mostly
done with the ITI Dental Implant System. ITI implants have been widely documented for up to 10 years of prospective follow-up at various centers. All studies showed success rates well above 90%. In summary, the non-submerged approach is a true alternative to the original healing modality with submerged titanium implants. The non-submerged approach offers several clinical advantages: (i) the avoidance of a second surgical procedure and less chair time per patient, resulting in overall reduced treatment cost; (ii) the lack of microgap at the bone crest level, leading to less crestal bone during healing and resulting in a more favorable crown-to-implant length ratio; and (iii) a simplified prosthetic procedure, presenting an ideal basis for cemented implant restorations. Due to these significant clinical advantages, the non-submerged approach will become more important in implant dentistry in the near future, particularly in implant sites without esthetic priority.

 Artikel frei einsehbar unter:  http://adr.sagepub.com/content/13/1/153.long

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**Shorter implants in clinical practice: rationale and treatment results.**

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**Abstract**

INTRODUCTION: The use of shorter implants offers a number of potential advantages if such utilization yields the same level of treatment success as the use of longer implants. The purpose of this retrospective study was to assess the survival of short implants in various clinical situations in function over time.

MATERIALS AND METHODS: A retrospective study was conducted of all patients treated between May 2000 and May 2007 who received endosseous implants that were less than 10 mm in length. Patient age, gender, location of implants, type of prosthesis, time in function, and stability of peri-implant crestal bone were assessed.

RESULTS: The retrospective analysis identified 2,073 implants of 6 mm, 7 mm, 8 mm, or 9 mm in length placed in a variety of clinical situations in 1,774 patients. Cumulative implant survival rates for implants in function in various areas of the mouth supporting single crowns or short-span fixed prostheses ranged from 98.1% to 99.7%. Each indication was examined with regard to individual success and failure rates and mean time in function.

CONCLUSIONS: When utilized appropriately, implants of 6 to 9 mm in length demonstrate cumulative survival rates under function comparable to those reported for longer implants.
Short (6-mm) nonsubmerged dental implants: results of a Multicenter clinical trial of 1 to 7 years.

ten Bruggenkate CM, Asikainen P, Foitzik C, Krekeler G, Sutter F.


Abstract

Limited bone height restricts the use of long dental implants, so short implants may be selected in these situations. Recent reports on clinical results with short implants have been negative, however, and have suggested that indications for the use of these implants are limited. To verify these findings, a multicenter study of short ITI implants was carried out. In a 6-year period 253 short implants with a length of 6 mm were placed into 126 patients, who were followed up from 1 to 7 years. Altogether 7 implants were removed; 6 of these were located in the maxilla and 1 in the mandible. The quality of survival was comparable with the clinical results of longer implants from the same implant system. Although the clinical results of these short implants were favorable, it is recommended that they be used in combination with longer implants, especially when used in the less dense bone that is often seen in the maxilla.