Mechanical and technical risks in implant therapy.

Salvi GE, Brägger U.


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.

Artikel frei einsehbar auf www.iti.org

Publications

Proceedings of the 4th ITI Consensus Conference
Biological and technical complications and failures with fixed partial dentures (FPD) on implants and teeth after four to five years of function.

Brägger U, Aeschlimann S, Bürgin W, Hämmerle CH, Lang NP.


Abstract

The aim of this study was to compare the frequency of biological and technical complications with fixed partial dentures (FPDs) on implants, teeth and as mixed tooth-implant supported FPDs over 4 to 5 years of function. All implants belonged to the ITI Dental Implant System. Group I-I (implant FPD) included 33 patients with 40 FPDs, group T-T (tooth FPDs) 40 patients with 58 FPDs, group I-T (mixed tooth-implant FPDs) 15 with 18 FPD. Of the bridge abutments 144 were teeth and 105 were implants. The median number of units replaced by the FPDs was 3 (range 2-14). The mean age of the patients was 55.7 years (range 23-83). Complete failures resulted in the loss of one FPD in each group. Two implants were lost due to fracture secondarily to development of a bone defect. One tooth had a vertical fracture and 1 tooth was lost due to periodontitis. Biological complications (peri-implantitis, PPD > or = 5 mm and BOP+) occurred at 9.6% (10) of the implants. This number was, however, reduced to 5% if the threshold for definition of peri-implantitis was set at PPD > or = 6 mm and BOP+. Biological complications occurred in 11.8% (17) of the abutment teeth (NS compared to implants); 2.8% (4) had secondary caries, 4.9% (7) endodontic problems and 4.1% (6) had periodontitis (PPD > or = 5 mm, BOP+). Ten out of 32 patients with a general health problem indicated a biological complication, whereas 9 out of 53 patients with no general health problem had a biological complication (chi 2: NS). Statistically significantly more technical complications were found in FPDs on implants (chi 2, P < or = 0.05). The technical complications were associated with bruxism. Out of 10 bruxers 6 had a technical complication whereas 13 out of 75 non-bruxers had such a complication (chi 2 < or = 0.01). Extensions were associated with more technical complications (13 out of 35 with extensions versus 9 out of 81 without). In conclusion, favourable clinical conditions were found at tooth and implant abutments after 4-5 years of function. Loss of FPD over 4-5 years occurred at a similar rate with mixed, implant or tooth supported reconstructions. Significantly more porcelain fractures were found in FPDs on implants. Impaired general health status was not significantly associated with more biological failures but bruxism as well as extensions were associated with more technical failures.
Immediate loading of maxillary and mandibular implant-supported fixed complete dentures: a 1- to 10-year retrospective study.

Ji TJ, Kan JY, Rungcharassaeng K, Roe P, Lozada JL.


Abstract

Abstract This study evaluated the success rates of 50 full-arch maxillary and/or mandibular implant supported fixed complete dentures. After a mean follow-up time of 42.1 month, 269 implants remained in function corresponding to cumulative implant success rates of 85.2% with an absolute success rate of 90.6% (269/297 implants). This study suggested that higher implant failure rates might be associated with a dental history of bruxism (29.3%) versus non-bruxers (4.6%) and surgeons with limited experience (≤5 years; 12.2%) versus surgeons with experience (2.4%).

Clinical follow-up of unilateral, fixed dental prosthesis on maxillary implants.

Wahlström M, Sagulin GB, Jansson LE.


Abstract

AIMS/BACKGROUND:

The aims of the present study were to evaluate (1) the success rate of unilateral maxillary fixed dental prosthesis (FDPs) on implants in patients at a periodontal clinic referred for periodontal treatment, (2) the prevalence of varying mechanical and biological complications and (3) effects of potential risk factors on the success rate.

MATERIAL AND METHODS:

Fifty consecutive patients were invited to participate in a follow-up. The patients had received FDPs on implants between November 2000 and December 2003 after treatment to achieve optimal periodontal health, and the FDPs had been in function for at least 3 years. A questionnaire was sent to the patients before the follow-up examination. Forty-six patients with 116 implants were examined. The follow-up comprised clinical and radiographic examinations and evaluations of treatment outcome.

RESULTS:

Before implant treatment, 13% of the teeth were extracted; of these, 80% were extracted due to periodontal disease. No implants had been lost before implant loading. One implant in one patient fractured after 3 years of functional loading and three implants in another patient after 6.5 years. The most frequent mechanical complications were veneer fractures and loose bridge screws. Patients with peri-implant mucositis had significantly more bleeding on probing around teeth and implants. Patients with peri-implantitis at the follow-up had more deep periodontal pockets around their remaining teeth compared with individuals without peri-implantitis, but these differences were not significant. Smokers had significantly fewer
teeth, more periodontal pockets ≥ 4mm and a tendency towards greater marginal bone loss at the follow-up, compared with non-smokers.

**CONCLUSION:**

In the short term, overloading and bruxism seem more hazardous for implant treatment, compared with a history of periodontitis.

---

**Retrospective analysis of porcelain failures of metal ceramic crowns and fixed partial dentures supported by 729 implants in 152 patients: patient-specific and implant-specific predictors of ceramic failure.**

Kinsel RP, Lin D.


Erratum in


**Abstract**

**STATEMENT OF PROBLEM:**

Porcelain fracture associated with an implant-supported, metal ceramic crown or fixed partial denture occurs at a higher rate than in tooth-supported restorations, according to the literature. Implant-specific and patient-specific causes of ceramic failure have not been fully evaluated.

**PURPOSE:**

The purpose of this retrospective study was to evaluate the potential statistical predictors for porcelain fracture of implant-supported, metal ceramic restorations.

**MATERIAL AND METHODS:**

Over a 6-month period, a consecutive series of patients having previously received implant-supported, metal ceramic fixed restorations were examined during periodic recall appointments. The number of supporting implants, number of dental units, type of restoration, date of prosthesis insertion, location in the dental arch, opposing dentition, type of occlusion, presence of parafunctional habits, use of an occlusal protective device, presence or absence of ceramic fractures, gender, and age were recorded for each patient. The generalized estimating equation (GEE) approach was used for the intrasubject correlated measurements analysis of categorical outcomes (presence or absence of ceramic fractures) to determine which patient- and implant-specific factors would predict porcelain fracture (alpha=.05).

**RESULTS:**

Data were collected from 152 patients representing 998 dental units (390 single crowns and 94 fixed partial dentures) supported by 729 implants. Porcelain fractures of 94 dental units occurred in 35 patients. The fractures were significantly (P<.05) associated with opposing
implant-supported metal ceramic restorations, bruxism, and not wearing a protective occlusal device. Metal ceramic prostheses (single crown or fixed partial dentures) had approximately 7 times higher odds of porcelain fracture (odds ratio (OR)=7.06; 95% confidence interval (CI): 2.57 to 19.37) and 13 times greater odds of a fracture requiring either repair or replacement (OR=13.95; 95% CI: 2.25 to 86.41) when in occlusion with another implant-supported restoration, as compared to opposing a natural tooth. In addition, patients exhibiting bruxism or not wearing an occlusal device had approximately 7 times higher odds (OR=7.23; 95% CI: 3.86 to 13.54), and 2 times higher odds (OR=1.92; 95% CI: 1.01 to 3.67) of porcelain fracture when compared to patients without bruxism and patients not wearing an occlusal device.

CONCLUSIONS:

Implant-supported metal ceramic single crowns and fixed partial dentures were found to have a significantly higher risk of porcelain fracture in patients with bruxism habits, when a protective occlusal device was not used, and when the restoration opposed another implant-supported metal ceramic restoration.

The effect of bruxism on treatment planning for dental implants.

Misch CE.

Dent Today. 2002 Sep;21(9):76-81.

Abstract

Bruxism is a potential risk factor for implant failure. Excessive force is the primary cause of late implant complications. An appreciation of the etiology of crestal bone loss, failure of implants, failure to retain implant restorations, and fracture of components will lead the practitioner to develop a treatment plan that reduces force on implants and their restorations. The forces are considered in terms of magnitude, duration, direction, type, and magnification. Once the dentist has identified the source(s) of additional force on the implant system, the treatment plan is altered to contend with and reduce the negative sequelae on the bone, implant, and final restoration. One viable approach is to increase the implant-bone surface area. Additional implants can be placed to decrease stress on any one implant, and implants in molar regions should have an increased width. Use of more and wider implants decreases the strain on the prosthesis and also dissipates stress to the bone, especially at the crest. The additional implants should be positioned with intent to eliminate cantilevers when possible. Greater surface area implant designs made of titanium alloy and with an external hex design can also prove advantageous. Anterior guidance in mandibular excursions further decreases force and eliminates or reduces lateral posterior force. Metal occlusal surfaces decrease the risk of porcelain fracture and do not require as much abutment reduction, which in turn enhances prosthesis retention. The retention of the final prosthesis or super-structure is also improved with additional implant abutments. Night guards designed with specific features also are a benefit to initially diagnose the influence of occlusal factors for the patient, and as importantly, to reduce the influence of extraneous stress on implants and implant-retained restorations.
Good occlusal practice in the provision of implant borne prostheses.

Davies SJ, Gray RJ, Young MP.

Abstract

The increased use of endosseous dental implants means that many dentists will encounter patients with dental implants in their everyday practice. Dental practitioners might be actively involved in the provision of implant borne prostheses at both the surgical and restorative phases, or only at the restorative stage. This section is written for all dentists and aims to examine the subject of occlusion within implantology. It aims to provide guidelines of good occlusal practice to be used in the design of the prosthesis that is supported or retained by one or more implants. As implantology is a ‘new’ discipline of dentistry, there are fewer standard texts and this section, therefore, is much more extensively referenced than the subjects that have been considered to date.

A retrospective analysis of factors associated with multiple implant failures in maxillae.


Abstract

This retrospective study was designed to verify the factors that influence implant failures. Six prosthodontic clinics in Sweden participated in the study, and together they included a total of 54 patients treated between January 1988 and December 1996. All patients were completely edentulous in the maxilla, and received either a fixed prosthesis or an overdenture supported by at least 4 implants (Brånemark System). Half of the patients belonged to the study group, and an inclusion criterion for this group was that they had lost at least half of their implants. To reduce bias, the patients in the control group were matched to the study group, i.e. they were selected so that both groups were as identical as possible. The results of the study indicate that the control group had a better initial bone support than the study group. Furthermore, the patients in the study group suffered from circumstances that could induce implant failure, such as bruxism, personal grief, depression, as well as addictions to cigarettes, alcohol and/or narcotics. On the study form the clinicians were asked to give their own opinion of the reason for implant failure. The answers given could easily be grouped into 5 different topics, and this experience can be useful to improve patient selection. This study suggests that there are certain factors of importance to consider to prevent a cluster phenomenon of implant failures i.e. lack of bone support, heavy smoking habits and bruxism.
Prosthetic complications in fixed endosseous implant-borne reconstructions after an observations period of at least 40 months.

De Boever AL, Keersmaekers K, Vanmaele G, Kerschbaum T, Theuniers G, De Boever JA.


Abstract

One hundred and seventy-two fixed reconstructions (317 prosthetic units), made on 283 ITI implants in 105 patients (age range 25-86 years) with a minimum follow-up period of 40 months, were taken into the study to analyse technical complication rate, complication type and costs for repair. The mean evaluation time was 62.5 +/- 25.3 months. Eighty were single crowns and 92 different types of fixed partial dentures (FPDs). In 45 cases the construction was screw retained and in 127 cases cemented with zinc phosphate cement or an acrylic-based cement. Complications occurred after a minimum period of 2 months and a maximum period of 100 months (mean: 35.9 +/- 21.4 months). Fifty-five prosthetic interventions were needed on 44 constructions (25%) of which 88% in the molar/premolar region. The lowest percentage of complications occurred in single crowns (25%), the highest in 3-4 unit FPDs (35%) and in FPDs with an extension (44%). Of the necessary clinical repair, 36% was recementing and 38% tightening the screws. Of all interventions, 14% were classified as minor (no treatment or <10 min chair time), 70% as moderate (>10 min but <60 min chair time) and 14% as major interventions (>60 min and additional costs for replacement of parts and/or laboratory). For seven patients the additional costs ranged from euro 28 to euro 840. Bruxing seemed to play a significant role in the frequency of complications. Longer constructions seemed to be more prone to complications. The relatively high occurrence of technical complications should be discussed with the patient before the start of the treatment.