Mechanical and technical risks in implant therapy.

Salvi GE, Brägger U.


Department of Periodontology, School of Dental Medicine, University of Bern, Bern CH-3010, Switzerland.

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.

Survival and complication rates of implant-supported fixed partial dentures with cantilevers: a systematic review.

Zurdo J, Romão C, Wennström JL.

Abstract

OBJECTIVE: The objective of the present systematic review was to analyze the potential effect of incorporation of cantilever extensions on the survival rate of implant-supported fixed partial dental prostheses (FPDPs) and the incidence of technical and biological complications, as reported in longitudinal studies with at least 5 years of follow-up.

METHODS: A MEDLINE search was conducted up to and including November 2008 for longitudinal studies with a mean follow-up period of at least 5 years. Two reviewers performed screening and data abstraction independently. Prosthesis-based data on survival/failure rate, technical complications (prosthesis-related problems, implant loss) and biological complications (marginal bone loss) were analyzed.

RESULTS: The search provided 103 titles with abstract. Full-text analysis was performed of 12 articles, out of which three were finally included. Two of the studies had a prospective or retrospective case-control design, whereas the third was a prospective cohort study. The 5-year survival rate of cantilever FPDPs varied between 89.9% and 92.7% (weighted mean 91.9%), with implant fracture as the main cause for failures. The corresponding survival rate for FPDPs without cantilever extensions was 96.3-96.2% (weighted mean 95.8%). Technical complications related to the supra-constructions in the three included studies were reported to occur at a frequency of 13-26% (weighted mean 20.3%) for cantilever FPDPs compared with 0-12% (9.7%) for non-cantilever FPDPs. The most common complications were minor porcelain fractures and bridge-screw loosening. For cantilever FPDPs, the 5-year event-free survival rate varied between 66.7% and 79.2% (weighted mean 71.7%) and between 83.1% and 96.3% (weighted mean 85.9%) for non-cantilever FPDPs. No statistically significant differences were reported with regard to peri-implant bone-level change between the two prosthetic groups, either at the prosthesis or at the implant level.

CONCLUSION: Data on implant-supported FPDPs with cantilever extensions are limited and therefore survival and complication rates should be interpreted with caution. The incorporation of cantilevers into implant-borne prostheses may be associated with a higher incidence of minor technical complications.
OBJECTIVE: The aim of this systematic review was to assess the survival rates of short-span implant-supported cantilever fixed dental prostheses (ICFDPs) and the incidence of technical and biological complications after an observation period of at least 5 years.

MATERIAL AND METHODS: An electronic MEDLINE search supplemented by manual searching was conducted to identify prospective or retrospective cohort studies reporting data of at least 5 years on ICFDPs. Five- and 10-year estimates for failure and complication rates were calculated using standard or random-effect Poisson regression analysis.

RESULTS: The five studies eligible for the meta-analysis yielded an estimated 5- and 10-year ICFDP cumulative survival rate of 94.3% [95 percent confidence interval (95% CI): 84.1-98%] and 88.9% (95% CI: 70.8-96.1%), respectively. Five-year estimates for peri-implantitis were 5.4% (95% CI: 2-14.2%) and 9.4% (95% CI: 3.3-25.4%) at implant and prosthesis levels, respectively. Veneer fracture (5-year estimate: 10.3%; 95% CI: 3.9-26.6%) and screw loosening (5-year estimate: 8.2%; 95% CI: 3.9-17%) represented the most common complications, followed by loss of retention (5-year estimate: 5.7%; 95% CI: 1.9-16.5%) and abutment/screw fracture (5-year estimate: 2.1%; 95% CI: 0.9-5.1%). Implant fracture was rare (5-year estimate: 1.3%; 95% CI: 0.2-8.3%); no framework fracture was reported. Radiographic bone level changes did not yield statistically significant differences either at the prosthesis or at the implant levels when comparing ICFDPs with short-span implant-supported end-abutment fixed dental prostheses.

CONCLUSIONS: ICFDPs represent a valid treatment modality; no detrimental effects can be expected on bone levels due to the presence of a cantilever extension per se.

Bone level changes at implants supporting crowns or fixed partial dentures with or without cantilevers.

Hälg GA, Schmid J, Hämmerle CH.


Clinic of Fixed and Removable Prosthodontics and Dental Material Science, Dental School, University of Zurich, Zurich, Switzerland. gianni.haelg@zzmk.uzh.ch

Abstract

OBJECTIVE: The aim of this study was to analyze whether or not a cantilever extension on a fixed dental prosthesis (FDP) supported by implants increased the amount of peri-implant bone loss or technical complications compared with reconstructions without cantilevers.

MATERIALS AND METHODS: Fifty-four partially dentate patients with a total of 54 FDPs supported by 78 implants were enrolled in the study. Twenty-seven FDPs were with cantilever and 27 FDPs were without cantilever (control group). All FDPs were supported by one or two implants and were located in the posterior maxilla or mandible. The primary outcome variable was change in peri-implant marginal bone level from the time of FDP placement to the last follow-up visit. FDPs were under functional loading for a period of 3 up to 12.7 years. Statistical analysis was carried out with Student's t-test. Regression analyses were carried out to evaluate the influence of confounding factors on the peri-implant bone level changes.
level change. In addition, implant survival rates were calculated and technical complications assessed.

RESULTS: After a mean observation period of 5.3 years, the mean peri-implant bone loss for the FDPs with cantilevers was 0.23 mm (SD+/-0.63 mm) and 0.09 mm (SD+/-0.43 mm) for FDPs without cantilever. Concerning the bone level change at implants supporting FDPs with or without cantilevers no statistically significant differences were found. The regression analysis revealed that jaw of implant placement had a statistically significant influence on peri-implant bone loss. When the bone loss in the cantilever group and the control group were compared within the maxilla or mandible separately, no statistically significant difference was found. Implant survival rates reached 95.7% for implants supporting cantilever prostheses and 96.9% for implants of the control group. Five FDPs in the cantilever group showed minor technical complications, none were observed in the control group.

CONCLUSION: Within the limitations of this study it was concluded that cantilever on FDPs did not lead to a higher implant failure rate and did not lead to more bone loss around supporting implants compared with implants supporting conventional FDPs. In contrast to these results more technical complications were observed in the group reconstructed with cantilever.

Implant-supported fixed cantilever prosthesis in partially edentulous jaws: a cohort prospective study.

Romeo E, Tomasi C, Finini I, Casentini P, Lops D.


Department of Prosthodontics, Dental Clinic, School of Dentistry, University of Milan, Italy. eugenio.romeo@unimi.it

Abstract

BACKGROUND: Reconstructive procedures present a higher rate of biological costs due to the necessity of bone harvest and grafts, use of semipermeable barriers etc. On the hand, implant supported cantilever prostheses could allow a simpler rehabilitation procedure.

AIMS: The aim of the present study was to assess the clinical outcome of patients treated with implant-supported fixed partial dentures (FPD) with cantilever after a mean follow-up time of 8 years.

MATERIAL AND METHODS: The study included 45 consecutive partially edentulous patients treated between January 1994 and August 2006 with 59 partial cantilever fixed prostheses supported by 116 ITI implants. The primary outcome variable considered was the presence of complications at the subject and bridge level; the secondary outcome variable was marginal bone loss (MBL). The frequency of complications was analyzed according to cantilever location and opposite dentition and tested by Fisher’s exact test. A multilevel regression model was constructed to analyze the factors influencing MBL with three levels: subject as the highest, and then implant and site. During the follow-up period, 11 implants showed a bone loss exceeding the limit for success, out of which two implants showed an infection of the peri-implant tissue. RESULTS: After an average observation of 8.2 years of cantilever prostheses loading, the implant success and survival rates were 90.5% and 100%,
respectively. Besides, the prosthetic success and survival rate were 57.7% and 100%, respectively.

DISCUSSION: None of the predictors included in the multilevel model presented a significant impact on the bone loss between baseline and the follow-up examination.

CONCLUSIONS: The authors concluded that the prognosis of implant-supported FPDs and marginal bone loss at implants were not influenced by the position or the length of the cantilever, the location of the bridge and type of opposite dentition. Implant-supported fixed cantilever prosthesis can be considered a suitable treatment choice.

**Prosthetic treatment planning on the basis of scientific evidence.**

Pjetursson BE, Lang NP.


Faculty of Odontology, University of Iceland, Reykjavik, Iceland, and University of Berne School of Dental Medicine, Berne, Switzerland. bep@hi.is

**Abstract**

The objective of this report is to summarize the results on survival and complication rates of different designs of fixed dental prostheses (FDP) published in a series of systematic reviews. Moreover, the various parameters for survival and risk assessment are to be used in an attempt to perform treatment planning on the basis of scientific evidence. Three electronic searches complemented by manual searching were conducted to identify prospective and retrospective cohort studies on FDP and implant-supported single crowns (SC) with a mean follow-up time of at least 5 years. Patients had to have been examined clinically at the follow-up visit. Failure and complication rates were analyzed using random-effects Poisson regression models to obtain summary estimates of 5- and 10-year survival proportions. Meta-analysis of the studies included indicated an estimated 5-year survival of conventional tooth-supported FDP of 93.8%, cantilever FDP of 91.4%, solely implant-supported FDP of 95.2%, combined tooth-implant-supported FDP of 95.5% and implant-supported SC of 94.5% as well as resin-bonded bridges 87.7%. Moreover, after 10 years of function the estimated survival decreased to 89.2% for conventional FDP, to 80.3% for cantilever FDP, to 86.7% for implant-supported FDP, to 77.8% for combined tooth-implant-supported FDP, to 89.4% for implant-supported SC and to 65% for resin-bonded bridges. When planning prosthetic rehabilitations, conventional end-abutment tooth-supported FDP, solely implant-supported FDP or implant-supported SC should be the first treatment option. Only as a second option, because of reasons such as financial aspects patient-centered preferences or anatomical structures cantilever tooth-supported FDP, combined tooth-implant-supported FDP or resin-bonded bridges should be chosen.