Prosthetic treatment planning on the basis of scientific evidence.

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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 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.
Comparison of survival and complication rates of tooth-supported fixed dental prostheses (FDPs) and implant-supported FDPs and single crowns (SCs).

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Abstract

OBJECTIVES: The objective of this systematic review was to assess and compare the 5- and 10-year survival of different types of tooth-supported and implant-supported fixed dental prosthesis (FDPs) and single crowns (SCs) and to describe the incidence of biological and technical complications.

METHODS: Three electronic searches complemented by manual searching were conducted to identify prospective and retrospective cohort studies on FDPs and SCs 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's regression models to obtain summary estimates of 5- and 10-year survival proportions.

RESULTS: Meta-analysis of the included studies indicated an estimated 5-year survival of conventional tooth-supported FDPs of 93.8%, cantilever FDPs of 91.4%, solely implant-supported FDPs of 95.2%, combined tooth-implant-supported FDPs of 95.5% and implant-supported SCs of 94.5%. Moreover, after 10 years of function the estimated survival decreased to 89.2% for conventional FDPs, to 80.3% for cantilever FDPs, to 86.7% for implant-supported FDPs, to 77.8% for combined tooth-implant-supported FDPs and to 89.4% for implant-supported SCs. Despite high survival rates, 38.7% the patients with implant-supported FDPs had some complications after the 5-year observation period. This is compared with 15.7% for conventional FDPs and 20.6% for cantilever FDPs, respectively. For conventional tooth-supported FDPs, the most frequent complications were biological complications like caries and loss of pulp vitality. Compared with tooth-supported FDPs, the incidence of technical complications was significantly higher for the implant-supported reconstructions. The most frequent technical complications were fractures of the veneer material (ceramic fractures or chipping), abutment or screw loosening and loss of retention.

CONCLUSION: On the basis of the results of the present systematic review, planning of prosthetic rehabilitations should preferentially include conventional end abutment tooth-supported FDPs, solely implant-supported FDPs or implant-supported SCs. Only for reasons of anatomical structures or patient-centered preferences and as a second option should cantilever tooth-supported FDPs or FDPs supported by combination of implants and teeth be chosen.
Cantilever fixed prostheses utilizing dental implants: a 10-year retrospective analysis.

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Abstract

OBJECTIVE: The dental literature has been unclear about long-term success of fixed cantilever prostheses supported by dental implants. The disappointing results reported when cantilever fixed partial dentures (FPDs) are supported with natural teeth are not directly applicable to implant cantilever FPDs. This article reports on 10 years of implant-retained fixed prostheses primarily in the maxillary arch using the ITI dental implant system.

METHOD AND MATERIALS: Sixty cantilever prostheses using 115 ITI dental implants on 36 patients were placed and monitored over a 10-year period.

RESULTS: No implant fractures, abutment fractures, porcelain fractures, prosthesis fractures, soft tissue recession, or radiographic bone loss were recorded. All 60 cantilevered prostheses remain in satisfactory function.

CONCLUSION: Positive, long-term results, using implant-retained cantilever FPDs can be achieved by: (1) using a rough surface implant of 4.1 mm or greater; (2) using an implant/abutment design that reduces stacked moving parts and reduces the implant-to-crowns ratio; and (3) using a cementable prosthesis design that eliminates the need for occlusal screw retention.

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

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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 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.

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**A systematic review of the survival and complication rates of implant supported fixed dental prostheses with cantilever extensions after an observation period of at least 5 years.**

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**Abstract**

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.

A systematic review of the survival and complication rates of fixed partial dentures (FPDs) after an observation period of at least 5 years. II. Combined tooth–implant-supported FPDs.

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Comment in:

• Evid Based Dent. 2005;6(4):98.

Abstract

OBJECTIVES: The objective of this systematic review was to assess the 5- and 10-year survival of combined tooth-implant-supported fixed partial dentures (FPDs) and the incidence of biological and technical complications.

METHODS: An electronic MEDLINE search supplemented by manual searching was conducted to identify prospective and retrospective cohort studies on FPDs with a mean follow-up time of at least 5 years. Patients had to have been examined clinically at the follow-up visit. Assessment of the identified studies and data abstraction was performed independently by two reviewers. Failure and complication rates were analyzed using random-effects Poisson regression models to obtain summary estimates of 5- and 10-year survival proportions.

RESULTS: From a total of 3844 titles and 560 abstracts, 176 articles were selected for full-text analysis, and 13 studies met the inclusion criteria. Meta-analysis of these studies indicated an estimated survival of implants in combined tooth-implant-supported FPDs of 90.1% (95 percent confidence interval (95% CI): 82.4-94.5%) after 5 and 82.1% (95% CI: 55.8-93.6%) after 10 years. The survival rate of FPDs was 94.1% (95% CI: 90.2-96.5%) after 5 and 77.8% (95% CI: 66.4-85.7%) after 10 years of function. There was no significant difference in survival of tooth and implant abutments in combined tooth-implant FPDs. After an observation period of 5 years, 3.2% (95% CI: 1.5-7.2%) of the abutment teeth and 3.4% (95% CI: 2.2-5.3%) of the functionally loaded implants were lost. After 10 years, the
corresponding proportions were 10.6% (95% CI: 3.5-23.1%) for the abutment teeth and 15.6% (95% CI: 6.5-29.5%) for the implants. After a 5 year observation period, intrusion was detected in 5.2% (95% CI: 2-13.3%) of the abutment teeth. Intrusion of abutment teeth were almost exclusively detected among non-rigid connections.

CONCLUSION: Survival rates of both implants and reconstructions in combined tooth-implant-supported FPDs were lower than those reported for solely implant-supported FPDs (Pjetursson et al. 2004). Hence, planning of prosthetic rehabilitation may preferentially include solely implant-supported FPDs. However, anatomical aspects, patient centered issues and risk assessments of the residual dentition may still justify combined tooth-implant-supported reconstructions. It was evident from the present search that tooth-implant-supported FPDs have not been studied to any great extent and hence, there is a definitive need for more longitudinal studies examining these reconstructions.

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Bone level change at implant-supported fixed partial dentures with and without cantilever extension after 5 years in function.


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Abstract

OBJECTIVE: The aim of this study was to retrospectively analyze whether the inclusion of cantilever extensions increased the amount of marginal bone loss at free-standing, implant-supported, fixed partial dentures (FPDs) over a 5-year period of functional loading.

MATERIAL AND METHODS: The patient material comprised 45 periodontally treated, partially dentate patients with a total of 50 free-standing FPDs supported by implants of the Astra Tech System. Following FPD placement (baseline) the patients were enrolled in an individually designed supportive care program. A set of criteria was collected at baseline to characterize the FPDs. The primary outcome variable was change in peri-implant bone level from the time of FPD placement to the 5-year follow-up examination. The comparison between FPDs with and without cantilevers was performed at three levels: FPD level, implant level, and surface level. Bivariate analysis was performed by the use of the Mann-Whitney U-test and stepwise regression analysis was utilized to evaluate the potential influence of confounding factors on the change in peri-implant bone level.

RESULTS: The overall mean marginal bone loss for the implant-supported FPDs after 5 years in function was 0.4 mm (SD, 0.76). The bone level change at FPDs placed in the maxilla was significantly greater than that for FPDs in the mandible (0.6 versus 0.2 mm; p<0.05). No statistically significant differences were found with regard to peri-implant bone level change over the 5 years between FPDs with and without cantilevers at any of the levels of comparisons. The multivariate analysis revealed that the variables jaw of treatment and smoking had a significant influence on peri-implant bone level change on the FPD level, but not on the implant or surface levels. The model explained only 10% of the observed variance in the bone level change.
CONCLUSION: The study failed to demonstrate that the presence of cantilever extensions in an FPD had an effect on peri-implant bone loss.

**Long-term survival and success of oral implants in the treatment of full and partial arches: a 7-year prospective study with the ITI dental implant system.**

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**Abstract**

**PURPOSE:** This study evaluated the long-term survival and success of different implant-supported prostheses supported by ITI implants.

**MATERIALS AND METHODS:** Two hundred fifty consecutive patients were rehabilitated using implant-supported prostheses. Seven hundred fifty-nine implants were loaded. Single-tooth prostheses (n = 106), cantilever fixed partial prostheses (n = 42), fixed partial prostheses (n = 137), fixed complete prostheses (n = 5), implant/tooth-supported prostheses (n = 13), and overdentures (n = 37) were used. The mean follow-up period was 3.85 years. Life table analyses were performed. Implant survival rates were calculated by means of standard life table principles. Statistical analysis was performed to compare the implant survival and success by implant placement site for each type of prosthesis.

**RESULTS:** The cumulative implant survival rates were calculated for implants supporting single-tooth prostheses (95.6%), cantilever fixed partial prostheses (94.4%), fixed partial prostheses (96.1%), fixed complete prostheses (100%), implant/tooth-connected prostheses (90.6%), and overdentures (95.7%). Similar survival and success rates were documented for implants placed in maxillae and mandibles. Implant size did not influence survival.

**DISCUSSION:** Seven-year survival rates were similar for implants supporting single-tooth prostheses, cantilever fixed partial prostheses, fixed partial prostheses, and implant/tooth-supported prostheses. Medium-long term implant survival and success were not influenced by the site (maxilla or mandible). Implant and prosthetic survival rates for overdentures supported by 2 implants were comparable to those for overdentures supported by 3 or more implants.

**CONCLUSION:** Prostheses supported by ITI implants represent a reliable medium-term treatment. (More than 50 references.)
Survival and complication rates of fixed partial dentures supported by a combination of teeth and implants.


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Abstract

Selection Criteria: The authors searched for all English-language articles in MEDLINE through 2004. The electronic search yielded 3844 titles, from which 151 studies were ultimately selected. The authors also conducted a manual search that included searching 8 specialty dental journals that published articles on implant-related research during 2001 to 2004. The manual search yielded 25 additional studies. Overall, no randomized controlled trials (RCTs) were found. Inclusion criteria required studies to have patients clinically examined at follow-up and to have reported on the characteristics of the fixed partial dentures (FPD) structure. The meta-analysis included 13 of 176 studies in which patients with 5 or 10 years of follow-up in a prospective or retrospective study design were evaluated clinically at the end of the follow-up period.

KEY STUDY FACTOR: The primary exposure was tooth-implant-supported fixed partial dentures compared with implant-only supported FPDs.

MAIN OUTCOME MEASURE: The main outcome measure was the failure rate of implants in tooth-implant-supported FPDs after 5 or 10 years of follow-up. Secondary outcome measures included the failure rate of the FPD itself or biological or technical complications.

MAIN RESULTS: The meta-analysis included 555 patients ranging in age from 17 to 83 years who received 1002 implants that supported 538 FPDs. Survival of implants in combined tooth-implant-supported FPDs was 90.1% (95% confidence interval [CI]: 82.4%-94.5%) after 5 years and 82.1% (95% CI: 55.8%-93.6%) after 10 years. Survival of FPDs was 94.1% after 5 years and 77.8% after 10 years. There was no difference in the failure rates of implant abutments (3.4%) or tooth abutments (3.2%) for the FPDs after 5 years. Biological complications were reported in only 2 of 13 studies after 5 years, and the cumulative rate was 11.7%.

CONCLUSIONS: The authors concluded that survival rates for implants and FPDs in combined tooth-implant-supported FPDs were lower than found in a similar meta-analysis of implant-only-supported FPDs. The worse survival data for FPDs after 10 years for combined tooth-implant support (77.8%) compared with implant-only support (86.7%) is based on data in only 60 FPDs.