Geroprothetic - Full patient's wishes lead to more quality of life

Zahn T
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Since the generation of people elder than sixty years is strongly growing and the average lifespan is increasing, the prosthetic concepts will have to be adapted to the elder patients and their requests nowadays for a highly esthetical and functional prosthetic restoration. The dentist has to evaluate parameters as the patients physical and psychological health status, his adaptability to new prosthetic concepts, his oral status and the various prosthetic concepts before treatment. To reach a successful result the patients wish for an esthetical, functional and long lasting restoration has to be considered and satisfied. The final restoration should also be easily to clean, adaptable to future oral situations, immobile and protect the residual natural teeth. The patient's agility does not depend on the patient's age and the experienced dentist has to take the challenge to find the best treatment regarding all parameters. Standardized concepts will not be able to fulfil each individual patient's status and should not be chosen only because of the elder patient's age.

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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.
Strains recorded in a combined tooth-implant restoration: an in vivo study.
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Abstract
Implant-supported fixed prosthesis is a treatment option to restore missing teeth. Occasionally, it is necessary to connect teeth and implants as abutments for these restorations. Whether such restorations can be recommended is a matter of debate. This in vivo study measured strains involved in connecting implants to a natural tooth and compared rigid and nonrigid tooth/implant connections. A patient was treated with mandibular unilateral fixed prosthesis supported by two implants and one proximal tooth. Strain gauges were cemented to the experimental framework restoration. Recordings were obtained from the restorations while the patient bit on a wooden stick on the day of placement and after 2 weeks in function, using both rigid and nonrigid attachment connections. A significant difference was found in horizontal deformation of the tooth/crown between day 1 and 2 weeks later. Vertical deformations were smaller than horizontal ones. After applying biting forces, horizontal and vertical deformations were maintained. Strain recorded in a clinical setting revealed mostly horizontal strains generated in a combined tooth/implant device. These strains were maintained after a 2-week recording. Within the limitation of this study, combined tooth/implant restorations could be a potential complication and could cause an intrusion of a natural abutment regardless of the type of connection (rigid or nonrigid).

Tooth-to-implant connection: a systematic review of the literature and a case report utilizing a new connection design.
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Abstract
BACKGROUND: In the treatment of partially edentulous patients, implants have often been connected to natural teeth. Numerous studies have reported significant complications and problems, while others have demonstrated favorable outcomes.

PURPOSE: The purpose of this article was to systematically review the literature regarding the splinting of implants and teeth. The difference in the biomechanical behavior between osseointegrated implants and teeth and the efficacy of the different modes of connection that have been employed are explored.

MATERIALS AND METHODS: A MEDLINE search between 1966 and October 2006 was performed to retrieve relevant articles. A further manual search from the bibliographies of the
former articles was performed to include as many references as possible. Prospective and retrospective clinical studies, as well as laboratory and computer-generated research, were included.

RESULTS: A pronounced difference in the biomechanics of teeth and implants has been revealed in theoretical models. This disparity has also been supported by the majority of the experimental work published. As a result, principal complications, such as intrusion of teeth and higher risk of overload and greater marginal bone loss around the implants have been reported. Among the several types of connections utilized, the rigid connection showed fewer complications but unfortunately did not eliminate them.

CONCLUSION: Totally implant-supported prostheses should be the treatment of choice. However, there are cases where combining teeth and implants is inevitable. The authors propose a rationale design of connecting implants and teeth. This design minimizes the biologic and technical complications.

Should we extract teeth to avoid tooth-implant combinations?

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Abstract

The controversy over combining teeth and implants for support of fixed partial dentures still remains after almost three decades of debate. The aim of this review was to evaluate what support that could be found in the literature for extracting teeth in favour of implants, and to elucidate whether tooth-implant prostheses were inferior to solely implant supported constructions in terms of survival and complications. The methods for gathering relevant information entailed electronic searches on PubMed using relevant key words, as well as complementary manual searches in the retrieved publications. The results showed that there was no support for extracting teeth in favour of placing implants. On the contrary, the healthy tooth had a survival that was life-long, which is yet to be shown for the dental implant. Also the use of teeth as abutments in combination with dental implants for support of fixed dental prostheses could be endorsed in certain situations with solid albeit limited scientific support. In a wider sense, such prostheses could be used as a reliable therapy in all regions of the jaws. However the status of the abutment teeth in terms of periodontal support, pulpal status and risk for carious lesions and biomechanical complications should always be considered in relation to the long-term prognosis of the prosthesis. The conclusion was that teeth should not be extracted in favour of placing dental implants without a specific indication, and that tooth-implant supported prostheses should be considered as a viable prosthetic option.
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.
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.
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.
Retrospective evaluation of complete-arch fixed partial dentures connecting teeth and implant abutments in patients with normal and reduced periodontal support.

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Abstract

STATEMENT OF PROBLEM: The clinical outcome of complete-arch fixed prostheses supported by implants and natural tooth abutments in patients with normal or reduced periodontal support has been reported by few studies, with controversial results.

PURPOSE: The purpose of this study was to report on the implant success rate, prosthetic complications, and the occurrence of tooth intrusion, when complete-arch fixed prostheses, supported by a combination of implants and teeth, were fabricated for patients with normal and reduced periodontal support.

MATERIAL AND METHODS: Nineteen patients with residual teeth that served as abutments were consecutively treated with combined tooth- and implant-supported complete-arch fixed prostheses and were retrospectively evaluated after a period varying from 24 to 94 months. Nine patients showed reduced periodontal support as a result of periodontal disease and treatment (RPS group), and 10 patients had normal periodontal support of the abutment teeth (more than 2/3 of periodontal support [NPS group]). Ninety implants and 72 tooth abutments were used to support 19 fixed partial dentures. Screw- and cement-retained metal-ceramic and metal-resin prostheses were fabricated with rigid and nonrigid connectors. Implant survival and success rates, occurrence of caries and tooth intrusion, and prosthetic complications were recorded. The number of teeth, implants, prosthetic units, fixed partial dentures, and nonrigid connectors were compared with a t test to assess differences between the 2 groups, while data for the occurrence of intrusions and prosthetic complications were compared with the Fisher exact test (alpha=.05).

RESULTS: One of the 90 implants was lost (99% survival rate) over 24 to 94 months, while 3 implants showed more than 2 mm of crestal bone loss (96% success rate) over the same period. No caries were detected, but 5.6% (4/72) of the abutment teeth exhibited intrusion. Intrusion of abutment teeth was noted in 3 patients who had normal periodontal support (13% of teeth in NPS group) of the abutment teeth and was associated with nonrigid connectors. No intrusion of teeth was noted in the patients exhibiting reduced periodontal support regardless of the type of connector or when a rigid connector was used for either group. The number of intruded teeth was significantly greater in patients with intact periodontal support (P=.03).

CONCLUSIONS: Complete-arch fixed prosthesis supported by implant and tooth abutments may be associated with intrusion of teeth with intact periodontal support when nonrigid connectors are used to join the implant- and tooth-supported sections of the prostheses. However, fixed partial dentures supported by implants and teeth with reduced periodontal support were not associated with tooth intrusion, regardless of the type of connectors used.
Biomechanical interactions in tooth-implant-supported fixed partial dentures with variations in the number of splinted teeth and connector type: a finite element analysis.

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Abstract

OBJECTIVE: The aim of this study was to investigate the biomechanical interactions in tooth-implant-supported fixed partial dentures (FPDs) under several loading conditions with different numbers of splinted teeth and connector types (rigid and non-rigid) by adopting the three-dimensional (3D) non-linear finite element (FE) approach.

MATERIAL AND METHODS: A 3D FE FPD model was constructed containing one Frialit-2 implant in the mandibular second-molar region splinted to the first and second premolars. Frictional contact elements were used to simulate realistic interface conditions within the implant system and the non-rigid connector function. The main effects for each level of the three investigated factors (loading condition, number of splinted teeth and connector type) in terms of the stress values and dissimilar mobility of the natural teeth and implant were computed for all models.

RESULTS: The results indicated that load condition was the main factor affecting the stress developed in the implant, bone and prosthesis when comparing the type of connector and the number of splinted teeth. The stress values were significantly reduced in centric or lateral contact situations once the occlusal forces on the pontic were decreased. However, the prosthesis stress for the non-rigid connections was increased more than 3.4-fold relative to the rigid connections. Moreover, the average tooth-to-implant displacement ratios (R(TID)) with a non-rigid connection were obviously larger than those for rigid connections under axial loading forces. Adding an extra tooth to support a three-unit tooth-implant FPD only exploited its function when the prosthesis withstood lateral occlusal forces.

CONCLUSIONS: The load condition is the main factor affecting stress distribution in different components (bone, prosthesis and implant) of tooth-implant-supported FPDs. Minimizing the occlusal loading force on the pontic area through selective grinding procedures could reduce the stress values obviously. A non-rigid connector may more efficiently compensate for the dissimilar mobility between the implant and natural teeth under axial loading forces but with the risk of increasing unfavorable stresses in the prosthesis.
Intrusion phenomenon in combination tooth-implant restorations: a review of the literature.

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Abstract

STATEMENT OF PROBLEM: Controversy regarding the connection of implants to natural teeth in fixed partial dentures has emerged in response to clinical reports of intrusion of the natural teeth. Although theories have been proposed to explain this phenomenon, the cause of the intrusion remains unknown. Numerous longitudinal studies have demonstrated that teeth can be successfully connected to implants. The use of rigid connectors, or nonrigid connectors with the keyway on the implant, are described as mechanisms to prevent intrusion of the natural tooth.

PURPOSE: This article reviews the literature that pertains to this subject and includes treatment modalities that may be helpful in preventing intrusion.

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.

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.)
Tooth-implant connection: a bibliographic review.

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Abstract

The aim of this study was to carry out a bibliographic review of all available literature addressing the issue of whether or not the connection of teeth to implants by means of a prosthesis is a viable treatment alternative. Twenty articles from a variety of sources were analyzed and classified in order to draw conclusions. Articles were classified by type and an analysis was made of the different variables considered in each study, obtaining percentages of implant survival ranging from 84.4% to 100%, prosthetic complications ranging from 80% to 90%, and the incidence of dental intrusion ranging from 0 to 5.6%. Biomechanical studies: Some articles studied models in order to assess different connections subjected to force, in which varying results were obtained. Rigid connections appeared to produce the most stress to the natural tooth, periodontal ligament and peri-implant bone; non-rigid connections reduced the stress to the bone, but increased stress to the prosthesis. Clinical studies: The results obtained were disparate. Studies in the medium or short-term show this as a viable treatment alternative, whereas some studies point to a greater risk of complications, although the use of rigid connection decreases the percentage of intrusion. Other bibliographic reviews have concluded that there is a need for more longitudinal studies on the viability of tooth-implant connection, also concluding that complications are greater when this is the chosen treatment. As a viable alternative with an acceptable success rate, this course of treatment is always associated with rigid connection rather than non-rigid connection. Although intrusion is avoided with rigid connection, this nevertheless remains inadvisable as the primary treatment choice.

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   http://www.medicinaoral.com/pubmed/medoralv15_i2_p387.pdf

Evaluation of stress induced by implant type, number of splinted teeth, and variations in periodontal support in tooth-implant-supported fixed partial dentures: a non-linear finite element analysis.

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Abstract

BACKGROUND: This study investigated the biomechanical interactions in tooth-implant-supported fixed partial dentures (FPDs) with variations in periodontal support, implant
system, number of splinted teeth, and load type using the non-linear finite element (FE) approach.

METHODS: The section contours of the alveolar bone, abutment teeth, and prosthesis were acquired using computed tomography (CT) and micro-CT to construct the FE models with normal periodontal support (NPS) and compromised periodontal support (CPS) containing one- and two-piece implants splinted to the first and second premolars. Realistic interface conditions within the implant system were simulated using frictional contact elements. The main effects for each level of investigated factors in terms of stress values and dissimilar mobility of natural teeth and the implant were computed for all models.

RESULTS: Analytic results indicated that the load condition was the predominant factor affecting stress developed in the implant, bone, and prosthesis. Additionally, the oblique occlusal forces increased the stress values relative to that of axial analogs. A splinted system with a two-piece implant increased stress on the bone and decreased stress on the prosthesis compared to that of the one-piece implant. The splinted system with a CPS only slightly increased implant stress on the bone compared to that of the splint system with NPS. Splinting an additional tooth did not significantly impact stress values for the tooth-implant-supported FPD.

CONCLUSIONS: A one-piece structure implant may be better than that of a two-piece structure implant in decreasing bone stress when a natural tooth is planned to connect with an implant. The factors of periodontal support and number of splinted teeth only slightly influenced stress in tooth-implant-supported FPDs.

Freestanding and tooth-implant connected prostheses in the treatment of partially edentulous patients. Part I: An up to 15-years clinical evaluation.

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Abstract

In 123 patients, 339 implants were connected to 313 teeth by means of fixed partial prostheses (test) and followed up for 1.5-15 years (mean: 6.5). In another ad random selected 123 patients, 329 implants were connected to each other by means of 123 freestanding fixed partial prostheses (control) and were followed up for 1.3-14.5 years (mean: 6.2). The aim of this study was to compare both treatment modalities with each other based on implant, tooth and prosthesis complications. The cumulative implant success, based on implant immobility and/or lack of implant fractures after loading, in the test and control groups amounted to 95% and 98.5%, respectively. Although in the test group 10 implants versus only 1 in the control group failed, a regression analysis of the survival data, based on the cox proportional hazards model, revealed no significant difference. In the test group periapical lesions (3.5%), tooth fracture (0.6%) and tooth extraction due to fatal decay or periodontitis (1%) were observed, besides tooth intrusion (3.4%) and crown cement failure (8%). Framework fracture occurred in 3 patients. In the control group, only 2 abutment
screws fractured. The treatment of partial edentulism by means of oral implants was beneficial for our patients. Because of a clear tendency of more implant failures (mobility or fractures) and tooth complications in the tooth-implant connected prostheses, the freestanding solution is the primary option to be considered. To avoid intrusion of abutment teeth, the connection, if made, should be completely rigid.

**Freestanding and tooth-implant connected prostheses in the treatment of partially edentulous patients Part II: An up to 15-years radiographic evaluation.**

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**Abstract**

A total of 123 patients were followed between January 1983 and July 1998 with 140 tooth-implant connected prostheses. The age of the patients at prosthesis installation ranged from 20 to 79 years (mean 51.8). 339 (Brånemark(R) system) implants were connected to 313 teeth. The loading time ranged from 1.5 to 15 years (mean: 6.5). 123 patients were randomly selected as a control group with freestanding implant-supported prostheses only. The age of the patients at prosthesis installation ranged from 22 to 78 years (mean 52.3). The loading time for the 329 freestanding (Brånemark(R) system) implants ranged from 1.3 to 14.5 years (mean: 6.2). Evolution of the marginal bone stability around the implant in the tooth-implant connected as well as the freestanding group was studied with respect to the prognosis of the implants. Over the period from 0 to 15 years, there was significantly more marginal bone loss (0.7 mm) in tooth-implant connected versus freestanding prostheses. No significant difference in marginal bone loss was found between the non-rigid tooth-implant connected prostheses versus freestanding prostheses. However, there was a significant difference in marginal bone loss for rigid and multi-connected tooth-implant connected prostheses versus freestanding ones. The results of this study indicate that more bone is lost around implants which are rigidly connected to teeth. This suggests that bending load, which is increased in tooth-implant connected prostheses, might be responsible for this phenomenon. These observations favor the use of freestanding prostheses whenever possible. However, the clinical significance of greater bone loss in rigid versus non-rigid connections might outweigh the annoying phenomenon of tooth intrusion in the case of non-rigid tooth connection, when connection is considered.
A survey of natural tooth abutment intrusion with implant-connected fixed partial dentures.

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Abstract

To elicit information about the phenomenon of intrusion of natural tooth abutments in implant-connected prostheses, a survey was distributed to clinicians with varied experience. Although practitioners with more experience in fabricating implant-supported dentures connected to natural teeth reported fewer instances of intrusion, it cannot be concluded that this observation is significant. The cause of intrusion is probably multifactorial, and respondents suggested several possible causative factors: disuse atrophy, debris impaction, impaired rebound memory, and mechanical binding. Because apical migration of abutment teeth affects occlusion and oral hygiene, the authors make several recommendations for treatment planning for patients who have natural dentition adjacent to proposed implant sites.

Tooth-implant connection: some biomechanical aspects based on finite element analyses.

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Abstract

This study investigated, with the use of two- and three-dimensional finite element analysis, the peri-implant stress that occurred during loading of a tooth that was rigidly connected to a distally placed implant. A fixed bond between the bone and the implant was assumed, while the periodontal ligament was represented by means of three-dimensional nonlinear viscoelastic spring elements. Two different loading conditions were compared in the study: i) an axially directed static load of 50 kg that was applied to the tooth for 10 s, and ii) a transitional load of 50 kg that was applied for 5 milliseconds. Load duration appeared to have a greater influence than load intensity on the stress distribution in the bone around an implant and a rigidly connected tooth. Static load is, therefore, potentially more harmful for peri-implant bone than transitional load. The periodontal ligament seems to play a key role in the stress distribution between a tooth and a rigidly connected implant.
Fixed partial dentures supported by natural teeth and Brånemark system implants: a 3-year report.

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Abstract

PURPOSE: To evaluate fixed partial dentures (FPDs) supported by a combination of natural teeth and implants in a variety of clinical situations.

MATERIALS AND METHODS: In 30 patients, 86 teeth and 85 implants were used as supports for 30 FPDs of varying extension (mean = 8.6 units); 23 in the maxilla and 7 in the mandible. The prostheses had a removable section fastened with screws to both the implants and to a section cemented on the supporting teeth, and were thus functioning as rigid, fixed partial dentures.

RESULTS: Five implants were lost prior to the placement of prostheses, 2 were lost after loading, giving survival rates of 91.0% in the maxilla and 95.5% in the mandible. Complications were predominantly soft tissue-related and were all amenable to treatments. One patient was lost to follow-up. The remaining 29 FPDs remained stable throughout the 3-year observation period.

DISCUSSION: Changes in plaque accumulated, bleeding on probing, pocket depths, and marginal bone level were acceptable. The survival rate of implants was comparable to that of similar studies. Further investigations are needed with regard to design for such FPDs.

CONCLUSION: These findings, together with the patient satisfaction experienced, indicated that the combined support of implants and teeth for fixed prostheses may be appropriate treatment for patients.