Systematic review of implant outcomes in treated periodontitis subjects
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CRD summary
This review aimed to evaluate the effect of a past history of periodontitis on the survival and success of dental implants in partially dentate patients. The authors reported that there was limited evidence that patients treated for periodontitis may experience more implant loss and implant complications than non-periodontitis patients. This was generally a well-conducted review and the authors’ conclusions were likely to be reliable.

Authors’ objectives
To evaluate the effect of a past history of periodontitis on the survival and success of dental implants in partially dentate patients.

Searching
MEDLINE and EMBASE were searched until March 2006; search terms were reported. The reference lists of relevant review articles and included articles were checked for additional studies. In-press articles were requested from three relevant journals. There were no language restrictions.

Study selection
All longitudinal studies comparing outcomes for treated periodontitis and non-periodontitis partially dentate patients following endosseous dental implants with more than six months loading were eligible for inclusion. Studies needed to include at least 10 patients, five in each comparison group; case series studies had to enrol consecutive patients. Studies evaluating titanium endosseous implants were included; studies evaluating transmandibular implants, zygomatic implants, implants used for anchorage in orthodontic therapy, facial prosthesis or any other non-dental use were excluded. Studies evaluating patients who were medically compromised, for example cancer or uncontrolled diabetes mellitus, were excluded. Studies had to report on at least one of the included outcomes (implant survival and implant success – including bone-level change – and peri-implantitis); comprehensive definitions for these were provided.

In the included studies, treated periodontitis patients were classified as having chronic periodontitis or aggressive periodontitis; this was not reported in some studies. Definitions of non-periodontitis patients varied between studies. A variety of implant systems and surgical procedures were used across the included studies. Some of the studies included completely edentulous patients. Other studies were not consecutive case series, although the inclusion criteria stated otherwise.

Two reviewers independently selected the studies for inclusion. Any disagreements were resolved through consensus or a third reviewer.

Assessment of study quality
Study quality assessment was based on criteria from Centre for Reviews and Dissemination (CRD) and included explicit inclusion criteria: similarity of baseline characteristics; blinding of outcome assessors; completeness of follow-up; and similarity of dropouts and reasons for drop-outs. In addition, case series studies were assessed on having patients entered consecutively. Studies were rated as high, medium or low risk of bias. Studies were also checked to assess whether confounding factors (for example, smoking) had been reported and adjusted for in the statistical analysis.

Validity assessment was performed independently by two reviewers. It was not reported how disagreements were resolved.

Data extraction
Data were extracted comprehensively into evidence tables according to study design.
Data extraction was performed independently by two reviewers. It was not reported how disagreements were resolved.

**Methods of synthesis**

Meta-analysis was not undertaken due to heterogeneity in interventions, definitions of patient groups, and outcome definition and measurement. Data synthesis was undertaken qualitatively by study design from the data in the evidence tables.

**Results of the review**

Nine studies were included in the review: three prospective cohort studies (n=118 patients); and six case series studies (number undeterminable). For three of the nine studies, data was utilised from only a subgroup of the total study population.

Six of the studies were rated as having a high risk of bias and three as having a medium risk of bias. Confounders were only adjusted for adequately in one study.

There was substantial variation in the way outcomes were defined and measured in the included studies.

The following is a summation of the review's comprehensive outcome reporting:

**Implant survival**

This outcome was measured in five studies (two cohort studies and three case series studies). All studies except one reported better implant survival in the non-periodontitis patients than in the treated periodontitis patients; this was statistically significant in two studies.

**Implant success**

This outcome was measured in five studies (three cohort studies and two case series studies). All studies except one reported better implant success in the non-periodontitis patients than with treated periodontitis patients, although this was statistically significant in only one study.

**Bone-level change**

Measured in five studies (three cohort studies and two case series studies). All studies reported less bone loss in the non-periodontitis patients than in the treated periodontitis patients; this was statistically significant in one study.

**Peri-implantitis**

This outcome was measured in three studies (one cohort study and two case series studies). All studies reported lower rates of peri-implantitis in the non-periodontitis patients than with treated periodontitis patients; this was statistically significant in two studies.

**Authors' conclusions**

There is some evidence that patients treated for periodontitis may experience more implant loss and complications around implants than non-periodontitis patients. Evidence is stronger for implant survival than implant success; methodological issues limit the potential to draw robust conclusions.

**CRD commentary**

This review had clearly stated inclusion criteria. Two relevant databases were searched, but the limited searching for unpublished articles may not have been adequate to prevent publication bias. Appropriate procedures were used to minimise error and bias in study selection, data extraction and quality assessment. There was some concern that some studies included edentulous patients (despite the aim of the review being to assess partially dentate patients) and also over the inclusion of non-consecutive case series (the inclusion criteria stated that only consecutive case series would be included). Comprehensive details of all the studies were provided. An appropriate narrative synthesis was undertaken, which addressed the variability in the included studies and the methodological limitations of the studies. This was generally a well-conducted review and the authors' conclusions were likely to be reliable.

**Implications of the review for practice and research**
Practice: the authors stated that patients treated for periodontitis who required implant therapy would need to be provided with full disclosure regarding the possible effects of periodontitis on implant therapy.

Research: the authors provided detailed recommendations for research. These can be summarised as a need for: improved methodological quality in the conduct of studies; standardisation of definitions for treated periodontitis and non-periodontitis patients; formal consensus on accepted implant success criteria; formal consensus on criteria for peri-implantitis; and to identify factors that affect the prognosis of implant outcomes in patients treated for periodontitis. The authors stated that the last point could be achieved by a well-designed and conducted prospective study that should aim to determine the effect of the quality and frequency of supportive periodontal therapy, as well as the influence of genetic factors, in the prognosis of implant outcomes in patients treated for periodontitis.

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