A meta-analysis of implants in partial edentulism

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Authors' objectives
To estimate the survival of implants supporting bridges or single crowns in partially edentulous patients.

Searching
MEDLINE was searched from 1980 to 1996 using the following keywords: 'dental implants', 'cylindrical intraosseous', 'osseointegration', 'edentulous', 'partial', 'single', 'fixed bridges', 'fixed partial dentures', 'prosthodontic treatment' and 'survival'. Additional material was located by examining the Index of Dental Literature and the reference lists of all retrieved papers. Only studies published in English or with an English abstract were considered.

Study selection
Study designs of evaluations included in the review
The following criteria were used to select studies for inclusion: study reported on threaded cylindrical metallic intra-osseous implants; there should be a minimum follow-up period of one year after loading; implant failure should be defined; cumulative survival rate should be calculable; and where multiple reports on the same implants were identified, only data from the most recent report should be used. Details of excluded studies with the main reason for their exclusion were presented. Retrospective and prospective studies were included, whereas case reports were excluded. The duration of follow-up ranged from 1 to 8 years.

Specific interventions included in the review
Threaded cylindrical metallic intra-osseous implants in the form of single crowns and partially-fixed dentures.

Participants included in the review
The participants were partially edentulous patients.

Outcomes assessed in the review
The primary outcome was that of implant survival, expressed as cumulative survival rate. Criteria of success were as defined by Albrektsson et al. (see Other Publications of Related Interest no.1) or were 'described sufficiently to allow for inclusion'.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the authors performed the selection.

Assessment of study quality
The authors do not state that they assessed validity.

Data extraction
Survival data were extracted from each study.

Methods of synthesis
How were the studies combined?
A life-table was constructed using the actuarial analysis method of Dawson-Saunders and Trapp (see Other Publications of Related Interest no.2). Results were presented as a survival curve with 95% confidence intervals.

How were differences between studies investigated?
Implant survival rates after 3 years were compared across studies and plotted; any differences between them were discussed. The survival analysis was repeated for prospective and retrospective studies.

Results of the review
Nineteen studies of 2,686 implants were included; these comprised at least 570 single crowns and 2,062 fixed partial dentures.

The cumulative probability of survival for fixed partial dentures was 95.9% at 1 year, 94.7% at 2 years, 94.2% at 3 years, 94% at 4 years, 93.6% at 5 years, and 93.6% at 6 years. Thereafter, survival remained at 93.6% until year 8, although the results at 7 years were based on 52 patients and, at 8 years, on 12 patients. The results for prospective versus retrospective trials were 93.4% (standard deviation, SD=1.6%) and 93.8% (SD=1.8%), respectively.

The cumulative probability of survival for single crown implants was 98.1% at 1 year, 98.1% at 2 years, and 97.5% at 3 years. Thereafter, survival remained at 97.5% until year 8, with the results at 5, 6, 7 and 8 years based on 120, 104, 7 and 5 patients, respectively. The results for prospective versus retrospective trials were 98.0% (SD=1.6%) and 97.0% (SD=2.3%), respectively.

The analysis was repeated by considering sleeping implants as lost to follow-up, compared with failures. The maximum difference in any cumulative survival data reported in individual studies was 3.7%.

Authors’ conclusions
The cumulative survival rate for implants placed in partially edentulous jaws supporting fixed partial dentures, including restoration of single teeth, was found to be over 90% for the pooled results from 19 studies. All but 2 studies reached the 3- to 4-year interval. In the short-term, the results were comparable with the survival rates for implants in completely edentulous jaws, and should be a strong argument for restoring partially edentulous jaws with implants.

CRD commentary
This clearly written and presented review included well-defined inclusion criteria, reasons for the exclusion of retrieved studies, a sensitivity analysis, examination of heterogeneity across studies, analysis of data under different assumptions for the outcomes of ‘sleeping’ implant, and consideration of the rationale for meta-analysis and inclusion criteria. The authors acknowledged that by limiting the search to English language publications some relevant studies may have been omitted.

Details of the methods used to select primary studies and extract data were not stated. In addition, there was no assessment of the validity of the included studies, which limits the applicability of the results. Without a validity assessment it is uncertain whether a meta-analysis was appropriate. There were also insufficient details provided on factors such as the underlying medical conditions and the time between losing the teeth and having the implant.

Even with the caveats described, the conclusions were supported by the evidence.

Implications of the review for practice and research
The authors state that, as the survival rates for implants in partially edentulous jaws are comparable with those in completely edentulous jaws, this should be considered a strong clinical argument for restoring partially edentulous jaws with implants.

Bibliographic details

PubMedID
Other publications of related interest

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Subject indexing assigned by NLM

MeSH
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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.