A systematic review of single-tooth restorations supported by implants
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Authors’ objectives
To assess the evidence on single-tooth restorations (STRs) supported by implants, and to aggregate overall survival results.

Searching
MEDLINE was searched from 1990 to April 1998 using the terms 'dental in SB', 'implant*' and 'single'. Conference abstracts and non-English language papers were excluded.

Study selection
Study designs of evaluations included in the review
The authors did not specify a study design in their inclusion criteria.

Specific interventions included in the review
STRs supported by implants.

Participants included in the review
Patients undergoing STRs supported by implants.

Outcomes assessed in the review
The outcomes were failure of the STR supporting implant (defined as a removed or lost implant), complications with the STR (dislodgement, screw loosening or screw fracture of the abutment or supporting crown), and crown completion.

How were decisions on the relevance of primary studies made?
Three of the researchers independently selected the studies. Consensus on selection was achieved through discussion. The agreement on each selection item was measured using the Cohens kappa-coefficient (see Other Publications of Related Interest no.4).

Assessment of study quality
Validity was assessed formally using a modification of the quality scoring system described by Antczak et al. and Kreulen et al. (see Other Publications of Related Interest nos.1-3). The studies were evaluated as to whether they represented good scientific practice (GSP), on the basis of criteria covering the areas of study methodology, dental methodology, evaluation methodology, and statistical methodology. Each criteria was marked with 3 points for full credit, 2 points for partial credit and 1 point for no credit. The total criteria score for each study was transferred to a scale from 0 to 1, and the result referred to as the ‘GSP-score’.

Two authors independently performed the validity assessment. The authors were blinded to the papers' identifying details, working only with copies of the 'Materials and Methods' and 'Results' sections of the included papers.

Data extraction
Two authors independently extracted the data. The authors worked only with copies of the 'Materials and Methods' and 'Results' sections of the included papers.

Information on common study outcomes was extracted from the included studies, and the numbers and proportions of failed STRs and implants (censoring, i.e. resulting from implant failure, included) were traced.
Methods of synthesis

How were the studies combined?
A common mean outcome was calculated to aggregate survival data.

Overall cumulative life table survival curves were constructed by pooling the data from the nine studies into new data sets.

In the case of no failures, asymmetrical confidence intervals were derived from standard tables.

How were differences between studies investigated?
The homogeneity of the data was tested by comparing the percentage of 2-year survival (and confidence interval) of each study, with respect to overall survival, at the 2-year follow-up.

Results of the review

Ten studies were included in the review. One of these was subsequently excluded at the third stage of the selection process because of a lack of statistical homogeneity for the outcomes after 2 years of follow-up. The remaining nine studies presented a total of 459 single-tooth implants.

At the first selection of papers (332 papers), observer agreement (kappa) was 0.79 (plus or minus, +/- 0.04).

At the second selection of papers (49 papers), full agreement was only observed for the items 'paper in English', 'follow-up period' and 'implant system'.

At the third selection of papers (26 papers), kappa ranged from 0.09 for the item 'numbers' (percentage agreement 50%) to 1 for the items 'evaluation criteria' and 'statistical procedures' (percentage agreement 100%).

For overall validity assessment, the data showed an overall mean GSP score of 0.37.

The 4-year implant survival for 459 single-tooth implants was 97% (+/- 1).

The 4-year combined STR survival, based on four studies (240 STRs) that presented appropriate data for this item, was 83% (+/- 3).

The homogeneity test revealed no differences between the outcomes of the studies after 2 years' follow-up, except for one study, which showed significantly more STR complications. The results of this study were excluded from the review.

Authors' conclusions

Single-tooth implants showed an acceptable short-term survival of 4 years, but crown complications were common. It was stated that only a small portion of the published data on restorative treatments could be used for inference.

CRD commentary

The authors stated their research question and the inclusion and exclusion criteria. The literature search was limited although there was an attempt to search for unpublished data. While English language publications were later excluded, the process revealed that these papers would have been excluded for not meeting other selection criteria. The authors report who, and how many of the reviewers, performed the study selection, quality assessment and data extraction processes. There was an extensive three-stage assessment of the included studies, which was based on a formal validated scoring system. The review's authors also made extensive additions to the validation process.

The statistical pooling presented survival curves and survival estimates for the stated outcomes. There was a detailed investigation regarding the homogeneity of the included studies, with a discussion at each stage of the review on the effects of excluding different sets of papers.
The authors' conclusions appear to follow from the results. They present an extensive procedure for the validity assessment of studies included in a systematic review in the field of dentistry.

**Implications of the review for practice and research**

Practice: The authors did not state any implications for practice.

Research: The authors state that further standardisation of clinical study methodology and reporting methodology will contribute to the effective summation of results.

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