Meta-analysis of fixed partial denture survival: protheses and abutments
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Authors' objectives
To formulate annual probability estimates for three categories of fixed partial denture (FPD) or abutment survival.

Searching
MEDLINE was searched from 1966 to 1999 using the following key terms in various combinations: 'bridges', 'fixed partial dentures', 'crown and bridgework', 'survival' and 'longevity'. The references of retrieved studies were examined for additional studies. Only studies published in the English language were included.

Study selection
Study designs of evaluations included in the review
Longitudinal studies were included. The follow-up periods ranged from 3 to 20.5 years.

Specific interventions included in the review
FPDs. FPDs had to be predominantly conventional, i.e. less than 50% cantilever FPDs and less than 25% nonfull coverage retainers. with an average of at most 8 units per FPD.

Participants included in the review
The patients were selected from dental school or insurance registry, or were randomly selected. The mean age of the patients ranged from 39 to 58 years.

Outcomes assessed in the review
FPD survival rate and denture abutment tooth survival. For FPD survival rate, survival was defined as either FPD not removed, or FPD not removed nor technically failed. The main causes of failure of prostheses and abutment were loose retainers, loss of retention, pontic or retainer fracture, insufficient retention, and abutment tooth loss.

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
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction.

Methods of synthesis
How were the studies combined?
Fast-pro software with Kaplan-Meier modelling was used to back-calculate the annual survival probability estimates, along with 95% confidence intervals for each of the included studies. For these annual estimates, the final surviving proportion of FPDs (i.e. the number of surviving FPDs over the number of FPDs followed) was used to estimate the annual surviving proportion, assuming a constant hazard rate. Multiple reports on the same population were grouped so as to be only included once. A meta-analytic Bayesian model was used to combine the annual survival probability estimates from the separate studies, in order to derive overall annual survival probability estimates with 95% CIs for each of the categories of survival.
How were differences between studies investigated?
The authors do not state how differences between the studies were investigated. However, they did state that the included studies were heterogeneous.

Results of the review
Eight studies were included: 2,761 FPDs and 3,299 abutments.

When failure was defined as FPD removal, 92% (95% CI: 89, 95) and 75% (95% CI: 69, 81) of the FPDs were estimated to survive at 10 and 15 years, respectively. When a broader definition of failure was used, namely, combining FPDs removed with those that technically failed and needed replacement, 87% (95% CI: 86, 88) and 69% (95% CI: 63, 75) were estimated to survive at 10 and 15 years, respectively. Abutment survival at 10 years (reported in only 3 studies) was estimated to be 96% (95% CI: 95, 97).

The CIs were shown graphically, but were not reported in the text. They have been calculated from available information in the figures and text.

Authors' conclusions
For the aggregate population represented by the limited longitudinal studies available, this review indicated that less than 15% of FPD were removed or in need of replacement at 10 years, whereas nearly 33% were removed or in need of replacement at 15 years. Less than 5% of abutments were removed at 10 years.

CRD commentary
The authors presented a well-defined research question. The inclusion criteria were clearly assessed. Sufficient details of the individual studies were presented.

The search could have been extended to include other databases, such as EMBASE, and could have involved an attempt to identify unpublished literature. As the authors note, the possibility of publication bias cannot be ruled out. The validity of the included studies was not assessed. The authors state that using 'removal of FPDs' as an outcome clearly overstated the survival of FPDs, as many are found in situ but in need of replacement. In addition, when combining the data across studies, there was variation in the decisions on which reported complications needed replacing. Although the primary data were combined appropriately, the CIs were not reported in the text. The authors' conclusions follow from the results.

Implications of the review for practice and research
The authors state that the clinical implications of the meta-analysis are that one might expect one third of FPD to require replacement by 15 years.

In addition, the authors state that with more treatment options available for replacing missing teeth, such as resin-bonded FPDs and single tooth dental implants, conventional FPD abutment survival becomes a more important outcome measure and should be more extensively evaluated.

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