Systematic review of survival rates for implants placed in the grafted maxillary sinus
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CRD summary
This review evaluated the survival rates of dental implants placed in grafted maxillary sinuses. It concluded that bone substitute materials, alone or in combination with autogenous bone, are as effective as autogenous bone, and rough surfaced implants were superior to smooth surfaced implants. Although limited details of the review methodology are reported, the conclusions are supported by the evidence presented.

Authors' objectives
To evaluate the survival rates of dental implants placed in grafted maxillary sinuses.

Searching
MEDLINE (1986 to 2002), EMBASE (1988 to 2002) and the Cochrane CENTRAL Register were searched for studies in any language; the search terms were reported. Five relevant journals and the bibliographies of relevant papers and reviews were handsearched.

Study selection
Study designs of evaluations included in the review
Studies of any design with a minimum of 20 sinus evaluations, a mean follow-up of no less than 12 months from implant loading or a follow-up range of 2 years, and less than 5% unexplained loss to follow-up, were eligible for inclusion. Where reported, the mean follow-up ranged from 22.4 to 75 months.

Specific interventions included in the review
Studies of root-form implants, where access to the antrum was via the lateral window procedure, and the graft material, implant type and implant placement timing were reported, were eligible for inclusion. Studies of multiple interventions were excluded. The included studies used grafts of a range of materials, and both smooth and rough surface implants were evaluated.

Participants included in the review
No specific inclusion criteria relating to the participants were reported, and no details of the participants included in the studies were given.

Outcomes assessed in the review
Implant survival rate had to be reported or calculable for a study to be included.

How were decisions on the relevance of primary studies made?
Two reviewers independently assessed the relevance of primary studies; any disagreements were resolved by discussion.

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

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. Authors were contacted for missing data. The overall survival rate of implants was extracted from each study.
Methods of synthesis
How were the studies combined?
The studies were combined in a narrative, grouped according to the type of graft material used, implant surface and implant placement timing.

How were differences between studies investigated?
The authors stated that heterogeneity was evaluated in relation to population characteristics, study protocol, methodology and outcomes. However, the details of the method used were not reported, and the results of the assessment were only briefly discussed.

Results of the review
Thirty-nine studies (n=2,046; 6,913 implants) were included in the review. Three studies were randomised controlled trials (n=81; 325 implants), seven were non-randomised controlled trials (n=344; 993 implants), ten were case series (n=300; 1,217 implants) and 19 were retrospective studies (n=1,321; 4,378 implants).

Graft material.
The overall survival rate for grafts of 100% autogenous bone (88%) was lower than that of composite grafts containing autogenous bone (95%) and 100% bone-replacement grafts (96%).

Implant surface.
The overall survival rate for grafts with a smooth surface (86%) was lower than that of grafts with a rough surface (96%).

Graft material and implant surface.
Of all implants, 70% were 100% autogenous bone with a smooth surface; these accounted for 88% of the total failures of 100% autogenous bone grafts. Composite grafts containing autogenous bone with a rough surface had a 94% survival rate.

Implant placement timing.
The overall survival rates for simultaneous and delayed grafts were similar (92% and 93%, respectively).

Authors’ conclusions
Bone substitute materials are as effective as autogenous bone when used alone or in combination with autogenous bone, and rough surfaced implants are superior to smooth surfaced implants.

CRD commentary
The review question was clear in terms of the interventions, outcomes and study design. Relevant databases were searched and attempts made to avoid language bias. The study selection process was conducted in duplicate, but it was unclear whether a similar method to reduce error and bias was employed during the data extraction, and study quality was not assessed. The decision to combine the studies in a narrative seems appropriate. The results were clearly presented, and the conclusions seem to be supported by the evidence presented.

Implications of the review for practice and research
Practice: The authors stated that when the matured bone graft is predominantly responsible for both mechanical and biologic implant stability, the use of a composite graft with an autogenous component should be considered.

Research: The authors stated that studies using a split-mouth design with one variable are needed to validate the findings. They also stated that the duration of follow-up needs to be standardised across trials.
Bibliographic details

Indexing Status
Subject indexing assigned by NLM

MeSH
Alveolar Ridge Augmentation; Bone Substitutes /therapeutic use; Bone Transplantation; Dental Implants; Dental Prosthesis Design; Follow-Up Studies; Maxilla /surgery; Maxillary Sinus /surgery; Randomized Controlled Trials as Topic; Survival Analysis

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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.