A systematic review of the success of sinus floor elevation and survival of implants inserted in combination with sinus floor elevation. Part II: Transalveolar technique

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CRD summary
This review found that tooth implants in sites with transalveolar sinus floor augmentation had high survival rates. The results are unlikely to be reliable because of the lack of information about study quality and the high risk of bias in the results. The findings of this review should be interpreted with a substantial amount of caution.

Authors' objectives
To evaluate survival rates of tooth implants placed in sites with transalveolar sinus floor augmentation and assess the incidence of surgical and postoperative complications related to this procedure.

Searching
PubMed was searched from inception to November 2007 for relevant studies; search terms were reported. References of all retrieved articles and related reviews were searched. There were no language restrictions.

Study selection
Prospective and retrospective cohort studies of 10 or more patients that reported on clearly defined implant survival with transalveolar sinus floor augmentation after one year of functional loading were eligible for inclusion. Studies with multiple dental interventions (such as simultaneous ridge augmentations) were excluded, as were studies that reported on the lateral technique or the two-stage approach.

The included studies were in institutions, multicentre sites and private practices. Where reported, median age of patients was between 46.7 and 60.7 years. The range of grafting materials used (alone or in combination) included autogenous bone grafts, collagen sponges, demineralised freeze-dried bone allograft, hydroxyapatite, deproteinised bovine bone material, tricalcium phosphate bioglass and freeze-dried bone allograft. Several different implant types were used. Residual bone height across the studies ranged from 2.87mm to 10mm. Prophylactic administration of antibiotics given pre- or post-procedure was reported in more than half of the studies.

Two reviewers independently performed study selection. Any disagreements were resolved by discussion. Kappa scores were calculated to evaluate interobserver agreement for inclusion criteria when selecting titles and abstracts.

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

Data extraction
Two reviewers independently extracted data to determine summary survival and failure event rates for implants and information on postoperative complications. Implant survival was defined as implants that remained in situ at follow-up irrespective of the condition of the surrounding tissues.

Methods of synthesis
Heterogeneity of study specific event rates was determined using the Spearman goodness of fit statistics and p-values. If the p-value was below 0.05, summary estimates of event rates were calculated using a random-effects Poisson regression model. Robust standard errors were used to obtain 95% confidence intervals (CI).

Results of the review
Nineteen studies were included in the review (n=4,388 implants): nine retrospective studies and 10 prospective studies. Kappa scores for interobserver agreement for study selection were 0.76 at the title level and 0.53 at the abstract level. Mean follow-up in the studies was 3.1 years (range one to five years). Percentage dropout ranged from 0% to 10%, but dropout rates were not reported in 10 studies.
Of the 103 implants that were lost, 55 implants were lost prior to loading and 28 implants were lost after at least one year of function.

The summary estimated failure rate per 100 implant years was 2.48 (95% CI 1.37 to 4.49). The summary estimate for survival after three years was 92.8% (95% CI 87.4% to 96%). When studies with bone height of more than 8mm were excluded, survival rate of implants decreased to 91.8% (95% CI 85.7% to 95.4%).

Annual failure rates were calculated for nine studies (770 implants). The estimated annual failure rate was 3.71% (95% CI 1.21% to 11.38%) which corresponded to 10.5% (95% CI 3.6 to 28.9%) of patients experiencing implant loss over three years.

The most common surgical complication was Schneiderian membrane perforation, which varied between 0% and 21.4% in eight studies that reported this outcome. Postoperative infections were the most common postoperative complication and ranged between 0% and 2.5% (six studies, 884 implants). Other complications included postoperative haemorrhage, nasal bleeding, blocked nose, haematomas and loosening of cover screws resulting in suppuration.

Authors’ conclusions
Survival rates of implants placed in the transalveolar sinus floor augmentation sites were comparable to those in non-augmented sites. The technique appeared to be safe with low incidences of surgical and postoperative complications.

CRD commentary
The review addressed a clear question and criteria for inclusion were stipulated. The search was restricted to one database and it did not appear that unpublished studies were sought. This means that studies may have been missed and that there was a risk of publication bias. Steps were taken to minimise errors and bias for study selection and data extraction. The reviewers did not perform an assessment of methodological quality of included studies and so reliability of individual studies was unknown. Findings from the uncontrolled studies included in this review were associated with a number of potential biases, which made interpretation of the results more difficult. There was substantial clinical heterogeneity, which meant that pooling of these studies may not have been appropriate and this analysis may be subject to a substantial risk of bias. Follow-up was unreported in more than half of the studies. Given a number of shortcomings, the findings of the review are unlikely to be reliable. Substantial caution is required when interpreting the results, given the potential for bias in this review.

Implications of the review for practice and research
Practice: The authors stated that when sinus floor elevations were performed, the risk of complications must be considered and appropriate treatment should be given.

Research: The authors stated that clinical trials with more than five years of follow-up were required of implants inserted in combination with sinus floor elevation. In particular, data on the effectiveness of different surgical techniques, implant types and grafting materials were required and sufficiently powered RCTs that compared transalveolar sinus floor elevations with and without grafting materials were required.

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