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Cochrane Reviews are regularly updated as new evidence emerges. The Cochrane Library should be consulted for the most recent version of reviews. The current status of all oral health-related reviews can be found on the Cochrane Oral Health Group's website at www.ohg.cochrane.org/reviews.html.

ABSTRACT

Interventions for replacing missing teeth: bone augmentation techniques for dental implant treatment

Background

Dental implants require sufficient bone to be adequately stabilized. For some patients implant treatment would not be an option without bone augmentation. A variety of materials and surgical techniques are available for bone augmentation.

Objectives

General objectives: To test the null hypothesis of no difference in the success, function, morbidity and patient satisfaction between different bone augmentation techniques for dental implant treatment. Specific objectives: (A) to test whether and when augmentation procedures are necessary; (B) to test which is the most effective augmentation technique for specific clinical indications. Trials were divided into three broad categories according to different indications for the bone augmentation techniques: (1) major vertical or horizontal bone augmentation or both; (2) implants placed in extraction sockets; (3) fenestrated implants.

Search strategy

The Cochrane Oral Health Group's Trials Register, the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE and EMBASE were searched. Several dental journals were hand-searched. The bibliographies of review articles were checked, and personal references were searched. More than 55 implant manufacturing companies were also contacted. Last electronic search was conducted on 9th January 2008.

Selection criteria

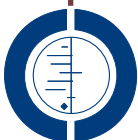
Randomized controlled trials (RCTs) of different techniques and materials for augmenting bone for implant treatment reporting the outcome of implant therapy at least to abutment connection.

Data collection and analysis

Screening of eligible studies, assessment of the methodological quality of the trials and data extraction were conducted independently and in duplicate. Authors were contacted for any missing information. Results were expressed as random-effects models using mean differences for continuous outcomes and odd ratios for dichotomous outcomes with 95% confidence intervals. The statistical unit of the analysis was the patient.

Main results

Seventeen RCTs out of 40 potentially eligible trials reporting the outcome of 455 patients were suitable for inclusion. Since different techniques were evaluated in different trials, no meta-analysis could be performed. Ten trials evaluated different techniques for vertical or horizontal bone augmentation or both. Four trials evaluated different techniques of bone grafting for implants placed in extraction sockets and three trials evaluated different techniques to treat bone dehiscence or fenestrations around implants.



Authors' conclusions

Major bone grafting procedures of resorbed mandibles may not be justified. Bone substitutes (Bio-Oss or Cerasorb) may replace autogenous bone for sinus lift procedures of atrophic maxillary sinuses. Various techniques can augment bone horizontally and vertically, but it is unclear which is the most efficient. It is unclear whether augmentation procedures at immediate single implants placed in fresh extraction sockets are needed, and which is the most effective augmentation procedure, however, sites treated with barrier plus Bio-Oss showed a higher position of the gingival margin when compared to sites treated with barriers alone. Non-resorbable barriers at fenestrated implants regenerated more bone than no barriers, however it remains unclear whether such bone is of benefit to the patient. It is unclear which is the most effective technique for augmenting bone around fenestrated implants. Bone morphogenetic proteins may enhance bone formation around implants grafted with Bio-Oss. Titanium may be preferable to resorbable screws to fixate onlay bone grafts. The use of particulate autogenous bone from intraoral locations, also taken with dedicated aspirators, might be associated with an increased risk of infective complications. These findings are based on few trials including few patients, sometimes having short follow up, and often being judged to be at high risk of bias.

Plain language summary

Some patients have insufficient bone to place dental implants but there are many surgical techniques to increase the bone volume making implant treatment possible.

Short implants are more effective and cause less complications than conventional implants placed in thin lower jaws (mandibles) augmented with bone from the hip. Bone substitutes (Bio-Oss or Cerasorb) might be used instead of self generated (autogenous) bone graft to fill large upper jaw (maxillary) sinuses. Bone can be regenerated in a vertical direction using various techniques, but it is unclear which technique is preferable. There is not enough evidence supporting or refusing the need of augmentation procedures when single extracted teeth are immediately replaced with dental implants, nor is it known whether any augmentation procedure is better than the others. There is not enough evidence to demonstrate superiority of any particular technique for regenerating bone around exposed implants, however the use of bone morphogenetic proteins may enhance bone formation.

Esposito M, Grusovin MG, Kwan S, Worthington HV, Coulthard P. Interventions for replacing missing teeth: bone augmentation techniques for dental implant treatment. *Cochrane Database of Systematic Reviews* 2008, Issue 2. Art. No.: CD003607. DOI: 10.1002/14651858.CD003607.pub3

ABSTRACT

Interventions for replacing missing teeth: antibiotics at dental implant placement to prevent complications

Background

Some dental implant failures may be due to bacterial contamination at implant insertion. Infections around biomaterials are difficult to treat and almost all infected implants have to be removed. In general, antibiotic prophylaxis in surgery is only indicated for patients at risk of infectious endocarditis, for patients with reduced host-response, when surgery is performed in infected sites, in cases of extensive and prolonged surgical interventions and when large foreign materials are implanted. To minimize infections after dental implant placement various prophylactic systemic antibiotic regimens have been suggested. More recent protocols recommended short term prophylaxis, if antibiotics have to be used. With the administration of antibiotics adverse events may occur, ranging from diarrhoea to life-threatening allergic reactions. Another major concern associated with the widespread use of antibiotics is the selection of antibiotic-resistant bacteria. The use of prophylactic antibiotics in implant dentistry is controversial.



Objectives

To assess the beneficial or harmful effects of systemic prophylactic antibiotics at dental implant placement versus no antibiotic/placebo administration and, if antibiotics are of benefit, to find which type, dosage and duration is the most effective.

Search strategy

The Cochrane Oral Health Group's Trials Register, the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE and EMBASE were searched up to 9th January 2008. Several dental journals were handsearched. There were no language restrictions.

Selection criteria

Randomized controlled clinical trials (RCTs) with a follow up of at least 3 months comparing the administration of various prophylactic antibiotic regimens versus no antibiotics to patients undergoing dental implant placement. Outcome measures were prosthesis failures, implant failures, post-operative infections and adverse events (gastrointestinal, hypersensitivity, etc.).

Data collection and analysis

Screening of eligible studies, assessment of the methodological quality of the trials and data extraction were conducted in duplicate and independently by two review authors. Results were expressed as random-effects models using risk ratios (RRs) for dichotomous outcomes with 95% confidence intervals (CIs). Heterogeneity was to be investigated including both clinical and methodological factors.

Main results

Two RCTs were identified: one comparing 2 g of preoperative amoxicillin versus placebo (316 patients) and the other comparing 2 g of preoperative amoxicillin plus 500 mg 4 times a day for 2 days versus no antibiotics (80 patients). The meta-analyses of the two trials showed a statistically significant higher number of patients experiencing implant failures in the group not receiving antibiotics: RR = 0.22 (95% CI 0.06 to 0.86). The number needed to treat (NNT) to prevent one patient having an implant failure is 25 (95% CI 13 to 100), based on a patient implant failure rate of 6% in patients not receiving antibiotics. The other outcomes were not statistically significant, and only two minor adverse events were recorded, one of which in the placebo group.

Authors' conclusions

There is some evidence suggesting that 2 g of amoxicillin given orally 1 hour preoperatively significantly reduce failures of dental implants placed in ordinary conditions. It remains unclear whether postoperative antibiotics are beneficial, and which is the most effective antibiotic. It might be recommendable to suggest the use of one dose of prophylactic antibiotics prior to dental implant placement.

Plain language summary

Missing teeth can sometimes be replaced with dental implants to which a crown, bridge or denture can be attached. Bacteria introduced during placement of implants can lead to infection and sometimes implant failure. It appears that the oral administration of 2 grams of amoxicillin 1 hour before placement of dental implants is effective in reducing implant failures. More specifically, giving antibiotics to 25 patients will avoid one patient experiencing early implant losses. It is still unclear whether postoperative antibiotics are of any additional benefits.

Esposito M, Grusovin MG, Talati M, Coulthard P, Oliver R, Worthington HV. Interventions for replacing missing teeth: antibiotics at dental implant placement to prevent complications. *Cochrane Database of Systematic Reviews* 2008, Issue 2. Art. No.: CD004152. DOI: 10.1002/14651858.CD004152.pub2

