Alveolar bone dimensional changes of post-extraction sockets in humans: a systematic review
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CRD summary
The review assessed bone loss following tooth extraction and concluded that during the healing period, clinical loss in width was greater than the loss in height. In light of the questionable pooling of data and the possibility that studies may have been missed during the searches, the authors’ conclusions should be interpreted with caution.

Authors’ objectives
To assess the amount of change in height and width of the alveolar residual ridge after tooth extraction.

Searching
MEDLINE and Cochrane Central Register of Controlled Trials (CENTRAL) were searched up to March 2009 for studies published in English; search terms were reported. Reference lists of selected studies were screened for additional papers.

Study selection
Eligible studies were of tooth extraction in adults (aged≥18 years) in good general health and assessed clinical and/or radiographic alveolar bone dimensions (height and/or width). Clinical trials with a control group, prospective clinical studies and case series were eligible study designs. Most studies did not describe reasons for extraction. Most cases were regular patients who received extractions at anterior and pre-molar sites. A range of treatments was used: ultrasound, xenografts, membranes, chlorhexidine, spontaneous healing and antibiotics. In most studies buccal flaps were raised before tooth extraction. Studies assessed bone changes at various aspects of the extraction sites and used various methods (radiographical evaluations were most common). Where reported, the proportion of male participants ranged from 33% to 63% and ages ranged from 20 to 76 years. Follow-up ranged from three to 12 months.

Two reviewers independently selected studies for inclusion. Disagreements were resolved through discussion.

Assessment of study quality
Studies were classed as having a low risk of bias if random allocation, defined inclusion/exclusion, patient and outcome assessor blinding, comparable groups, identical treatment between groups except for intervention and reporting of follow-up were described. When a criterion was missing, risk was classed as moderate. When two or more criteria were missing, risk was classed as high.

The authors did not state how many reviewers performed the assessments.

Data extraction
The authors stated that three reviewers extracted means and standard deviations for changes in alveolar bone height and width.

Methods of synthesis
Studies were pooled using meta-analysis to produce weighted mean differences with 95% confidence intervals (methods were used to pool and weight studies were unclear). The authors pre-specified several factors to be examined in order to evaluate heterogeneity.

Results of the review
Twelve studies were included in the review (n=223, range 10 to 46): six randomised controlled trials, four controlled clinical trials, one case series and one described as a prospective clinical trial. Five studies had a split-mouth design. Risk of bias was considered low for six studies, moderate for three and high for three.
Weighted mean changes at the approximal aspect of the neighbouring teeth showed a mean loss of 0.64mm (95% CI -0.70 to -0.59; three studies, n=45). Mid-buccal loss was 1.67mm (95% CI -1.91 to -1.43; six studies, n=84). Change at the mid-lingual aspect was -2.03mm (95% CI -2.49 to -1.56; two studies, n=32). Socket fill-in height (measured relative to the original socket floor) was on average 2.57mm (95% CI 2.45 to 2.71; three studies, n=39). Reduction in width of alveolar ridges was 3.87mm (95% CI -4.06 to -1.56; five studies, n=71). Mean crestal height change (assessed on radiographs) was 1.53mm (95% CI -1.70 to -1.37; four studies, n=111). Further results for radiographical outcomes were reported.

Authors’ conclusions
During the post-extraction healing period, weighted mean changes showed the clinical loss in width to be greater than the loss in height assessed clinically and radiographically.

CRD commentary
The review question was clear. Eligibility criteria appeared appropriate. Only two databases were searched for relevant studies published in English and no search was conducted for unpublished studies, so relevant studies may have been missed and the review may have been subject to language and publication biases. Suitable methods (independent duplicate processes) were used to reduce risks of reviewer error and bias during study selection; methods used were unclear for quality assessment and data extraction processes. A study quality assessment was made, but the results were not used in interpreting the results of the review. The authors pooled data using meta-analysis, despite reporting considerable clinical heterogeneity between studies; therefore, the reliability of the pooled data was questionable. The authors discussed implications of possible heterogeneity, but made no statistical assessment. No details on the type of model (or method of weighting) used for the meta-analyses were provided.

In light of the questionable synthesis of data and the possibility that studies may have been missed during the searches, the authors’ conclusions should be interpreted with caution.

Implications of the review for practice and research
The authors did not state any implications for practice and research.

Funding
Not stated.

Bibliographic details
van der Weijden F, Dell’Acqua F, Slot DE. Alveolar bone dimensional changes of post-extraction sockets in humans: a systematic review. Journal of Clinical Periodontology 2009; 36(12): 1048-1058

PubMedID
19929956

DOI
10.1111/j.1600-051X.2009.01482.x

Original Paper URL

Indexing Status
Subject indexing assigned by NLM

MeSH
Alveolar Bone Loss /etiology; Humans; Smoking; Tooth Extraction /adverse effects; Tooth Socket /surgery

AccessionNumber
12010001813
Date bibliographic record published
14/07/2010

Date abstract record published
06/04/2011

Record Status
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.