Effect of loading time on the success of complete mandibular titanium implant retained overdentures: a systematic review

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CRD summary
The authors concluded that there is no evidence that immediate or early loading of implant-retained overdentures had adverse effects for up to 24 months post surgery when compared to conventional timing of loading, but more research was needed. Given the very small amount of relevant evidence, limited search and methodological weaknesses in the review, the conclusions may not be reliable.

Authors' objectives
To compare the effect of early and immediate versus conventional loading protocols for complete mandibular implant-retained overdentures.

Searching
MEDLINE (to September 2005) was the only named database searched. The search strategy was reported. Thirteen relevant journals were handsearched. The search was restricted to articles published in English.

Study selection
Prospective comparative studies were eligible, provided that they compared immediate (post-surgery), early (up to 12 weeks post-surgery) or conventional (at least 12 weeks post-surgery) loading times for mandibular overdentures retained by titanium root formed implants in participants of any age and either gender. Trials that compared different types of implant or connection systems were also eligible. In all cases, the comparison groups had to be considered comparable. Outcomes of interest were marginal bone level by panoramic or intra-oral X-Ray (primary outcome), plaque, probing depth, mobility (by Periotest), bleeding and inflammation (all measured at 12 and/or 24 months). Trials involving augmentation of the mandibular-alveolar ridge, trans-mandibular or fixed implants were excluded, as were studies of patients in specialty care or with systemic medical conditions. Crossover and within-subject studies were also excluded.

Loading timing in the included studies was immediate, early (two to six weeks) or conventional (three to eight months). A variety of implant systems was used, with either two or four fixtures and balls, bars or magnets used for connection. Marginal bone levels were measured with panoramic, long cone or standard X-Rays. Other outcome measures commonly used were the modified plaque and modified bleeding indexes. About half of the included studies compared different types of implant or connection systems rather than loading times.

A single reviewer selected studies for inclusion.

Assessment of study quality
It appeared that study validity was assessed using a standardised format, with criteria including study design, use of allocation concealment and follow-up rates. It was not stated clearly how the validity assessment was conducted or how many reviewers were involved.

Data extraction
Mean differences between the groups and 95% confidence intervals were extracted for studies reporting direct comparison between loading times. For other studies, means and standard deviations or medians and ranges were extracted on changes from baseline for each intervention group. Panoramic images were assumed to be 26 per cent enlarged relative to intra-oral images and were adjusted accordingly. Some data were extracted from graphs.

Data were apparently extracted using a standardised format. It was not stated how many reviewers were involved.
Methods of synthesis
Weighted mean differences and standardised mean differences were calculated by pooling the data from studies comparing loading times; p values for heterogeneity were reported for these comparisons. Data on changes from baseline from other studies were sub-grouped by loading time (immediate, early or conventional) and presented graphically.

Results of the review
Nine studies were included (n=243): five randomised controlled trials (n=168) and four controlled trials (n=75). Five of the studies included comparisons of loading times (three randomised controlled trials, n=92 and two controlled trials, n=41) Only one randomised controlled trial clearly concealed treatment allocation. No type of blinding was reported in any study. The follow up rate was over 80 per cent in all studies.

Immediate versus conventional loading (one randomised controlled trial):
No statistically significant difference between the groups was found for any outcome at 12 or 24 months.

Early versus conventional loading (two randomised controlled trials and one controlled trial):
Results for probing depth at 24 months significantly favoured the conventional group (weighted mean difference 0.26, 0.04, 0.48, p=0.02, two randomised controlled trials, n=72). No other significant differences were found between the groups at 12 or 24 months. No significant heterogeneity was reported for any outcome.

The review also summarised before-and-after data from studies conducted at a single loading time.

Authors' conclusions
There was no evidence that immediate or early loading of implant-retained overdentures have adverse effects for up to 24 months when compared to conventional timing of loading, but more research was needed.

CRD commentary
The review objectives were clear. But, the inclusion criteria were not consistent with the objectives, with the result that nearly half the primary studies did not include controlled comparisons of loading times. It appeared that only one database was systematically searched, so studies may have been missed. In addition, the restriction to articles in English created potential language bias. It did not appear that specific attempts were made to locate unpublished studies, so publication bias was also possible (there was no formal check for publication bias).

Studies were selected by a single reviewer, which increased the risk of error and bias. It was unclear whether this also applied to validity assessment and data extraction as these processes were inadequately described. It appeared that relevant criteria were used to assess study validity. The statistical methods used to combine studies seemed appropriate, and a check for statistical heterogeneity was conducted (although the test used was not stated). There were several inconsistencies in reporting in the text and tables. Abbreviations were not explained in all cases. The potential for bias caused by clinical heterogeneity between the studies was acknowledged in the text. The authors failed to focus adequately on the controlled evidence and based their conclusions partly on indirect comparisons between studies designed to answer other clinical questions. Given the very small amount of relevant evidence, the limited search and methodological weaknesses in the review, the authors’ conclusions may not be reliable.

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

Research: The authors stated that more controlled studies were needed with standard design and outcomes measures, extended follow up (more than 24 months) and clearly reported power calculations. The effect of clinical heterogeneity (such as type of implant, connecting system) should also be investigated.

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