Comparison of vacuum-formed and Hawley retainers: a systematic review

CRD summary
The authors concluded that some evidence suggested no differences in changes to intercanine and intermolar widths between vacuum-formed and Hawley retainers after orthodontic retention. For occlusal contacts, cost-effectiveness, patient satisfaction and survival time there was insufficient evidence to distinguish the effectiveness of one retainer over the other. This conclusion reflects the limited evidence presented and seems reliable.

Authors' objectives
To compare the effectiveness of vacuum-formed and Hawley retainers in patients following orthodontic treatment.

Searching
Five electronic databases (listed in the paper) were searched without language restrictions from 1960 to July 2013. A MEDLINE search strategy was presented. Additionally, the Pro-Quest Dissertation and Thesis database and ProQuest Science Journals were searched without limits on publication date. Four journals (from 1980 to 2012), two conference proceedings and reference lists of clinical trials were searched for additional studies.

Study selection
Eligible studies were randomised or quasi-randomised controlled trials that compared vacuum-formed and Hawley retainers with at least six months follow-up of patients after any active orthodontic treatment. Patients could have maxillary retainers, mandibular retainers or both. Retainers had to cover the teeth at least from first molar to first molar. Primary outcomes of interest were Little's index of irregularity, intercanine width, intermolar width and arch length. Secondary outcomes of interest were patient satisfaction, survival time and occlusal contacts. Adverse effects on periodontal health were also of interest. Patients with severe craniofacial deformities, cleft lip or palate, and poor periodontal status were excluded.

Most patients in most studies were female. Mean age ranged from 12.9 years to 19.6 years. One study was conducted in the United Kingdom. Location was unclear for the remaining studies. Retainer wear time varied between studies.

Two reviewers independently selected the studies for inclusion. Disagreements were resolved by discussion with a third reviewer.

Assessment of study quality
Study quality was assessed using Cochrane criteria for sample size calculation, random sequence generation, allocation concealment, blinding of outcome measurement assessment, reporting of withdrawals and use of intention-to-treat analysis. Quality was scored as low, moderate or high risk of bias.

Quality assessment was carried out by two reviewers independently. Disagreements were resolved by discussion with a third reviewer.

Data extraction
Data were extracted independently by two reviewers on the various outcomes of interest. Statistical significance was reported in some cases. Disagreements were resolved by discussion with a third reviewer. Study authors were contacted for further information where necessary.

Methods of synthesis
A narrative synthesis was presented.

Results of the review
Seven parallel group studies were included (five randomised controlled trials and two controlled clinical trials). Two trials were based on the same population but they reported different outcomes and so were counted as two trials in the analysis. Sample sizes ranged from 30 to 397. Follow-up ranged from three months after de-bond up to one year.
Overall, three trials had low risk of bias, three had moderate risk of bias and one had a high risk of bias. Intention-to-treat analysis was reported in three trials.

There was no significant difference between vacuum-formed and Hawley retainers in retaining dentition in terms of intercanine and intermolar widths (three trials). No significant differences in arch lengths were reported (two trials). In one trial, vacuum-formed retainers were more effective than Hawley retainers for holding corrections of the maxillary and mandibular labial segments (Little's index of irregularity).

Other results were based on single studies. These reported higher numbers of occlusal contacts for patients wearing Hawley retainers and higher patient satisfaction relating to vacuum-formed retainers. There was no difference in the amount of time a retainer was worn away from home and no differences in survival time of retainers over one year follow-up. There were higher rates of breakage with Hawley retainers but no differences in rates of loss between groups.

The authors stated that the included studies presented no evidence of adverse effects on periodontal health.

**Cost information**

The cost-effectiveness of retainers was addressed in one trial (397 patients) spanning a six-month retention period. Results showed that patients with Hawley retainers faced significantly greater costs than those with vacuum-formed retainers (mean difference €2.15; 95% CI €2.90 to €7.57). Hawley retainers were associated with significantly greater costs than vacuum-formed retainers in relation to the National Health Service (MD €31.35, 95% CI €28.06 to €34.68) and to orthodontic practices (MD €32.60, 95% CI €30.58 to €34.67).

**Authors’ conclusions**

There was some evidence to suggest there were no differences with respect to changes in intercanine and intermolar widths between vacuum-formed and Hawley retainers after orthodontic retention. For occlusal contacts, cost-effectiveness, patient satisfaction and survival time, there was insufficient evidence that vacuum-formed retainers were more effective than Hawley retainers.

**CRD commentary**

The review question was clear and inclusion criteria were adequately specified. Several relevant data sources were searched and steps were taken to minimise publication and language biases. The review process was conducted with measures to maximise transparency. A suitable quality assessment tool was applied to the included trials and results of this were clearly reported. Study details were presented and (given variable characteristics) a narrative synthesis appeared to be the appropriate choice.

The authors’ conclusion reflects the limited evidence presented and seems reliable.

**Implications of the review for practice and research**

**Practice:** The authors stated that Hawley retainers might be a better choice for patients who did not have good posterior settling after orthodontic treatment.

**Research:** The authors stated that additional high quality randomised controlled trials comparing vacuum-formed and Hawley retainers were needed to determine which retainer was better following orthodontic procedures. Particular research focus was recommended on speech articulation outcomes and associations between retainer material thickness and survival, retainer damage and compliance, and compliance and retainer survival. Further economic evaluations of retainers were needed across different locations worldwide.

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