The effect of a pulsed Nd:YAG laser in non-surgical periodontal therapy
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CRD summary
The review found no evidence that pulsed neodymium-doped:yttrium, aluminium and garnet laser was superior to conventional methods in initial treatment of periodontitis. The review was well conducted in most respects and given the scant and inconsistent nature of the evidence, the authors’ conclusions appear reliable.

Authors' objectives
To evaluate the clinical effects of pulsed neodymium-doped:yttrium, aluminium and garnet (Nd:YAG) laser in the initial treatment of periodontitis.

Searching
MEDLINE and Cochrane Central Register of Controlled Trials (CENTRAL) were searched to January 2009. Search terms were reported. Reference lists of potentially relevant studies and reviews were checked. The search was restricted to articles in English.

Study selection
Controlled trials of pulsed Nd:YAG laser (alone or in combination with non-surgical therapy) for initial treatment of periodontitis in generally healthy adults (at least 18 years) were eligible for inclusion. Studies were required to include controls who received conventional care (ultrasonics and/or hand instrumentation) or placebo, use statistical analysis and report as outcomes plaque, bleeding, gingivitis and/or probing depth.

In the included studies periodontitis was defined by a variety of radiographic and/or clinical criteria, and could affect either single-rooted teeth and/or furcation defects. Nd:YAG lasers varied widely with respect to energy setting (range 0.5 to 7.0 watts), tip, coolant, contact time (range 60 to 180 seconds) and type and depth of fibre insertion. Nd:YAG laser was evaluated as monotherapy at differing intensities and/or combined with conventional non-surgical therapy (scaling and root planing, with or without ultrasound). One study used a prototype of another type of laser (Nd:NCG) described as nearly identical to Nd:YAG. Analgesia was available in most cases. Controls received sham treatment, scaling and root planing, and/or ultrasound. Some studies included three arms. Few studies described oral hygiene education. Outcomes reported in the review included plaque index (Silness and Loe, where reported), various gingival and bleeding indexes, probing depth, clinical attachment level and gingival recession. Duration of follow-up ranged from four weeks to six months.

Two reviewers independently selected studies. Disagreements were resolved by discussion.

Assessment of study quality
Validity items assessed included randomisation, sample size calculation, description of inclusion criteria, allocation concealment, blinding, group equivalence and losses to follow up/dropouts. The overall risk of bias for each study was estimated (for example, as moderate or high).

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

Data extraction
Mean values and standard deviations (SDs) for differences between groups were extracted or calculated from standard errors for each outcome of each study. In all cases the unit of analysis was the tooth or site rather than the participant.

Two reviewers performed data extraction.

Methods of synthesis
Studies were combined in a narrative synthesis organised by type of analysis (between-group or within-group) and outcome. Heterogeneity was assessed qualitatively in the text.

**Results of the review**

Eight randomised controlled trials (RCTs) were included; the number of participants and teeth assessed in each intervention group was unclear. The design was split-mouth in four RCTs, parallel group in two and unclear in two. Risk of bias was moderate in one study and high in seven. No studies described allocation concealment method. The text of the review noted that only two studies were double blinded and only four reported dropout rates; reporting of these quality criteria was inconsistent in the review.

**Comparison between groups (six RCTs)**: One of four RCTs of gingival index reported a statistically significant benefit in the Nd:YAG laser group. One of four RCTs that reported probing depth and one of four RCTs that reported clinical attachment level found a statistically significant benefit in the conventional therapy group. The other RCTs found no statistically significant difference between the groups for these outcomes and for plaque index (two RCTs), bleeding index (one RCT) and gingival recession (one RCT).

Changes from baseline (eight RCTs) were reported in the review.

**Authors' conclusions**

There was no evidence that pulsed Nd:YAG laser was superior to conventional methods in initial treatment of periodontitis.

**CRD commentary**

The objectives and inclusion criteria of the review were clear. Relevant sources were searched for studies, although the restriction to studies in English meant that some relevant studies may have been missed. It was unclear whether the search was restricted by publication status. Potential for publication bias was not discussed. Steps were taken to minimise risk of reviewer bias and error by having more than one reviewer independently select studies and extract data; it was unclear whether this also applied to validity assessment. The decision to combine studies by narrative synthesis was appropriate given variation in study design, methods and participant characteristics. No numerical measures of statistical significance or variability were reported, which made it difficult to interpret the potential clinical value of the findings. The included studies were few, generally of poor quality and had small sample sizes. However, the review was well conducted in most respects and given the scant and inconsistent nature of the evidence the authors’ conclusions appear reliable.

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

The authors did not state any implications for practice or further research.

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