Laser vs. Handpiece: Indirect Pulp Treatment

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PURPOSE

The purpose of this prospective in vivo study was to determine the efficacy of the use of the laser as compared to the high speed rotary handpiece in performing indirect pulp caps in primary and permanent teeth.

BACKGROUND

Several types of pulp treatment are used for primary and permanent teeth. Success rates of Indirect Pulp Treatment (IPT) have been reported higher than 90% in primary teeth and thus its use is recommended in patients in whom a preoperative diagnosis suggests no signs of pulp degeneration. In successful treatment, the tooth remains vital and the dentition remains intact, maintaining the arch length for eruption of permanent teeth. Pulp treatment is dependent on providing a sterile environment to maintain pulp vitality and promote tertiary dentin formation. Lasers have the potential to kill bacteria and stimulate cell growth. Case reports have been presented on laser biostimulation of dental tissue cells that induced healing and dentin formation.

METHODS

• Patients 3-17 years who were ASA Type I or II and required vital pulp therapy were treated either with the high speed handpiece or with the Biolase MD Er:Cr:YSGG laser. Treatment type was determined by availability of the laser.
• Teeth were selected with the following criteria: clinical absence of pulp exposure, fistula, swelling of periodontal tissues, and irreversible pulps. Radiographically, caries extend 1-2mm from the pulp; absence of radioacuities in the interradicular or periapical regions, or thickening of the periodontal spaces.
• All teeth were restored within the same guidelines.
• Patients were followed for 3 month intervals for up to 9 months with clinical examination and periapical radiographs.

TECHNIQUE FOR INDIRECT PULP TREATMENT

Step 1
Caries excavation up to thin, hard layer of sound, carious dentin over pulp wall

Step 2
Vitrebond liner set over carious dentin

Step 3
Composite filling was used if tooth preparation was limited to the occlusal surface only. If more than one surface a stainless steel crown was cemented with Ketac.

RESULTS

40 patients were treated within the scope of this study. 24 returned for follow up evaluation. Of the 24 who returned for 3 month evaluation, 8 returned for 6 month evaluation and 3 patients were evaluated at the nine month interval. Of the patients that returned for evaluation, 20 were primary and 4 were of the permanent dentition. Treatment to all teeth resulted in a 100% success rate.

Table 1. Success by treatment type at 3 month intervals

<table>
<thead>
<tr>
<th>Treatment</th>
<th># Success</th>
<th>% Success</th>
<th># Failure</th>
<th>% Failure</th>
<th># Success at 6mo</th>
<th>% Success at 6mo</th>
<th># Success at 9mo</th>
<th>% Success at 9mo</th>
<th>Success</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser</td>
<td>16</td>
<td>80%</td>
<td>0</td>
<td>0%</td>
<td>3</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>80%</td>
</tr>
<tr>
<td>Handpiece</td>
<td>24</td>
<td>100%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>100%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Pt experienced trauma to treated area after 3mo evaluation and prior to failure at 6mo. Patient and two treated teeth subsequently excluded from the study.

DISCUSSION

The data reinforces the high success rate of indirect pulp therapy. This data will serve as the foundation for continued follow up of the remaining cases that have not reached 9 month recalls.

The lone failure of laser treatment occurred in adjacent teeth in the same patient after a successful 3 month recall visit. The patient reported trauma directly to the area of treatment. The teeth were extracted after observation of periapical abscess formation of both teeth.

This study was limited to data collection over a one year period. 40% of the subjects did not present for follow up. One could hypothesize these 16 subjects had clinically successful pulp therapy because they did not return in pain. A longer clinical collection period would provide a larger number of subjects.

Laser indirect pulp treatment is demonstrated here to be as effective as traditional treatment. The bactericidal properties of the laser treatment and the possibility of stimulating tertiary dentin formation indicate its use as a viable agent in maintaining a vital pulp.

CONCLUSIONS

Laser treatment is an effective vital pulp therapeutic agent. Further study increasing sample size and length of evaluation of outcomes may demonstrate the advantages to laser therapy.

References:

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