Inflammatory fibrous hyperplasia, also referred to as epulis fissuratum, is a generalized hyperplastic enlargement of mucosa and fibrous tissue in the alveolar ridge and vestibular area, which most often results from ill-fitting dentures. In the early stages of fibrous hyperplasia, when fibrosis is minimal, nonsurgical treatment with a denture in combination with a soft liner is frequently sufficient for reduction or elimination of this tissue. When the condition is present for some time, significant fibrosis exists within the hyperplastic tissue; because this does not respond to nonsurgical treatment, excision of the hyperplastic tissue is the treatment of choice.1

In the early 20th century, laser was made known as a new phenomenon in the world of science.2 For the past 30 years, this technology has been used for medical treatments and surgery.3 Carbon dioxide laser is one of the most powerful lasers suggested as an alternative to the surgical scalpel on soft oral tissues. The CO2 laser was the first laser used for incision and removal of tissues, because of its minimal spot size, good power, and high absorption in most biological tissues and water.4

Comparative Survey on Carbon Dioxide Laser and Surgical Scalpel Removal of Epulis Fissuratum

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Purpose: Since the introduction of laser to medical fields, carbon dioxide laser has been considered a substitute for the surgical scalpel in soft tissue surgical procedures. The purpose of this study was to compare the use of carbon dioxide laser vs surgical scalpel to remove epulis fissuratum.

Materials and Methods: In this clinical trial, 12 patients were selected with acceptably symmetrical epulis fissuratum in the anterior parts of the jaws. Based on random selection, half of this hyperplastic tissue in each patient was treated with carbon dioxide laser, and the other half was resected with the surgical scalpel and sutured continuously. All procedures were timed to determine their duration. Wound healing was checked at days 7 and 14 postoperatively. At day 14, vestibular depth in each section was measured.

Results: Better healing was observed with carbon dioxide laser than with the surgical scalpel at postoperative days 7 and 14; this was found in 11 cases at day 7, and 10 cases at day 14. However, none of the cases showed complete re-epithelialization during these 2 weeks. In all patients, the difference in vestibular depth of the two sections and the difference in procedure time on each side were statistically significant.

Conclusion: Removal of epulis fissuratum with CO2 laser results in better wound healing and less decrease in the vestibular depth. In order to determine the clinical significance of the time savings provided by the laser procedure, more detailed studies are needed to reveal other advantages and disadvantages of this approach.

Keywords: inflammatory fibrous hyperplasia, epulis fissuratum, carbon dioxide laser, wound healing, vestibular depth.

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CO₂ laser has been suggested instead of the surgical scalpel for preprosthetic surgery. Conventional surgical procedures, such as removal of epulis fissuratum with a scalpel, cause bleeding and postoperative pain, and require sutures and sometimes tissue grafts. In contrast, with CO₂ laser, a dry treatment area is provided, there is minimal pain after surgery, and no sutures are needed.⁵,⁶

In this study, we compared the use of CO₂ laser and the surgical scalpel for the removal of epulis fissuratum. The main outcome measures were the duration of surgery, wound healing, and vestibular depth after lesion removal with each approach.

**MATERIALS AND METHODS**

In this clinical trial, patients with acceptably symmetrical anterior maxillary or mandibular epulis fissuratum (Fig 1) were included. Patients with systemic diseases, such as diabetes or heart disease, were excluded. A total of 12 patients were enrolled in this study (8 female and 4 male) and their ages ranged from 51 to 63 years. The maxilla was involved in 5 cases, and in the other 7, epulis fissuratum had a mandibular origin. All patients were completely edentulous.

First the area was anesthetized. Then, based on random selection, half of the hyperplastic tissue in each patient was treated with carbon dioxide laser, and the other half – in the same patient – with the surgical scalpel serving as controls (Fig 2). Six cases were first treated with laser, and in the other 6, conventional surgery with the scalpel was performed first. To cut the lesions, CO₂ laser was set to continuous mode, with a beam of 5 W, and focused to generate a 0.2 mm spot size. For hemostasis, it was set to super-pulse mode, with a defocused beam of 4 W. The procedure was timed from incision to the end of hemostasis.

Surgery was performed on the other half of the lesion with a scalpel using the conventional technique, and then sutured continuously. Each procedure was timed from the incision to the end of suturing.

Wound healing was observed at days 7 and 14 after surgery. In addition, on the 14th day, vestibular depth in each section was measured with a probe at three points from the vestibule to the top of the alveolar ridge and the average was calculated for each section.

**RESULTS**

On the 7th postoperative day, the laser-treated side showed better wound healing in 11 patients. In one patient, there was no difference between the two sides. In 8 patients, the laser wound was in the fibroplastic phase, while the other side was still in the inflammation phase (Fig 3).

On the 14th day after surgery, 10 patients showed better healing on the side treated with CO₂ laser. Two patients showed no difference. On this day, in all 12 patients, the wound on the lasered side was in the fibroplastic phase, while the opposite side was in this phase in only two patients. Despite signs of epithelium formation, none of the patients showed complete epithelium formation on either side (Fig 4).

Table 1 summarizes the results in terms of the vestibular depth and time needed for surgery. The postoperative vestibular depths in the two sections in
each patient (Table 2) were statistically different according to the paired sample t-test (p < 0.05). The paired sample t-test also revealed a statistically significantly shorter procedure time with laser (p < 0.05).

**DISCUSSION**

Most articles concerning surgery with CO₂ laser refer to the decreased edema after surgery,⁶ which was observed in our study as well.

Peterson¹ reported that the inflammation phase lasted 3 to 5 days in conventional surgery. This could explain our results seen at day 7 in wounds caused by the scalpel. Similar to the results of the present study, Catone and Aling² reported that healing after CO₂ laser surgery was clinically different in comparison to that after scalpel surgery. They have stated that wound

![Fig 3](image)

7th day after surgery.

![Fig 4](image)

14th day after surgery.

**Table 1** Mean ± standard deviation of the postoperative vestibular depth, the procedure duration, and the difference between the laser and scalpel approaches

<table>
<thead>
<tr>
<th>Variable</th>
<th>Approach</th>
<th>Mean ±SD</th>
<th>Difference (Laser – Scalpel)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postoperative vestibu...</td>
<td>Laser</td>
<td>11.01 ±4.74</td>
<td>4.14 ±1.11</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Postoperative vestibu...</td>
<td>Scalpel</td>
<td>6.88 ±4.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Procedure duration</td>
<td>Laser</td>
<td>5.63 ±0.86</td>
<td>-3.88 ±0.98</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Procedure duration</td>
<td>Scalpel</td>
<td>9.50 ±0.88</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2** The average postoperative vestibular depth in millimeters (mm) measured at three points of the two treated sides in all 12 cases

<table>
<thead>
<tr>
<th>Case number</th>
<th>Mean postoperative vestibular depth (mm)</th>
<th>CO₂ Laser</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>6.83</td>
<td>11.16</td>
</tr>
<tr>
<td>2</td>
<td>3.83</td>
<td>8.0</td>
</tr>
<tr>
<td>3</td>
<td>8.0</td>
<td>13.0</td>
</tr>
<tr>
<td>4</td>
<td>2.33</td>
<td>5.0</td>
</tr>
<tr>
<td>5</td>
<td>13.33</td>
<td>18.66</td>
</tr>
<tr>
<td>6</td>
<td>7.66</td>
<td>14.0</td>
</tr>
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<td>7</td>
<td>8.83</td>
<td>13.33</td>
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<td>8</td>
<td>4.5</td>
<td>9.0</td>
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<td>13.0</td>
</tr>
<tr>
<td>12</td>
<td>2.16</td>
<td>5.5</td>
</tr>
</tbody>
</table>
edges remained for 42 days when the scalpel was used, but only 28 days with laser surgery.

In the study by Filho et al., good signs of new epithelium formation were seen 3 days after removal of epulis fissuratum with CO₂ laser.

Frame believes there is delayed healing with CO₂ laser surgery because of less wound shrinkage and the absence of secondary wound healing, which takes longer. In our study, we did not observe complete epithelium formation in any treated areas, either on the 7th or the 14th day postoperatively.

As there is no need for suturing in laser procedures, some articles claim these types of wounds show less decrease in depth. When wound edges are apposed with sutures, the vestibular depth normally decreases. Rogrel has reported a decrease in vestibular depth with conventional epulis fissuratum surgery where the wound is closed with sutures. This can explain the results of our study. In addition, CO₂ laser wounds have been reported to contain fewer myofibroblasts, which are responsible for wound contraction. Less damage inside tissues in laser surgery leads to fewer myofibroblasts. These points all help explain the results of our study.

The decreased time required for surgery with CO₂ laser observed in our study needs to be assessed for clinical relevance. This has to be considered along with other advantages and disadvantages of CO₂ laser, so its clinical benefits can be properly evaluated.

CONCLUSION

1. Removal of epulis fissuratum with CO₂ laser results in better wound healing at days 7 and 14 after surgery, as compared to conventional surgery.
2. Removal of epulis fissuratum with CO₂ laser, in comparison with the scalpel approach, causes less decrease in the vestibular depth.
3. CO₂ laser removal of epulis fissuratum is less time consuming than conventional surgery.

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REFERENCES


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