Low Level Laser Therapy Versus Dexamethasone 
Phonophoresis after Third Molar Surgery

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Abstract

Background and Purpose: The aim of this study was to evaluate the comparative effectiveness of Low Level Laser Therapy (LLLT) and dexamethasone phonophoresis in patients with trismus following third molar surgeries. Low level laser therapy and dexamethasone have been effective in reducing pain, trismus and edema; thus improving the quality of patient life.

Patients and Methods: The study was carried out on thirty patients aged from 25 to 45 years and suffered from swelling and trismus following third molar surgery. They were divided into two equal groups; Group A and Group B. Group A received low level laser therapy immediately after third molar extraction surgery for 6 min/session over the masseter muscle daily for 7 days. Group B received phonophoresis of dexamethasone ampoule (in each session with half of 8mg vial and 35gm ultrasound gel immediately after third molar extraction (7 minutes/session over the masseter muscle area for 7 days). Assessment was carried out for vertical mouth opening were evaluated on pre-operative, 2nd day and 7th day postoperative.

Results: The results showed that both low level laser therapy and dexamethasone phonophoresis were significantly effective in decreasing trismus following third molar surgery as manifested by the highly increased Vertical Mouth Opening (VMO) with no significant difference.

Conclusion: This study demonstrates that there is no significant difference between LLLT and dexamethasone phonophoresis for reduction of trismus.

Key Words: Third molar – Low level laser therapy – Dexamethasone phonophoresis.

Introduction

SURGICAL removal of wisdom teeth under local anaesthesia is widely carried out in general dental practice and in many institutional surgery clinics, occupying an appreciable amount of clinical time. This procedure is usually associated with postoperative pain, swelling, and trismus as direct and immediate consequences of the surgical procedure [1]. Inability to open the mouth even within its normal limits is called trismus. This is so due to a reflex spasm of the masticatory muscles leading to a completely or incompletely limited mouth opening in a patient [2]. Postoperative trismus frequently associates the oral surgical interventions performed in the region of the ramus and the mandibular angle [3,9].

One of the basic purposes in dental treatment is to provide a painless post operative treatment for patients. Low-level laser therapy is a painless, reproducible, non-invasive, and without need of anaesthesia which is used to treat a variety of pain syndromes, injuries, wounds, fractures, neurological conditions and pathologies. Low-level laser therapy (LLLT) has been shown to modulate the inflammatory process without adverse effects, by reducing pain and swelling and promoting the repair of damaged tissues [4,5]. Phonophoresis is a technique by which therapeutic ultrasound is used to introduce pharmacologic agents, usually anti-inflammatory or analgesic drugs, through intact skin into the subcutaneous tissues, phonophoresis can provide a safe and painless alternative to injections for treatment of common inflammatory conditions such as bursitis, sprains, strains, and tendinitis. Phonophoresis has been studied in vivo with several anti-inflammatory drugs, including hydrocortisone, benzydamine, dexamethasone, and salicylates, and with anesthetics, such as lidocaine, with variable results. Authors of in vitro studies of the phono-

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Material and Methods

The study was performed on thirty patients from 25 to 45 years and suffering from trismus following third molar surgery. They were selected from Maxillofacial Surgery Unit of Oral and Dental Medicine Faculty, El-Fayoum University during (2015-2016). All patients signed a consent form. A complete medical history and an oral examination were performed, including a panoramic radiograph.

Measuring the distance between the incisal edges of the upper and lower central incisors using the mouth caliper (vernier caliper gauge). Baseline measurements were taken just before the surgery and similar readings were carried out on days 2 (48 hours) and 7 postoperatively [10].

Inclusive criteria:
- Age between 25-45 years.
- Impacted third molars in the mesioangular position and with class B of average depth.
- Equivalent degree of surgical difficulty.
- All patients had the same surgical procedure with the same operative duration.
- No systemic disease, e.g. (D.M).
- Absence of cystic or tumoral complication on third molars.
- Absence of acute pericoronitis, severe periodontal disease or associated pathology on the adjacent teeth.

The patients were classified randomly into two equal groups; Group (A) consisted of fifteen patients who received low level laser therapy immediately after third molar extraction surgery for (6min/session over the masseter muscle daily for 7 days). The laser was given as (infrared laser) wavelength (950nm), output power 15mw, pulsed 80% and dose 4.3J/cm² for 6min [2,4].

Group (B) consisted of fifteen patients who received phonophoresis of dexamethasone half of 8mg vial and 35gm ultrasound gel immediately after third molar extraction surgery ultrasound will be applied over dexamethasone gel on the mastication muscle area for 7 minutes, 1MHz, pulsed 20% and dose 1.0W/cm² [7,8,11].

Data were collected and were transferred with statistical programme to obtain the following statistical tools:
- Descriptive statistic in the form of mean.
- Inferential statistics in the form of:
  - Paired $t$-test to compare results of the same group.
  - Independent $t$-test to compare pre and post treatment test between the two groups.
  - Repeated measures ANOVA to measure difference between 3 records in each group.
- Significance level is less than 0.05.

Results

Thirty patients of both genders aged between 25 and 45 years (mean 28 in laser Group (A) and 30.27 in dexamethasone Group (B). There were no significant differences between both groups concerning age.

For vertical mouth opening: As shown in (Table 1) and Fig. (1), unpaired $t$-test revealed that there was no significant difference in vertical mouth opening between groups preoperatively, 2nd day, and 7th day postoperatively. Regarding preoperative measurements, there was no significant difference where $t$-value equal 0.3656 which has an associated probability value 0.7174. Also, there was no significant difference in vertical mouth opening 2nd day postoperatively where $t$-value equal 0.7407 which has an associated probability value 0.4651. Moreover, there was no significant difference in vertical mouth opening 7th day postoperatively where $t$-value equal 1.247 which has an associated probability value 0.2226.

<table>
<thead>
<tr>
<th>Vertical mouth opening</th>
<th>Mean and SD± of US phonophoresis group</th>
<th>Mean and SD± of laser group</th>
<th>Test</th>
<th>$t$-value</th>
<th>$p$-value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative</td>
<td>3.97±0.234</td>
<td>3.94±0.264</td>
<td>Unpaired $t$-test</td>
<td>0.3656</td>
<td>0.7174</td>
<td>N.S</td>
</tr>
<tr>
<td>2nd day postoperative</td>
<td>2.01±0.267</td>
<td>2.08±0.224</td>
<td>Unpaired $t$-test</td>
<td>0.7407</td>
<td>0.4651</td>
<td>N.S</td>
</tr>
<tr>
<td>7th day postoperative</td>
<td>4±0.146</td>
<td>3.92±0.2007</td>
<td>Unpaired $t$-test</td>
<td>1.247</td>
<td>0.2226</td>
<td>N.S</td>
</tr>
</tbody>
</table>
Discussion

It was clear from the results that there was no difference between the laser and dexamethasone phonophoresis treated groups for edema and trismus at 2nd and 7th days after surgery. Low level laser therapy has been reported to prevent pain, swelling, and trismus following the removal of impacted third molars, but some studies reported a positive laser effect while other didn’t [10,12]. Maia et al., [13] stated that the effectiveness of LLLT is more accentuated when using the laser in wave lengths in the infrared region of light spectrum due to their greater penetration. Another study was done by Ares and Güngörmü [14] demonstrated that extra oral LLLT is more effective than intraoral LLLT for the reduction of postoperative trismus and swelling after extraction of the lower third molar.

In contrast, a systematic review carried out by Brignardello et al., [15] to assess the efficacy and safety of Low-Level Laser Energy Irradiation (LLEI) for decreasing pain, swelling, and trismus after surgical removal of impacted mandibular third molars summarized and indicated no beneficial effects of LLEI over placebo. Also Lopez et al., [16] found that laser has no beneficial effects in reducing pain, swelling, and trismus after removal of impacted lower third molars.

Markiewicz et al., [17] suggested that perioperative administration of corticosteroids produces a mild to moderate reduction in edema and improvement in range of motion after M3 removal. Ehsan et al., [18] found in their study that; pre-operative 4mg submucosal dexamethasone injection was significantly effective in reduction of postoperative swelling and trismus. Also Nabili et al., [19] reported that ultrasound application enhanced the delivery of an anti-inflammatory ocular drug. Toopchizadeh et al., [7] iso supported dexamethasone phonophoresis and demonstrated that phonophoresis of dexamethasone ampoule is better than the other treatments.

Finally, after the discussion of the results and according to reports of the previous investigators in fields related to this study, it can be claimed that both LLLT and dexamethasone phonophoresis had available effects on edema and trismus following third molar surgery but dexamethasone phonophoresis was more effective to reduce swelling on seventh postoperative day as evidenced by the highly significant increase in (VMO).

References


