

The efficacy of 690 nm diode laser and diclofenac sodium in reduction of signs and symptoms after surgical removal of vertically impacted mandibular third molars

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Abstract

The signs and symptoms after surgical removal of the impacted mandibular third molar tooth can include pain, trismus and swelling; there are many modalities to treat these signs and symptoms like pain killer and non steroidal anti-inflammatory drugs. Low power laser therapy can be one of these modalities. The aim of the study is to investigate the effects of low power laser therapy, diclofenac sodium or in combination in reduction of post operative signs and symptoms. Material and methods: A total of 40 patients requiring surgical removal of mandibular third molars were divided in 4 groups of 10 patients in each group: the first group treated with low power laser therapy, group 2 was treated with diclofenac sodium, group 3 was treated with combination of low power laser and diclofenac sodium and group 4 was treated with placebo. Results: the postoperative pain records for group 1, group 2 and group 3 were pain records less than that for group 4. The mean of postoperative mouth opening measurements records for group1, group2 and group 3 were more than the group 4. Also the mean of postoperative swelling records for group1, group2 and group 3 were less than the group 4. These results may agree with most researchers in proving that Low power laser therapy can be beneficial in the reduction of post-operative signs and symptoms; however the methods of application and the doses of laser power need further investigations. In conclusion low power laser therapy alone or with combination with Diclofenac sodium medication can be good procedure for the reduction of postoperative signs and symptoms after surgical operation of removal of mandibular third molar. Diclofenac sodium medication alone was superior to Low power laser therapy alone .

Introduction

The surgical removal of the impacted mandibular third molar tooth can be traumatic procedure, which involves the surgical manipulation of both soft and hard tissues as well as exposure of susceptible tissue to a septic environment. The inflammatory response of the tissue to this procedure obviously contributes to the pain; swelling and trismus experienced postoperatively by the patients. (Brabander & Cattaneo 1988) Capuzzi, et al. 1994) Although, there are so many methods conducted to counteract these postoperative complaints, a search for an ideal agent to be used with mandibular third molar tooth surgery that reduce pain, swelling and trismus, promote healing and has no untoward effects is still under investigation (Buren & Kleinknecht, 1979) (Cameron 1980). Low level laser therapy (LLLT) is also referred to as cold laser therapy, low-power laser therapy (LPLT), low-intensity laser and low-energy laser therapy. When LPLT is administered to the acupuncture pressure points, it may be referred to as laser acupuncture. The LPLT includes an extensive variety of procedures involving several laser types and treatment methods. These various treatment procedures have been proposed for a wide range of medical conditions. There does not appear to be standards regarding the dose, number of treatments or the period of treatment. (Kreiser et al 2004) (Carrillo, Jet al. 1990) (Douglas, 1993) The exact mechanism of its effect is unknown; however, hypotheses have included improved cellular repair and stimulation of the mediators, immune, lymphatic and vascular systems. (Neimz, 1996) (Roynesdal et al . 1993) (Clokie, et al . 1991) (David 1994)

Materials and Methods



Figure (1) Gallium-Aluminum-Arsenide diode laser

This clinical trial included a total of 40 patients requiring surgical removal of mandibular third molars, attending the department of oral and maxillofacial surgery in Al- Kadhymia Dental Health Centre in Baghdad during a period of six months from (June -2007 to November -2007).

A clinical trial on 40 patients between 17 and 35 years old of age (average age 22) was done. They were randomly assigned in 4 groups:

1. 10 patients treated by low level laser therapy LPLT only.
2. 10 patients treated by diclofenac sodium medication only.
3. 10 patients treated by combination of diclofenac sodium medication and LPLT.
4. 10 patients treated by placebo.

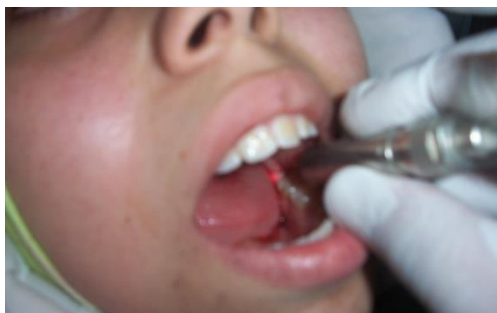


Figure (2) Intraoral application of LPLT

The studied drugs consisted of diclofenac (in a form of diclofenac sodium) tablets 50mg (trade name is Olfen manufactured by Mepha Ltd., Aesch-basel Switzerland) in addition to placebo (Glucose capsules) has been prepared (by pharmacist). All patients received antibiotic therapy of Amoxicillin capsules 500 mg (as Amoxicillin Trihydrate BP manufactured by Micro Labs limited India). Low power laser therapy LPLT was applied by using Gallium-Aluminum-Arsenide diode laser device (oralaser trade mark Italy) figure (1.1) with a power of 10 mW and wavelength 690 nm for 5 minutes (300 seconds) at distance 2cm away from the surgical wound immediately after suturing and this procedure repeated every alternative day until the seventh day.

The study was designed as a randomized, single blind clinical trial, therefore the studied drugs diclofenac, the placebo and were placed in identical appearing containers with a code number on each one. Low power laser therapy was applied for group 1 and group 3. A standard surgical technique was used for all the patients based on the method described by Alling III et al. (1993). Post operative pain has been assessed by simple visual analog scale method. The patient was asked to describe his/her pain in

number from 0 to 4 according to severity. Postoperative swelling has been assessed by clinical grading system method and facial measurements preoperative and postoperative and compare between the measurements (Holland. 1980). (Kalamchi, & Hensher 1987) Trismus was assessed by measuring the distance upon effortless opening of the mouth between the upper and lower central incisors with a Willi's bite gauge. The measurement was repeated three times, and the values were averaged, the difference between the preoperative and postoperative values was used as a measure of trismus. The technique was suggested by Wood and Branco, 1979.

Results

Post operative pain level: According to V.A.S method in the 1st -7th postoperative day the mean of pain records for group 1, group 2 and group 3 were pain records less than the group 4. As shown in figure 3.

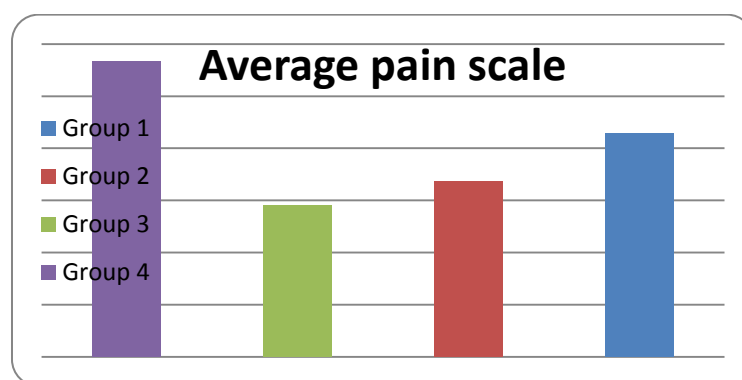


Figure 3 Average pain level of the four groups

Post operative mouth opening: the difference between the readings of interincisal distance recorded preoperatively and to represent the degree of trismus or reduction in mouth opening. The result show the mean of records for group1, group2 and group 3 were less than the group 3. In other word the mean of mouth opening measurements records for group1, group2 and group 3 were more than the group 4. As shown in figure 4.

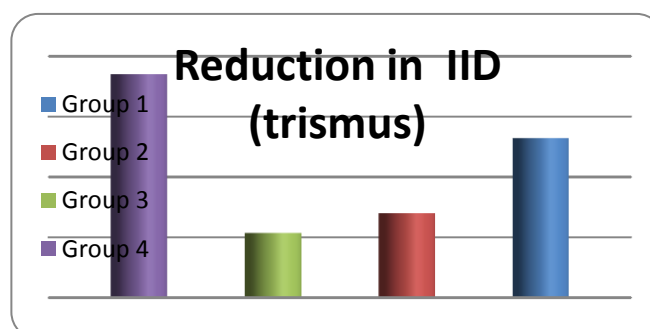


Figure 4 postoperative trismus of the four groups

Post operative swelling level : According to facial measurement method, in the 1st -7th post operative day, the mean of swelling records for group1, group2 and group 3 were less than the group 4. As shown in figure 5.

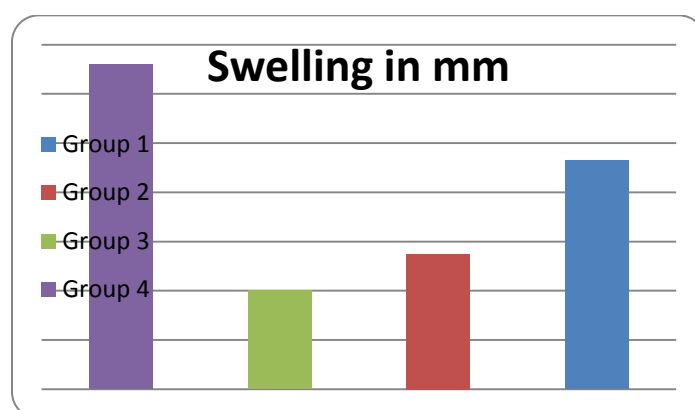


Figure 5 postoperative swelling for the four groups

Discussion and Conclusions

Evaluating the literature describing clinical applications of LPLT is complicated by the wide variations in methodology and dosimetry among different studies. Not only have a range of different wavelengths been examined, but exposure times and the frequency of treatments also vary

In general, the assessment of pain must always be subjective since pain is a subjective phenomenon only the patient can therefore measure its severity (Scott & Huskisson, 1976). Pain: in this study pain has been assessed by the V.A.S. method which has been considered as the most reliable and sensitive method of pain assessment (Seymour, 1983, Berge 1988). The simple descriptive pain scale although has been used by so many authors, it lacks the sensitivity since patients have to select one of the 4 or 5 grades in spite of the fact that the degree of their pain may be in between each 2 grades, while in the V.A.S. method since there are so many points that the patients can select, therefore their selection will closely correspond their pain levels (Scott & Huskisson, 1976).

In this study the highest pain scores for each study group were seen in the 1st day, thereafter, pain scores (pain level) tended to decline with the time until the 7th postoperative day in which significant differences had been found between the treatment groups, this indicates that the peak pain intensity following MTM surgery occurs during the first 24 hrs following operation, later on pain level tends to decline. The combination group shows the best results in reduction of pain.

swelling level: Although there are so many methods reported in the literatures for assessing postoperative swelling, they are not used in our study since the majority of them are complicated methods, costly, and require sophisticated equipment such as stereophotogrammetry, ultrasound, or MRI.

In this study overall swelling level during the total investigation period was less in the group 3 (the combination of LPLT and diclofenac sodium) compared to placebo, also this result reflects the superiority of the anti-inflammatory effect of

diclofenac sodium, in combination with LPLT and these findings agree with Henrikson *et al.* (1985)

Trismus :Although there are so many reasons for postoperative trismus reported in the literature, such as voluntary restriction to avoid pain, mechanical restriction from swelling, or spasm of the muscles of mastication, in our study it is difficult to point out precisely which one operating. (Greenfield & Moor 1989).

According to the above mentioned reasons of trismus, this finding gives the impression that the analgesics and the anti – inflammatory effect of both diclofenac sodium, and LPLT were superior to placebo therefore less pain and swelling presented in both groups and as a consequence less trismus, this finding agree with Markovic and Todorovic 2007 .

Low power laser therapy application in surgical wounds

The result of this study agree with Kreiser et al 2004 in that Low power laser therapy can be beneficial for reduction of post operative pain, however the clinical efficiency and applicability regarding oral surgery required further investigation. This particularly true for optimal energy dosage and the number of laser treatment needed after surgery.

This study agree with Ekim et al 2007, and with Bjordal et al 2007 as they stated in their study that LPLT play important role in wound healing.

Although LPLT alone group was not significant to diclofan group but it was significant in compare with placebo group.

This result disagree with Fernando et al 1993 when they stated that there was no evidence of difference in pain and swelling after third molar removal surgery between LPLT and placebo.

This study results also agree with Markovic and Todorovic 2007 that the effects of LPLT can be enhanced by simultaneously of analgesic medication.

In conclusion

1. Low power laser therapy is a method that can be used in promotion of healing and reduction of postoperative pain, swelling and trismus after surgical operation of removal of mandibular third molar.
2. Low power laser therapy with combination with Diclofenac sodium medication is a good method to enhance reduction of postoperative signs and symptoms after surgical operation of removal of mandibular third molar.
3. Diclofenac sodium medication alone was superior to Low power laser therapy alone in this study.

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تقييم علاج الليزر شبه الموصل ذو التأثير المنخفض والطول الموجي 690 نانوميتر مقارنة بدواء
دايكلوفان صوديوم في تخفيض العلامات والاعراض السريرية بعد الإزالة الجراحية لأضرار العقل
المطمورة بشكل عمودي
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الملخص

هدف الدراسة هو تقييم علاج الليزر ذو التأثير المنخفض مقارنة بدواء دايكلوفان صوديوم في تخفيض الألم، وتحديد فتحة الفم، والتورم بعد الإزالة الجراحية لأضرار العقل المغمورة بشكل عمودي، الدراسة أجريت على أربعين مريضاً قسموا إلى أربعة مجموعات كل مجموعة تتكون من 10 مرضى. المجموعة الأولى تعالج بعلاج الليزر ذو التأثير المنخفض، المجموعة الثانية تعالج بدواء دايكلوفان صوديوم، المجموعة الثالثة تعالج بعلاج الليزر ذو التأثير المنخفض و دواء دايكلوفان صوديوم معاً. المجموعة الرابعة تعالج بعلاج ممّو. كان علاج الليزر ذو التأثير المنخفض بقوة من 10 ميلي واط وطول موجة 690 نانوميتر لمدة 5 دقائق (300 ثانية) في مسافة سنتيمترين بعيداً عن الجرح الجراحي هذا الإجراء كرر كل يومين حتى اليوم السابع بعد العملية. كشفت النتائج بأن الألم، وتحديد فتحة الفم، والتورم بعد الإزالة الجراحية في مجموعة الليزر كان أوطأ من مجموعة العلاج الممّو في فترة المتابعة. و المجموعة الثالثة التي تستلم علاج الليزر ذو التأثير المنخفض و دواء دايكلوفان صوديوم لهما أفضل النتائج في تخفيض الألم، وتحديد فتحة الفم، والتورم. نستنتج من ذلك ان علاج الليزر ذو التأثير المنخفض مع دواء دايكلوفان صوديوم يُمكن أن يُعتبر طريقة جيدة تخفيض الألم، وتحديد فتحة الفم، والتورم بعد الإزالة الجراحية لأضرار العقل المغمورة. ولكن كفاءته السريرية وتطبيقه فيما يتعلق بجراحة الفم والأسنان يتطلب دراسات أخرى. بشكل خاص لجرعات الطاقة المثالية وعدد جلسات معالجة الليزر بعد الجراحة.

