Postoperative Pain Control in Patients after Lower Third Molar Extraction

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Abstract: The most valuable treatment objective in dental practice is to afford the patient a pain-free treatment. The **aim of this study** was to compare the use of low-power laser irradiation and the non-steroidal anti-inflammatory drug diclofenac sodium, as dental analgesic postoperative tools. **Materials and Methods**: Ninety patients undergoing non- surgical extraction of lower third molar with local anaesthesia (2% lidocaine with epinephrine 1:80.000) were enrolled in this study. Sixty received a preoperative single dose of 100 mg diclofenac sodium; thirty patients of them had postoperative low power laser irradiation in addition. They were compared to a third group with only regular postoperative recommendations (30 patients). **Results** showed that low-power laser irradiation significantly reduced postoperative pain intensity than in patients pre-medicated with diclofenac alone, or depend only on regular recommendations (controls).**In conclusion**: We suggested that the use of low-power laser irradiation enables the best postoperative analgesic effect and the most comfortable postoperative course after non surgical extraction of lower third molar than non-steroidal anti-inflammatory drugs or regular postoperative treatment.

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1. INTRODUCTION

The primary obligation and ultimate responsibility of oral health care providers is not only to restore function, but also to relieve pain. Currently available analgesic agents include aspirin and other non-steroidal anti-inflammatory drugs (NSAIDs). The efficacy and safety of NSAIDs have been reviewed extensively, Shapiro and Cohen (1992).Potential adverse effects of NSAIDs included peptic ulcer disease, gastrointestinal (GI) bleeding, GI perforation, impaired renal function and inhibition of platelet function. So, there is a need to depend on another analgesic tool with minimal side effects, Fisher et al., (1988). The application of low energy lasers in the field of dentistry and oral surgery has been described since the 1970s. Low energy laser light was supposed to reduce pain, to accelerate wound healing and to have a positive effect on inflammatory processes, Neckel et al.,(2001). The aim of this study was to compare the use of low-power laser irradiation and the non-steroid anti-inflammatory drug diclofenac sodium, which are claimed to be among the most successful aids in postoperative pain control.

2. Materials and Methods:

2.1.Materials:

Patients

Ninty healthy patients of both sexes, randomly selected among patients undergoing non surgical third molar extraction with local anesthesia (2% lidocaine with epinephrine 1:80.000) in the outpatient oral surgery clinic- National Research Centre-Cairo. Informed consent was obtained from participating patients. The study was approved by the local ethical committee. Exclusion criteria were

chronic diseases – pregnancy- known allergy to local anaesthetics – recent history of chronic pain medication.

2.2.Methods

2.2.1.Procedure

Sixty patients received a preoperative single dose of 100 mg diclofenac sodium,one hour before surgical procedure, thirty of them had postoperative low power laser irradiation in addition. They were compared to a third group with only regular postoperative recommendations (30 patients) (cold packs, soft diet, etc.) which is also given after extraction procedure to all the investigated patients. The laser group received a low-power laser using a soft laser SL-202 (PETRO LASER, Pr. Stachen, Saint-Petrsburg, 198097, Russia) with an 870 nm wave length applied intra-orally from a distance of 1 cm for 10 minutes after extraction procedure. The energy output was 4 J/cm^2, with constant power density of 80 mW. Laser treatment was performed once. The extraction was performed by a single surgeon to minimize individual technical differences to prevent pain bias. Postoperatively, extraction wounds were primarily closed by interrupted sutures. Although the patients were grouped randomly, the duration of surgical procedure and its complexity, based on the need for root separation, were again comparable among all the investigated patients, regardless of the used analgesic regimen (Table 1). After surgical procedure, all the patients were instructed to note pain intensity (using visual analogue scale [VAS]), and any possible side effects, for example, dizziness and nausea. Postoperative analgesic efficacy was estimated by the postoperative VAS of 100 mm length, where patients marked the maximal pain intensity they experienced during the postoperative period.

2.2.2. Statistics:

Data was analyzed using professional statistics package (SPSS for windows, Release 7.5, SPSS Inc., and Chicago, IL, USA). Descriptive data represented as mean ± SD for numeric data. Data of the three studied groups were compared using one-way analysis of variance (one way ANOVA) test. sig. (2-tailed) $p<0.05$ was considered significant.

Table (1): General and operation characteristics among the three studied groups

Parameter	Laser N = 30	Diclofenac N = 30	Control N = 30	P
Age	28 ± 7.9	29 ± 6.5	27.5 ± 5.8	> 0.05
Sex distribution Males Females	18 (60%) 12 (40%)	17(56.7%) 13(43.3%)	19(63.3%) 11(37.7%)	> 0.05
Duration of surgery (mean ± SD)	27.9±13.5	30.5± 10.6	28.9±11.5	> 0.05
Distribution of the duration of surgery: < 30 min. 30 – 60 min.	26(86.7%) 4 (13.3%)	25(83.3%) 5 (16.7%)	26 (86.7%) 4(13.3%)	> 0.05
Tooth separation: Yes No	13(43.3%) 17(56.7%)	15 (50%) 15 (50%)	14 (46.7%) 16(53.3%)	> 0.05

3. Results

The general and operative characteristics of the studied groups were presented in table (1). There was no significant difference between the three groups regarding their mean age, sex distribution, mean duration of surgery, the distribution of the duration of surgery and the incidence of tooth separation (one way ANOVA test) ($P > 0.05$). The results showed that there was significant reduction of pain intensity in patients treated with low-power laser irradiation, in comparison to patients medicated with diclofenac sodium alone and to the controls (fig 1).

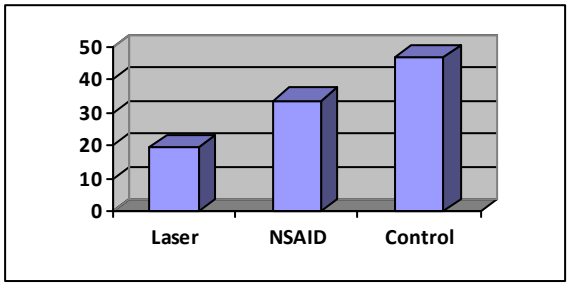

Fig. (1): Mean Pain score as assessed by VAS (visual analogue scale) among the three groups

In laser group, the mean pain intensity obtained by VAS was 19.7 ± 24.8 mm, the maximal value was 65 mm and the minimal was 3 mm. While in patients preoperatively medicated with diclofenac sodium only, the average pain intensity was 33.8 mm,

the maximal value was 85 mm and the minimal was 10 mm. In control patients, the average pain intensity was 46.7 mm, the maximal value was 90 mm and the minimal was 15 mm (Table 2).

Table (2): Comparison of post-operative analgesic effect (Assessed by *VAS) among the studied groups

Group	N	Minimum	Maximum	Mean ± SD	P
Laser	30	3	65	19.7 ± 24.8	< 0.01
Diclofenac	30	10	85	33.8 ± 22.9	< 0.01
Control	30	15	90	46.7 ± 38.6	< 0.05

*VAS: visual analogue scale

These differences were statistically significant for pain reduction in patients treated with low-power laser irradiation compared to patients medicated with diclofenac sodium alone or in controls. There were no clinically evident side effects that could be attributed to the used diclofenac sodium or low level laser therapy.

4. Discussion

It has been emphasized that one of the most valuable treatment objectives in dental practice is to afford the patient a pain-free treatment Ngan et al., (1999). By the evolution of the laser applications, the dental committee aimed to achieve this goal without analgesic drugs and painful methods , Walsh (1997).

The use of laser as a non-surgical medical treatment modality for assisting the normal processes of healing has increased over the last few years. However, the efficacy of laser in reducing pain or promoting tissue repair still remains controversial, Enwemeka et al.,(2004).

Laser therapy aims to restore the normal biological function of injured or stressed cells so 'Normalization' is the keystone of laser therapy Tunér and Hode (2002). The stimulatory effect of laser therapy can be seen in wounded cells or in cells that are growing suboptimally whereas cells that are normal or fully functional remain unaffected and no therapeutic effect can be observed ,Smith (1991).

Laser light has the unique properties of monochromaticity (a single wavelength), collimation (travels in a single direction without divergence) and coherence (with all waves in phase) Denise and Heidi (2007). These properties are what allows laser light to penetrate the skin surface non-invasively, Matic et al.,(2003); Theralase. (2003) and Schindi (1999). Therapeutic lasers are athermic with no appreciable heat transfer (<0.65 °C) so the photonic energy is transferred directly to the target cells and thermal damage is avoided Matic et al.,(2003); Theralase. (2003). Therapeutic lasers use monochromatic light in the 630 to 905 nm range, known as the "therapeutic window" Stadler et al.,(2004) .

The unique pain reduction abilities of LLLT (Low Level Laser Therapy) have been extensively researched and documented in numerous clinical studies and medical papers. Because the pain amelioration capabilities of LLLT are accomplished via the combination of local and systemic actions — utilizing enzymatic, chemical and physical interventions — the process is very complex. However, there is a preponderance of medical evidence that justifies a conclusion that effective pain reductions can be achieved via increase in

b-Endorphins, blocked depolarization of C-fiber afferent nerves, Ohno(1997), increased nitric oxide production, increased nerve cell action potential, axonal sprouting and nerve cell regeneration, decreased Bradykinin levels, increased release of acetylcholine or ion channel normalization, Byrnes et al.,(2002)and Rochkind et al.,(1997).

Many clinical studies and case reports investigated the use of oral soft laser applications. Positive laser effect was used for the prevention of pain, swelling or trismus after removal of third molars and periodontal surgery procedures as well as for reducing orthodontic post-adjustment pain Kreisler et al., (2004)and Roynesdal et al.,(1993).

Moreover, soft lasers were used for the treatment of craniomandibular disorders, chronic facial pain, chronic sinusitis, gingivitis, herpes simplex, dentinal tooth hypersensitivity, and sensory aberrations in the inferior alveolar nerve. The results were controversial. While some studies reported on a positive laser effect with regard to the investigated parameters others showed no or only negligible clinically relevant influence of LLLT, Youssef et al., (2008)

Amarillas-Escobar et al. (2010) found that the use of therapeutic laser in the postoperative management of patients having surgical removal of impacted third molars, decreased postoperative pain, swelling, and trismus, but without statistically significant differences. In agreement with Douglas et al.(2004) and Little et al.(1997).

Aras and Güngörmüş (2009) Stated that extraoral LLLT is more effective than intraoral LLLT for the reduction of postoperative trismus and swelling after extraction of the lower third molar.

Fernando et al. (2001) in their randomized double blind comparative study of low level laser

therapy following surgical extraction of lower third molar teeth showed that there was no evidence of a difference in pain and swelling on the third day after operation between laser and placebo sides. There was no difference between the two sides when they were assessed for healing 7 days after surgery.

Roynesdal et al. (1993) had reached similar conclusion where they found no statistically significant differences observed in comparison of the experimental side with the placebo side. They concluded that soft-laser treatment had no beneficial effect on swelling, trismus, and pain after third molar surgery.

In the current study we compared between low-power laser irradiation and a non-steroid anti-inflammatory drug diclofenac sodium in postoperative pain control after surgical removal of third molars. Postoperative analgesia is one of the most important segments of surgical extraction of third molars. Many attempts have been made to control postoperative pain, the results being satisfactory only to some extent, Seymour and Walton (1984). It seems, from the results of this study that the use low power laser irradiation is the most promising type of therapy in reducing the post-operative extraction pain.

The results of this study indicated that postoperative use of low-power laser irradiation after surgical extraction of third molars significantly reduces postoperative pain, Compared with the postoperative analgesic effect of diclofenac sodium that was beneficial but less prominent. The Influence of preoperative use of diclofenac-Na on postoperative pain after removal of impacted lower third molars was investigated before and its positive effects reported. However it had slow effect, Gregg(1992) ; Markovic and Todorovic(1995).

Also results of the current study agreed with the results of the study of Aleksa et al. (2006) who investigated the analgesic effect of low level laser therapy after lower third molar extraction and they found that LLLT was superior than non-steroidal anti-inflammatory drug diclofenac and long acting anaesthetic drug (bupivacaine). Markovic and Todorovic (2007) Suggested that low power laser irradiation after lower third molar surgery can be recommended to minimize swelling. The effect is enhanced by simultaneous local intramuscular use of dexamethasone.

The mandate for dentistry in the 21st century calls for continued efforts directed toward eliminating dental disease and enhancing the overall health and well-being of patients by translating scientific discovery into clinical practice, Kreisler et al., (2004)

This persuades us to strongly recommend the use of LLLT for molar extraction in addition to the usual conservative measures and the anti inflammatory drugs.

5. Refrences:

-Amarillas-Escobar ED, Toranzo-Fernández JM, Martínez-Rider R, Noyola-Frías MA, Hidalgo-Hurtado JA, Serna VM, Gordillo-Moscoso A, Pozos-Guillén AJ. Use of therapeutic laser after surgical removal of impacted lower third molars. J Oral Maxillofac Surg. 2010; Feb; 68(2):319-24.

-Aras MH, Güngörmüş M. Placebo-controlled randomized clinical trial of the effect two different low-level laser therapies (LLLT)-intraoral and extraoral-on trismus and facial swelling following surgical extraction of the lower third molar. Lasers Med Sci. 2009, May; 31: 266-272.

Aleksa B., Markovic´ D. and Todorovic L . Postoperative analgesia after lower third molar surgery: contribution of the use of long-acting local anesthetics, low-power laser, and diclofenac. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006;102:e4-e8

Byrnes KR, Tsuchiya K, Rochkind S. Cellular invasion following spinal cord lesion and low power laser irradiation. *Lasers Surg Med*. 2002; S14:11.

Denise H. and Heidi A. Phototherapy — a treatment modality for wound healing and pain relief. African Journal of Biomedical Research. 2007 , Vol. 10; 99 – 109.

Douglas N., Dederich D. and Ronald B. Lasers in dentistry: Separating science from hype. J Am Dent Assoc, 2004; 135;204-212.

Enwemeka C.S., Parker J.C., Dowdy D.S., Harkness E.E., Sanford L.E., and Woodruff L.D. The efficacy of low power lasers in tissue repair and pain control: a meta-analysis study. Photomed Laser Surg. 2004; 22(4), 323-329

-Fernando S, Hill CM, Walker R. A randomised double blind comparative study of low level laser therapy following surgical extraction of lower third molar teeth. Br J Oral Maxillofac Surg. 2001, Jun; 31(3):170-2.

-Fisher SE, Frame JW, Rout PGJ, McEntegart DJ. Factors affecting the onset and severity of pain following the surgical removal of unilateral impacted

mandibular third molar teeth. Br Dent J. 1988; 164:351-4.

-Gregg RV. Postoperative pain control for dental and oral surgery. Anesth Prog. 1992; 39:142-5.

-Kreisler M. B., Al Haj H., Noroozi N., Willershausen B., d'Hoedt B. Efficacy of low level laser therapy in reducing postoperative pain after endodontic surgery—A randomized double blind clinical study. Int. J. Oral Maxillofac. Surg. 2004; 33: 38–41.

-Little JW, Falace DA, Miller CS, Rhodus NL. Dental management of the medically compromised patient. 5th ed. St. Louis: Mosby; 1997;p. 299, 458, 486

Matic M., Lazetic B., Poljacki M., Duran V. and lvkov-Simic M. Low level laser irradiation and its effects on repair processes in the skin. Med Pregl. 2003; 56(3-4), 137-141.

Markovic A, Todorovic L. Influence of preoperative use of diclofenac-Na on postoperative pain after removal of impacted lower third molars [in Serb]. Stom Glas S 1995; 42:37-40.

Markovic A and Todorovic Lj. Effectiveness of dexamethasone and low-power laser in minimizing oedema after third molar surgery: a clinical trial. Int J Oral Maxillofac Surg. 2007;Mar; 36(3):226-9.

-Neckel C, Kukiz P. Biostimulation. A . Comparative study in the postoperative outcome of patients after third molar extraction. J Oral Laser Applications 2001; 1:215-9.

-Ngan P, Kess B .and Wilson S. Perception of discomfort by patients undergoing orthodontic treatment, *Am J Orthod* 1999; 96, pp. 47–53.

-Ohno T. *Pain suppressive effect of low power laser irradiation.* A quantitative analysis of substance P in the rat spinal dorsal root ganglion. J Nippon Med Sch. 1997; 64 (5):395-400.

-Roynesdal AK, Björnland T, Barkvoll P, Haanaes HR. The effect of soft-laser application on postoperative pain and swelling. A double-blind, crossover study. Int J Oral Maxillofac Surg. 1993; Aug; 22(4):242-5.

-Rochkind S, Shahar A, and Nevo Z. An innovative approach to induce regeneration and the repair of spinal cord injury. *Laser Therapy* 1997*;* 9 (4):151. Shapiro RD and Cohen BH. Perioperative pain control. Oral Maxillofac Clin North Am; 1992, 4:663-74.

-Schindi A., Schindi M., Pernerstorfer-Schon H., Kerschan K., Knobler R. and Schindi, L. Diabetic neuropathic foot ulcer: Successful treatment by low intensity laser therapy. Dermatology. 1999;198, 314-317.

-Seymour RA and Walton JG. Pain control after third molar surgery. Int J Oral Surg; 984;13:457-85.

-Stadler I., Lanzafame R., Oskoui P., Zhang R., Coleman J. and Whittaker M. Alteration of skin temperature during low level laser irradiation at 830nm in a mouse model. Photomedicine and Laser Surgery. 2004;22(3), 227-231

-Smith K. Light and Life: The photobiological basis of the therapeutic use of radiation from lasers. Progress in Laser Therapy: Selected papers from the October 1990 ILTA Congress. Published by Wiley and Sons, Inc. New York and Brisbane. 1991; pp 17.

-T**unér J. and Hode L.** Laser Therapy — Clinical Practice and Scientific Background. Prima Books AB, Grangesberg, Sweden. Chapter 1. Some basic laser physics. 2002; pp. 12, 21, 22.

-Theralase. A. Therapeutic laser treatment. Laser Theory from designers and manufacturers of therapeutic medical laser systems. 2003. Available from: URL: http://wwvv.theralase.com/technoloqv.php. Accessed on 12/02/2010

-Walsh LJ. The current status of low level laser therapy in dentistry. Part 1. Soft tissue applications. Aust Dent J 1997; 42: 247–254.

-Youssef M, Ashkar S, Hamade E, Gutknecht N, Lampert F, Mir M . The effect of low-level laser therapy during orthodontic movement: a preliminary study. Lasers Med Sci. 2008; Jan; 23(1):27-33.

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