Iraqi Journal of Physics, 2024 *Vol. 22, No. 3, PP. 17-26*
https://doi.org/10.30723/ijp.v22i3.1235 *P-ISSN: 2070-4003*
E-ISSN: 2664-5548

Pain Perception and Anesthesia Requirements in Diode Laser vs. Traditional Methods for Second Stage Implant Exposure

Saad M. Jameel[1a*], Salah A. Alkurtas[2b], and Mohammed K. Dhahir[1c]
[1]*Laser Institute for Postgraduate Studies, University of Baghdad, Baghdad, Iraq*
[2]*Consultant maxillofacial surgeon, College of Dentistry, Al-Turath University, Baghdad, Iraq*
[b]E-mail: mohammed@ips.uobaghdad.edu.iq, [c]E-mail: Sa_alkurtas2006@yahoo.com
[a*]Corresponding author: saad.jameel2102m@ilps.uobaghdad.edu.iq

Abstract

Using a 940nm diode laser or traditional methods, second-stage implant exposure involves removing soft tissue above the dental implant to expose the implant fixture and complete the implant procedure. This study included twenty-three patients (43.5% of whom were males, and the female percentage was 56.5%), aged between 18 and 70 years, who had at least two implants (3-6 months after implant insertion). Implant exposure was performed in case 1, using the traditional methods of puncture, flap, or incision, and in case 2, using a 940 nm diode laser. The study took place in Baghdad, Iraq. The results showed that the average pain in the laser group was 1.48, which was less than the average pain in the traditional group, which was 3.70. The pain scores that patients immediately reported for the laser cases were between 0 and 3, while the pain scores for the conventional cases were higher, ranging from 2 to 6. This was statistically significant in favour of the laser cases. All patients using the traditional method required infiltration anaesthesia, while 20 patients were satisfied with topical anaesthesia in the diode laser cases; this was statistically significant, favouring the laser method. This study revealed that the 940 nm diode laser is more efficient than the conventional method regarding the patient's perception of pain and the need for infiltration anaesthesia.

Article Info.

Keywords:
Laser, Implant, Pain, 2nd Stage, Anesthesia

Article history:
Received: Jan. 21, 2024
Revised: May, 03, 2024
Accepted: May, 18,2024
Published: Sep. 01, 2024

1. Introduction

A substantial quantity of dental implants has been surgically placed by dental practitioners worldwide, owing to the extensive history of implant practice and research in dentistry spanning over five decades [1]. Since its introduction by Branemark in the late 1960s, the concept of osseointegration, which refers to the firm attachment of a titanium implant to the bone surface without any intervening tissue, has witnessed notable progress [2]. Due to its biocompatibility, absence of cytotoxicity, and little inflammatory response in peri-implant tissues, titanium has found widespread application [3]. Dental implants have gained significant appeal due to their ability to retain adjacent tooth structure and bone, in contrast to alternative treatment modalities [4]. To mitigate the potential risk of implant failure resulting from movements at the interface, a longstanding protocol in the field of dental implantology for the treatment of partially or edentulous patients has recommended the practice of implant submersion for a period of 3-6 months to facilitate osseointegration [5]. In cases of submerged healing, a second operation is required. In two-stage implant surgery, the implant may be exposed using either a scalpel or a laser, both of which are effective. The healing abutment may need to be adjusted with several trials to ensure fitting [6].

Lasers became accessible for dental care because of their efficiency, ease of use, and comfort [7]. Laser is an acronym for “Light Amplification by Stimulated Emission of Radiation”. An atom source is an important active medium needed to create a radiation-stimulated light source. One possible form of the active medium is liquid,

solid, or gas. It is responsible for identifying and categorizing the type of laser beam released [8]. Based on the wavelength of the monochromatic light that can be absorbed, dispersed, or reflected, a laser beam's effects on biological tissue can vary. Biological tissue is made up of many components that absorb light at different wavelengths, which causes energy to be deposited inside the tissue. Different lasers are utilized in oral maxillofacial surgery for various therapeutic purposes depending on their wavelength range and simultaneous absorption by biological chromophores, like haemoglobin and water [9]. Lasers have the benefit of being less intrusive while producing outcomes comparable to those of traditional surgery. Moreover, laser surgery often has a great potential for healing and results in reduced oedema and inflammation after surgery. By coagulating tiny blood vessels, the laser radiation's coagulation effect increases visibility [10].

Dental lasers are being utilized more often in addition to conventional techniques at various stages of implant surgery [11]. As a result of the photothermal action of a focused laser beam and energy absorption, laser ablation is a technique for eliminating materials from a surface [12]. Dentists favour dental lasers over traditional dental drills and suction because of the lasers' capacity to vaporize the tissue, stop bleeding, stimulate new cell growth, disinfect the area, and kill bacteria [13]. Diode lasers are almost exclusively utilized for soft tissue ablation due to their strong absorption in soft tissue and low absorption in bone and other generally hard tissue [14].

This research compares two implant techniques, the conventional and the diode laser, to determine which method is superior regarding patient comfort, recovery time, surgical trauma, anaesthetic avoidance, and visual outcomes. In this study, the effect of the 940 nm diode laser on gingiva in relation to pain and the need for infiltration anaesthesia is studied. The use of the diode laser was compared with the traditional method in second-stage implant exposure.

2. Experimental Part

Inclusion Criteria

The patients included in this study were:

1. Patients designated for fixed implants by conventional implant procedure, which was done (3-6) months ago, using a two stage dental implant.
2. One patient with two or more implants.
3. Patients aged 18 to 70 years of both genders, with the presence of adequate osseointegration and healthy keratinized tissue surrounding the implant site.

Exclusion criteria

The patients excluded from this study were:

1. Patient of a single implant.
2. Patients with exposed dental implants or already have gingival former.
3. Patients with poor oral hygiene.
4. Patients with failure of implant osseointegration to bone.

Twenty-three individuals, ages 18 to 70, participated in this study. All were nonsmokers and either in good general health or had controlled systemic disease; they had implants before (3-6 months) from various companies of implant bodies. The implant was exposed as part of impression taking to construct the prosthetic part. The necessary information was noted, including the patient's age and gender, medical and dental history, clinical assessment, and the number of implants—the patient's jaw must have at least two implants—and other pertinent details. In a private clinic and a government-run hospital in Baghdad, the second step of implant exposure was carried out on twenty-three patients. Each patient was subjected to the conventional method (designated the control) using a puncture, flap, or blade on one implant and to the laser

method (designated as the study) using a 940 nm diode laser (biolase, Epic X, USA-made, shown in Fig. 1) on a second implant. The implant uncovering program of the laser system was selected by navigating the device's pre-installed programs. The laser power was chosen to be 1.5 W in the pulse mode which was decided upon according to a pilot study that was done on four rabbits of 8 months of age to assess less carbonization with better healing and cutting efficiency (see Fig. 2). The mode used was 400 µm of optic fiber, 1 ms pulse duration, 1 ms pulse interval, duty cycle 50%, average power 1.2W, peak power 2.4, pulse repetition rate: up to 20 kHz, beam divergence 8–22° per side). The patient was provided with an informed consent after being made aware of the purpose of the study. 47 implants were put in these patients through a two-stage process. A surgeon specialist did the site laser exposure.

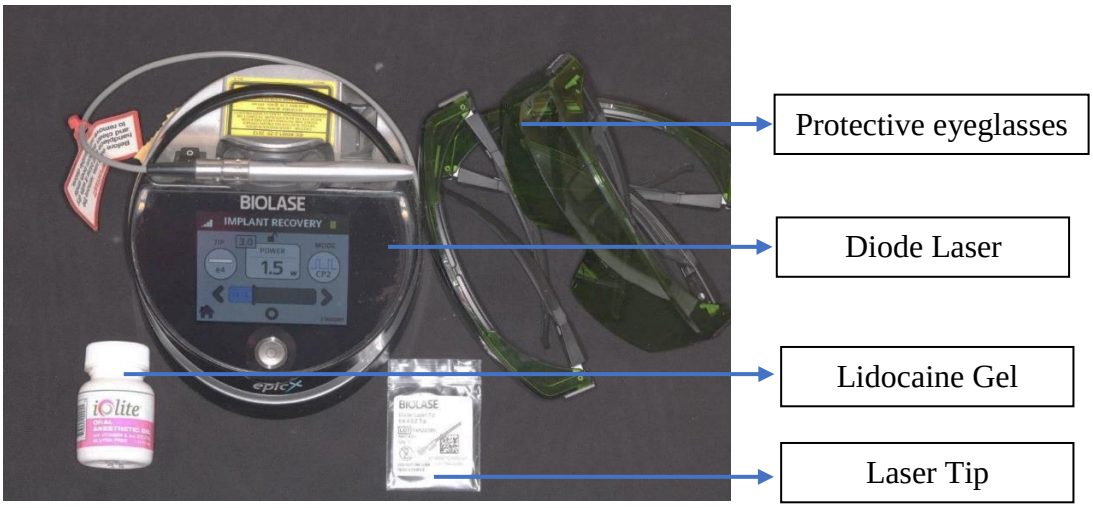

Figure 1: Diode Laser biolase 940 nm.

The patient's appointments for the second part of the procedure came three to six months after placing the implants. X-rays (periapical or orthopantomography) were used to pinpoint the implant position and determine whether there was enough healthy keratinized tissue surrounding the implant site with acceptable osseointegration. For the control cases, infiltration anesthetic was provided to the soft tissues surrounding the implant site; a small circular incision of the tissues (3 with punctures, 5 with flaps and 15 with incision) smaller than the size of the implant was done with a No. 15 surgical scalpel to locate the implant precisely and revealing the implants. The circular incision was enlarged to expose the implant fully, the implant screw was removed, and a healing abutment was then placed. For the study cases of the same 23 patients, a 940 nm diode laser was used to locate the implants using X-ray after the initiation of laser to activation (see Fig. 3).

For the study cases, topical anaesthesia was provided on the soft tissue above the implant; the laser tip was made to touch the soft tissue to make a small circular incision by ablation to expose the implant. This incision was gradually widened until the cover screw was visible. Infiltration anaesthesia was provided if the patient felt pain, which only happened with 3 patients. After this process, the implant's cover screw was removed, and a suitable healing abutment was placed in its place.

The patients in both cases didn’t receive an antibiotic prescription following surgery. For analgesia, 500 mg of paracetamol four times a day was prescribed to be taken only when it was essential. The patients were requested to return after (2, 5, and 7) days for a clinical assessment of their development for any complication in the operation site, such as inflammation or bleeding.

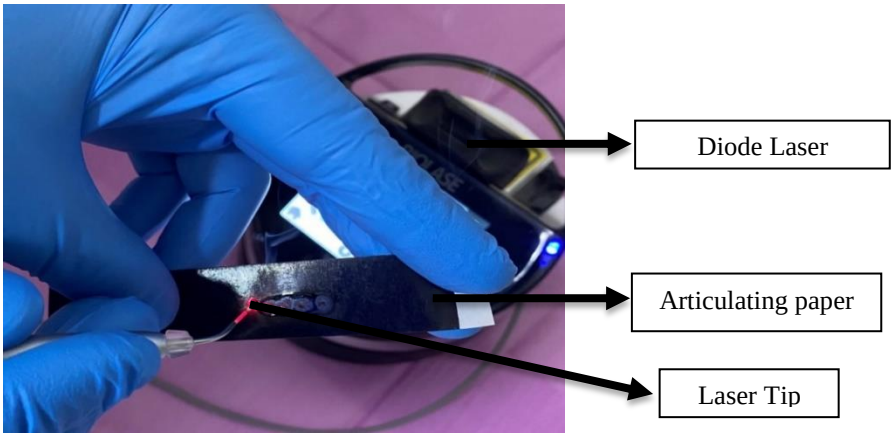

Figure 3: Laser tip initiation.

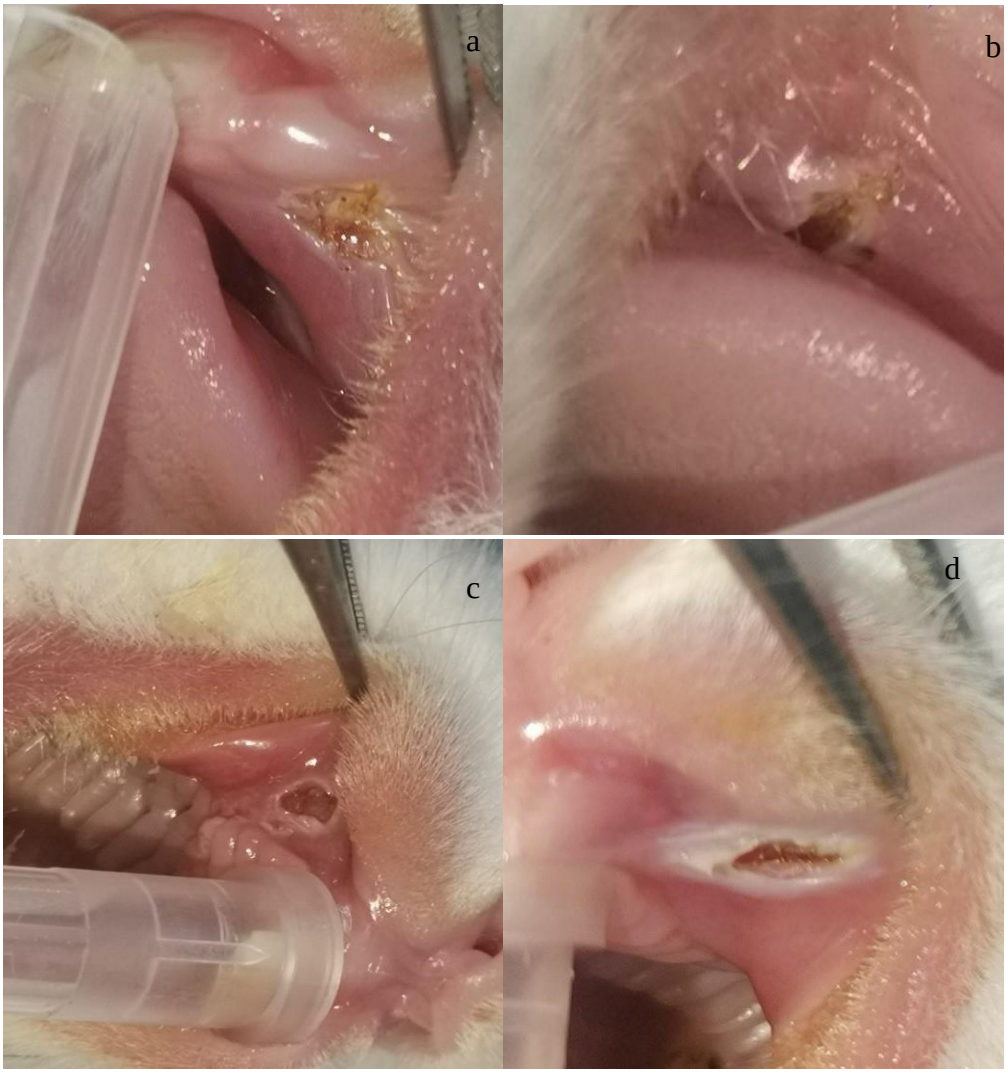

Figure 2: Pilot study for diode laser 940 nm in pulse mode (a) 1 W, (b) 1.5 W, (c) 2 W, and (d) 2.5 W.

2.1. Factors Evaluated for the Comparison of the Two Techniques

The patients were trained to use the Visual Analog Scale (VAS), a pain rating scale composed of numbers from 1 to 10, where 1 is no or little pain and 10 is worse-feeling pain [15]. The patients were asked to register their pain intensity daily during the

first seven days after surgery. Additionally, they were requested to document their use of analgesics during the postoperative period.

Implant exposure was done by specialists using scalpels or punctures (in the conventional technique group) and diode lasers (in the study group), as shown in Fig. 4. The operation varied from case to case due to a number of factors, such as individual variation between specialists or soft tissue thickness.

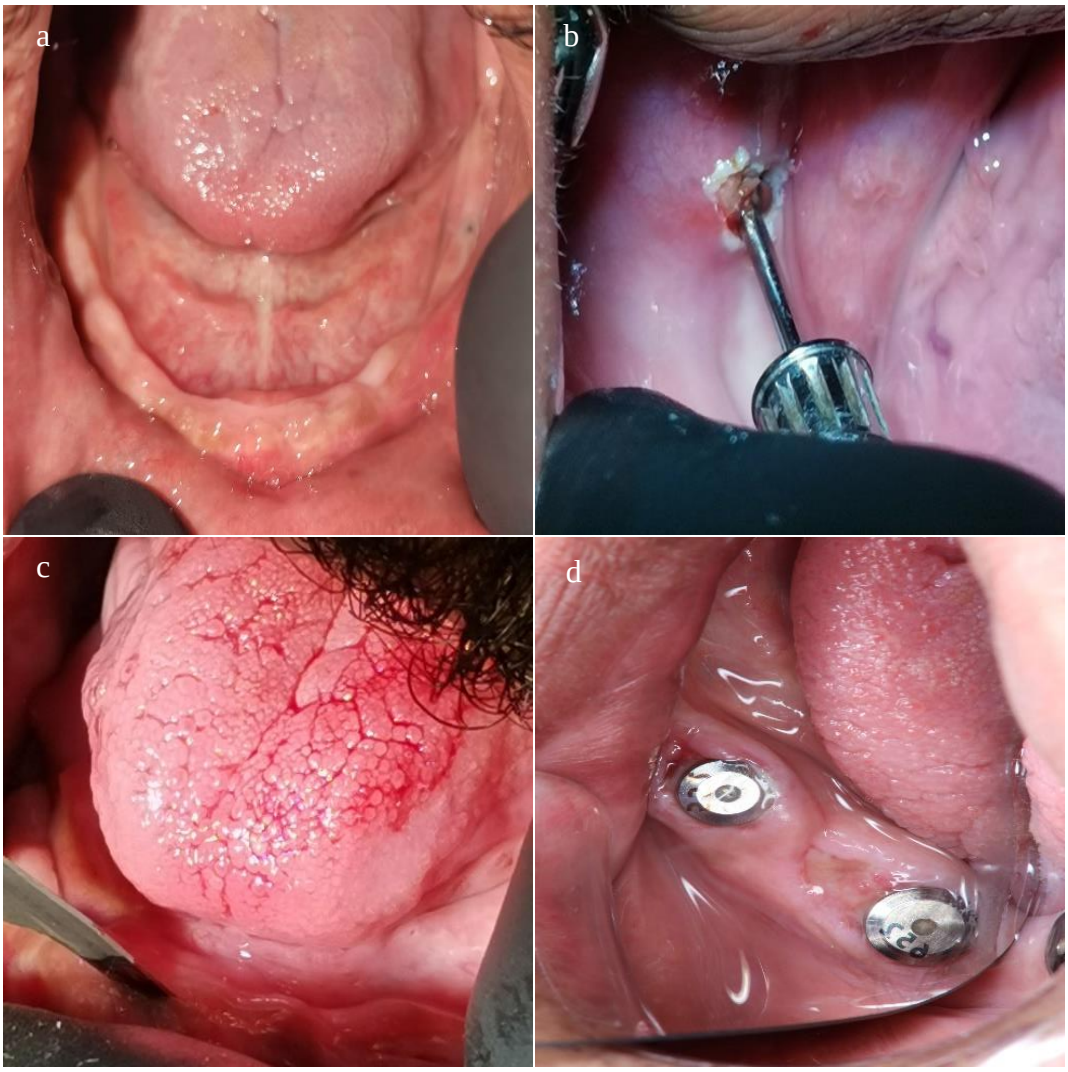

Figure 4: Second-stage implant exposure with a 940nm diode laser and surgical flap: (a) Edentulous patient 47 years of age with implant placement before 3 months; (b) Tissue ablation by laser for implant site; (c) Surgical flap for implant site exposure; (d) Healing after 7 days.

2.2. Statistical Analysis

Version 21 of the Statistical Package for Social Sciences (SPSS) was used to analyze the data. The data was presented as ranges, a mean, and a standard deviation. To show categorical data, percentages and frequencies were utilized. An independent t-test was employed to compare the continuous variables. The Chi square test was utilized to ascertain the correlation between a provisional diagnosis and particular data. In cases where the anticipated frequency was below 5, the Fisher exact test was employed instead. A significance level of 0.05 was used for the P-value.

2.3. Ethical Considerations

The Institute of Laser for Postgraduate Studies' Ethical Scientific Committee reviewed and approved the research proposal. After fully explaining the study's objectives and providing assurances regarding the anonymity of the data obtained and its exclusive use for the current investigation, each patient was asked to sign a consent form. The study follows the Declaration of Helsinki [16].

3. Results

The distribution of participants varied between males and females over the age range of 18 to 70 years. The mean age of males was 40.1± 2.73 years old, with males accounting for 43.5% of the total sample size. In contrast, the mean age of females was 44.9±2.88 years old, representing 56.5% of the sample size, as shown in Fig. 5.

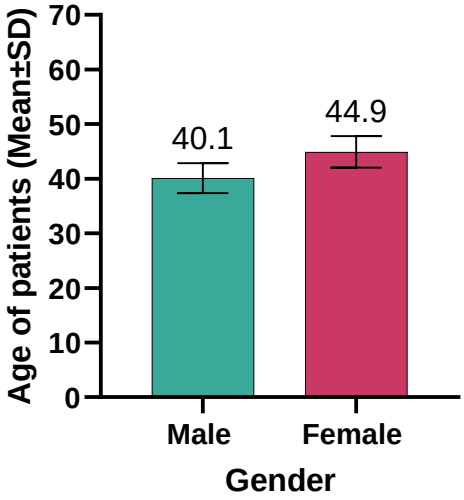

Figure 5.: Comparing the study groups based on gender and age.

Immediate pain was significantly lower when using the laser method than when using the traditional method (p-value <0.001), as shown in Table 1. At the same time, pain was felt in the control cases despite the use of infiltration anaesthesia. Fig. 6 shows a comparison between the clinical results of the traditional method and the 940 nm diode laser method on gingiva. Infiltration anaesthesia was needed less when using the laser method than the traditional method, as illustrated statistically in Table 2. It was found that infiltration anaesthesia was significantly (p-value <0.001) less needed when using the laser than in the traditional method.

Table 1: Pain score comparison between the laser and traditional methods.

Pain (vas)	**Tested groups**		**P value**
	conv	**laser**	
Mean	3.70	*1.48	
Std. Error of Mean	0.23	0.18	0.001
Median	4.00	1.00	H. Sig
Std. Deviation	1.11	0.85	
Minimum	2.00	0.00	
Maximum	3.00	6.00	

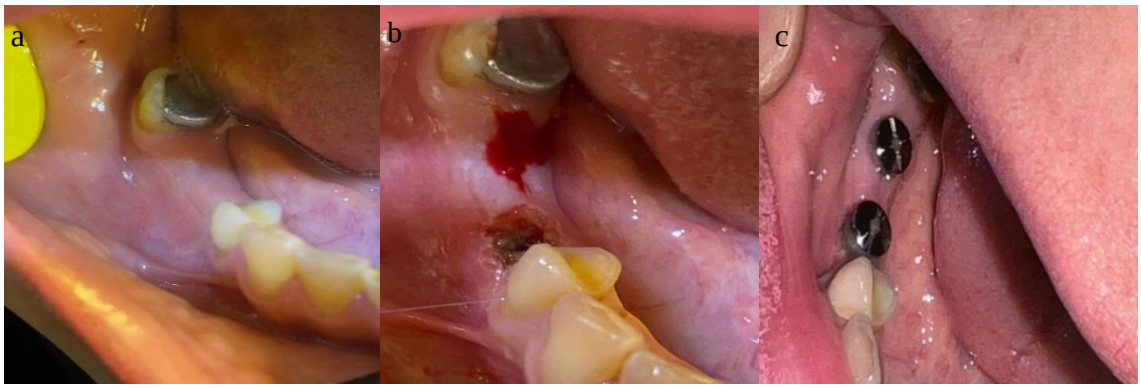

Figure 6: (a) Patient aged 33 years old with missing two teeth in lower right jaw; (b) Implant exposure lower second premolar by laser and lower six implant exposure by incision; (c) Gingival former placement.

When comparing the implants exposed with a blade with those exposed using laser, there was a significant difference between the two groups regarding anesthesia requirement ($P < 0.0001$). Only three of the patients required a tiny dose of a local anesthetic to be infused; the other patients could undergo the procedures while just getting topical anaesthesia. In contrast, for every control case, an anaesthetic had to be infused into the crystal tissue side, as shown in Table 2.

Table 2: Anesthetic used in the laser and traditional methods.

Anesthetic agent	**Conv. N(%)**	**Laser N(%)**	**P-value**
Topical	0(0)	20(87)	0.001 H SIG
Infiltration	23(100)	3(13)	

At the 7-day follow-up, all of the surgical sites of the laser-treated group had fully healed, and no symptoms of inflammation, redness, burning, or oedema were seen. The patients did not require any painkillers after surgery apart from two control cases, depending on the patient record pain (VAS) seen in Table 3.

Table 3: Distribution of VAS score among tested groups.

Study groups	**Pain (vas) N(%)**										**Total**
	P1	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**p10**	
Conv. group	0	3(13)	8(35)	6(26)	5(22)	1(4)	0	0	0	0	15
Laser group	2(9)	11(48)	7(30)	3(13)	0	0	0	0	0	0	15
P-value	0.001 H.SIG										

4. Discussion

Dental implants are frequently utilized to treat teeth loss [13]. The initial step in implant-supported prosthetic dentistry is obtaining an impression. In the second-stage, surgery is necessary in cases of submerged healing [11]. Laser use for peri-implant surgical soft tissue therapy attempts to improve masticatory performance, implant longevity, and cosmetic results by avoiding food impaction and maintaining better cleanliness around the dental implant [17]. Scalpels have been used for a long time to make incisions in the soft tissues covering or surrounding the implant, but using laser

instead has proved to have many benefits; it speeds up healing and reduces the amount of time needed to take an impression [18].

Lasers are beneficial in implant dentistry, particularly in the two-stage procedure. Its key benefits are less discomfort, less damage to soft tissues and bone, and a lower risk of infection following surgery [19].

In this respect, the 940 nm diode laser, using both initiated and noninitiated tips, seems to be the safest because it does not penetrate the titanium body and does not result in a noticeable temperature increase [20]. The 940 nm diode laser can penetrate deeper than a laser of visible spectrum wavelengths [21]. The 940 nm laser better regulates the overheating issues associated with implant irradiation [22].

It is no longer deemed appropriate to do oral soft tissue surgery with a diode laser in the continuous wave (CW) mode. In light of its benefits in clinical instances, the pulsed mode was shown to be more helpful, efficient, and simple to do incisions and cuttings with fewer intra- and postoperative problems. For younger patients, in particular, the pulsed mode laser treatment provides a safe, acceptable, and successful treatment with remarkable results [23]. This supports El-Kholey's assertion that the decrease need of injectable anesthetic during second-stage implant surgery is one of the benefits of using laser [24]. According to Jawad and Hamdi local anaesthesia is not required for laser surgery as opposed to scalpel incisions because of the quick vaporization of cells by the laser, which results in the loss of intracellular fluid, coagulation of biomolecules, denaturation of intracellular substance, and protein [25]. Shalawe et al. mentioned several benefits of using laser instead of a scalpel when performing an oral biopsy, including less local anaesthetic needed, improved hemostasis (no need for suturing after surgery, which saves money), less postoperative pain and oedema and reduced inflammatory response [26]. This agrees with Tunc et al. who revealed the benefits of the diode, erbium (Er), and chromium-doped yttrium, scandium, gallium, and garnet (Cr:YSGG) lasers, including reduced surgical trauma, less anaesthetic need, improved visualization because of less haemorrhage, and postoperative patient comfort; both lasers can be regarded as reliable and secure techniques in second-stage implant surgery [13]. The ability of lasers to seal lymphatic channels reduces postoperative oedema, which reduces discomfort following surgery. Additionally, the formation of a fibrin clot over the surgical wound reduces inflammation and pain after surgery by protecting the wound from external irritation and avoiding the need for laser-tissue interaction medications [27]. Strakas et al. concluded that, for soft tissue surgery, the 940 nm diode laser most effective power parameters were from 3 to 5 W. This laser enables dental practitioners to attain the best possible clinical outcomes and prevent problems [28]. Diode laser with proper usage do not damage the implants because it does not alter their structure or make them rougher. Improper use, excess, or inappropriate dosages of a laser by a dentist may damage the surfaces they are lighting [29]. The patient feels less pain since the laser long wavelength results in less damage to the vascular and epithelial tissues [30]. Without affecting the surface quality of the implant, the application of a diode laser on titanium implants has eliminated all microorganisms in more than two-thirds of the sample [31]. Kholey et al., in their study with a randomized controlled clinical trial, concluded that diode laser-assisted implant exposure could be done without local anaesthesia; however, the results, including duration of surgery, postoperative pain, healing time, and overall implant success rates, were comparable to those of scalpel surgery [32]. According to Eroglu et al., there was no statistically significant variation in the postoperative analgesics used between the groups of Er and Cr:YSGG lasers and the scalpel group [33].

5. Conclusions

This study revealed that the diode laser of 940 ± 10 nm wavelength is more efficient than the conventional method regarding patient perception of pain and the need for infiltration anaesthesia. Using a pulsating diode laser at 1.5 W at 940 nm results in a considerable reduction in pain as well as a reduction in the requirement for infiltration anesthesia. For the second step of implant exposure, it is thus recommended to utilize a 940 nm diode laser.

Acknowledgements

The authors would like to thanks the Laser institute, University of Baghdad for presenting this work and for sharing so-called insight and comments.

Conflict of interest

Authors declare that they have no conflict of interest.

Ethical Approval

The research ethics committee of the institute of laser for postgraduate studies granted their ethical approval for this study with the number (1375), at October 2023.

References

1. N. A. Valente, A. Calascibetta, G. Patianna, T. Mang, M. Hatton, and S. Andreana, J. Oral Implant. **43**, 94 (2017). DOI: 10.1563/aaid-joi-D-16-00188.
2. I. Atsuta, Y. Ayukawa, R. Kondo, W. Oshiro, Y. Matsuura, A. Furuhashi, Y. Tsukiyama, and K. Koyano, J. Prosthod. Res. **60**, 3 (2016). DOI: 10.1016/j.jpor.2015.07.001.
3. I. N. Safi, B. M. A. Hussein, and A. M. Al-Shammari, J. Periodont. Implant. Sci. **52**, 242 (2022). DOI: 10.5051/jpis.2006080304.
4. H. W. Elani, J. R. Starr, J. D. Da Silva, and G. O. Gallucci, J. Dent. Res. **97**, 1424 (2018). DOI: 10.1177/0022034518792567.
5. A. A. Al-Sawai and H. Labib, J. Invest. Clin. Dent. **7**, 217 (2016). DOI: 10.1111/jicd.12152.
6. T. Albrektsson and A. Wennerberg, Clin. Implant. Dent. Relat. Res. **21**, 4 (2019). DOI: 10.1111/cid.12742.
7. G. Pellegrini, L. Francetti, B. Barbaro, and M. Del Fabbro, J. Invest. Clin. Dent. **9**, e12349 (2018). DOI: 10.1111/jicd.12349.
8. M. Asnaashari, M. B. Roudsari, and M. S. Shirmardi, J. Lasers Medic. Sci. **14**, e44 (2023). DOI: 10.34172/jlms.2023.44.
9. K. V. Shaik, M. I. N. Alanazi, R. M. Albilasi, B. F. A. Albalawi, and F. A. Alruwaili, J. Pharm. Bioall. Sci. **13**, S19 (2021). DOI: 10.4103/jpbs.JPBS_710_20.
10. M. Hohmann, D. Kühn, D. Ni, M. Späth, A. Ghosh, M. Rohde, F. Stelzle, F. Klämpfl, and M. Schmidt, Sci. Rep. **14**, 1263 (2024). DOI: 10.1038/s41598-024-51449-1.
11. D. H. Edinger and F. Beuer, Clin. Oral Investig. **25**, 1345 (2021). DOI: 10.1007/s00784-020-03442-x.
12. W. K. Hamoudi, Z. S. Shakir, R. A. Ismail, H. A. Al-Jumaily, S. Anees Sahib, and A. Abedulwahhab, J. Lasers Medic. Sci. **12**, e82 (2021). DOI: 10.34172/jlms.2021.82.
13. S. K. Tunc, N. Z. Yayli, A. C. Talmac, E. Feslihan, and D. Akbal, Saudi Med. J. **40**, 490 (2019). DOI: 10.15537/smj.2019.5.24105.
14. H. C. Jo and D. Y. Kim, Lasers Med. Sci. **34**, 1031 (2019). DOI: 10.1007/s10103-018-2693-4.
15. Y.-T. Chen, C.-H. Chen, S. Wu, and C. C. Lo, Mathematics **7**, 19 (2019). DOI: 10.3390/math7010019.
16. F. Garola, G. Gilligan, R. Panico, N. Leonardi, and E. Piemonte, Med. Oral Patol. Oral Cirug. Bucal **26**, e691 (2021). DOI: 10.4317/medoral.24256.
17. B. Shrestha and L. Dunn, J. Nepal Heal. Res. Coun. **17**, 548 (2020). DOI: 10.33314/jnhrc.v17i4.1042.
18. A. F. Al-Quisi, O. Mohammed Aldaghir, and H. A. Al-Jumaily, Int. J. Dent. **2022**, 1329468 (2022). DOI: 10.1155/2022/1329468.
19. M. Kaur, Y. P. D. Sharma, P. Singh, S. Sharma, and A. Wahi, J. Indian Soci. Periodont. **22**, 228 (2018). DOI: 10.4103/jisp.jisp_46_17.

20. C. Fornaini, E. Merigo, P. Vescovi, M. Bonanini, W. Antonietti, L. Leoci, G. Lagori, and M. Meleti, Lasers Med. Sci. **30**, 1631 (2015). DOI: 10.1007/s10103-014-1623-3.
21. M. Heidari, R. Fekrazad, F. Sobouti, M. Moharrami, S. Azizi, H. Nokhbatolfoghahaei, and M. Khatami, Lasers Med. Sci. **33**, 1639 (2018). DOI: 10.1007/s10103-018-2492-y.
22. M. Hafeez, L. Calce, H. Hong, W. Hou, and G. E. Romanos, Photobiomod. Photomed. Laser Surg. **40**, 554 (2022). DOI: 10.1089/photob.2021.0156.
23. A. Al-Khatib and A. Al-Azzawi, J. Dent. Lasers **9**, 50 (2015). DOI: 10.4103/0976-2868.158461
24. H. A. Al-Jumaily, J. Baghdad Coll. Dent. **31**, 25 (2019). DOI: 10.26477/jbcd.v31i1.2574.
25. H. A. Jawad and S. A. Hamdi, IOSR J. Dent. Med. Sci. Ver. I. **14**, 2279 (2015). DOI: 10.9790/0853-14610509.
26. J. Sibgatullah, A. K. Gogoi, V. Ningrajappa, and N. G. Meitei, Mod. Res. Dent. **6**, 000630. (2021). DOI: 10.31031/MRD.2021.06.000630.
27. T. N. Aldelaimi and A. A. Khalil, J. Craniof. Surg. **26**, 1220 (2015). DOI: 10.1097/scs.0000000000001727.
28. D. Strakas, D. Dionysopoulos, K. Tolidis, and J. Meister, Lasers Surg. Med. **55**, 294 (2023). DOI: 10.1002/lsm.23639.
29. A. Wawrzyk, M. Rahnama, W. Sofińska-Chmiel, S. Wilczyński, B. Gutarowska, A. Konka, D. Zeljas, and M. Łobacz, Materials **15**, 5890 (2022). DOI: 10.3390/ma15175890.
30. Y.-Q. Kong, X.-X. Dong, J.-Z. Zhao, P.-G. An, Y.-Z. Li, R. Ma, Y.-J. Tang, J. Liu, M.-L. Cheng, and Q. Li, Photobiomod. Photomed. Laser Surg. **41**, 644 (2023). DOI: 10.1089/photob.2023.0069.
31. M. A. Atieh, I. Fadhul, M. Shah, H. Hannawi, and N. H. M. Alsabeeha, Int. Dent. J. **72**, 735 (2022). DOI: 10.1016/j.identj.2022.06.026.
32. T. Hyder, J. Pakistan Dent. Associat. **31**, 100 (2022). DOI: 10.25301/JPDA.312.100.
33. C. N. Eroglu, S. K. Tunç, and S. Elasan, Photomed. Laser Surg. **33**, 533 (2015). DOI: 10.1089/pho.2014.3856.

الإحساس بالألم وتقييم الاحتياج الى البنج الموضعي بواسطة الحقن باستخدام ليزر الدايود940 نانوميتر في المرحلة الثانية لكشف الزرعة ومقارنته بالطرق التقليدية

سعد محمود جميل[1] و صلاح القرطاس[2] و محمد كريم ظاهر[1]

[1]معهد الليزر للدراسات العليا، جامعة بغداد، بغداد، العراق

[2]قسم طب الاسنان، جامعة التراث، بغداد، العراق

الخلاصة

الكشف عن زراعة الأسنان باستخدام ليزر الدايود يعمل عند الطول الموجي 940 نانومتر، باستخدام طاقة قدره 1.5 واط في وضع النبضي لغرض اظهار الزرعة حيث يمكن للعلاج باالدايود ليزر أيضًا أن يحافظ بشكل فعال على الغشاء الكيراتيني حول الغرسات مقارنةً بتقنية المشرط التقليدية. وشمل هذا البحث خمسة عشر مريضاً تتراوح أعمارهم بين (18 إلى 70) سنة. كانوا جميعًا يتمتعون بصحة مناعية جيدة او مسيطرين على المرض مثل(السكر و الضغط)، وغير مدخنين، وتم تشخيص المريض بوجود زرعات الاسنان قبل (3-6) أشهر واظهرت النتائج فَي هذه الدراسة , لوحظ تقليل الاحتياج الى البنج الموضوعي بواسطة الابرة عند استخدام الدايود ليزر 940 نانوميتر والاكتفاء بالبنج الموضعي المرهم واضافة الى تقليل الألم بنسبة كبيرة مقارنتة بالطرق التقليدية.

الكلمات المفتاحية: ليزر، الزراعة، الألم، المرحلة الثانية، المخدر.