Diode Laser and Scalpel: A Comparison of the Two "Cutting-Edge" Surgical Tools in Maxillofacial Surgery

Ankur Mittal[1], Arun K Goyal[2], Siddharth Sharma[3]

ABSTRACT

Background: Scalpel has been the gold standard tool for intraoral surgery. Since a few decades, lasers have also stepped up as operating instruments, be it cutting, ablation or photobiomodulation. In our research, we compared the efficacy of scalpel and diode laser in intraoral maxillofacial surgery. Setting and Design: In the durationof 3 years, a total of 100 patients were included in our study which were divided into two groups of 50 patients each; 50 in the test group for scalpel and 50 in the control group for laser.

Materials and Methods: Inclusion criteria includes clinically diagnosed intraoral soft tissue lesions/growth indicative of tissue ablation, incision, excision, or biopsy. Exclusion criteria: Non consenting and/or non-cooperative patients. Presence of uncontrolled or advanced systemic diseases, immunocompromising diseases, porphyria or medications that cause photosensitivity (eg. Chloroquine, methotrexate etc) and serious eye defects.

Results: While laser provided a clean surgical field by facilitating haemostasis during bleeding, its healing time was slower as compared to laser during the first postoperative week. 2% Lignocaine HCl with 1:80000 adrenaline was used as a local anaesthetic agent. Swelling and redness were both found to be pronounced in scalpel as opposed to laser which produced a coagulum ring of eschar formation during cutting.

Discussion: Scalpel offers unmatched precision and speed during surgery. Its only drawback is bleeding which may be inconvenient for the surgeon. Laser not only clears the surgical field of the operator but also reduces the risk of bleeding from highly vascular areas like the tongue. The heat from the laser tip negates any additional measures required for cleaning.

Conclusions: The 980 nm diode laser promises versatility and surgical efficacy during intraoral maxillofacial procedures and can be a good alternative to the conventional cold scalpel, offering equal patient satisfaction.

Keywords: Diode Laser and Scalpel, Two "Cutting-Edge" Surgical Tools, Maxillofacial Surgery

INTRODUCTION

For millennia, surgical knives were single-piece instruments for which maintaining the sharpness of the blade was a constant problem. In 1910, Murphy began experimenting with a replaceable blade, but the process was cumbersome. In 1915, Morgan Parker, a 22-year-old engineer, patented a locking scalpel handle and blade sys tem that was more secure and enabled an easier exchange of the blades.[1]

Scalpel, also known as cold knife has been considered a gold standard cutting tool till now. Traditionally, it was considered the surgical cutting tool of choice because of its precision control, preservation of tissue integrity, and superior association with wound healing. But its main disadvantages like excessive bleeding rendered inadequate visibility in the operating field and non-sterilizing incision cut. [2]

Therefore, this necessitated the usage of other alternatives for surgery. A more recent surgical tool, the laser, an acronym for light amplification by stimulated emission of radiation, is a device for generating a high-intensity, ostensibly parallel beam of monochromatic (single wavelength) electromagnetic radiation. The possibility of stimulated emission was predicted by Einstein in I9I7; based on the work of Gordon in 1955 and Schawlow and Townes in 1958, Maiman created the first operational laser in 1960, a ruby laser emitting a brilliant red beam of light. [3] The research paper by Maiman stated that when a ruby crystal of 1 cm dimensions was coated on two parallel faces with silver and irradiated by a high-power flash lamp, the emission spectrum obtained under these conditions showed the presence of negative temperatures and regenerative amplification via stimulated emission was ensued. [4]

A multitude of lasers with different wavelengths and lasing media are now used in surgical practice. Carbon dioxide (CO_2) laser (10,600 nm), Neodymium Yttrium Aluminium Garnet (Nd:YAG) laser (1064 nm), Erbium Yttrium Aluminium Garnet (Er:YAG) laser (2940 nm), Holmium Yttrium Aluminium Garnet (Ho:YAG) laser (2100 nm), Argon laser (514 nm), Potassium Titanyl Phosphate (KTP) laser (532 nm) and semiconductor Diode laser (808-980 nm) are commonly used laser systems.

Each machine delivers laser energy fibro-optically in continuous wave and gated pulsed modes and is used in contact with soft tissue for surgery or out of contact for deeper

coagulation. The Diode laser is an excellent soft tissue surgical laser and is indicated for cutting and coagulating oral mucosa. [6] D'Arcangelo et al observed that in minor

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How to cite this article: Ankur Mittal, Arun K Goyal, Siddharth Sharma.Diode laser and scalpel: a comparison of the two "cutting-edge" surgical tools in maxillofacial surgery. International Journal of Contemporary Medical Research 2019;6(12):L21-L29.

oral surgical procedures, diode laser therapy certainly is less invasive and presents some indisputable advantages such as the elimination of bleeding and suturing, as well as minimal postsurgical pain and oedema. The use of low-level lasers started with Mester in 1971. Biomodulation by laser was based on the principle that irradiation at a specific wavelength can alter cellular behaviour by acting on the mitochondrial chain or membrane calcium channels, promoting an increased cell metabolism and proliferation. [7]
Based on the studies of Ize-Iyamu et al, the laser was seen to expose unerupted teeth, reposition the maxillary frenum, and facilitate aesthetic recontouring of hyperplastic gingivae and remove granulomatous gingivae as a result of orthodontic movement. The use of lasers in soft tissue management maximized the health of the oral tissues.[8]
The efficacy of laser surgery has also been observed in the removal of mucoceles[10], in overcoming the limitations of surgical methods of treatment in oral submucous fibrosis patients with favourable results[11], reducing the incidence and severity of hematoma, swelling and pain during the first week after periosteal releasing incision during guided bone regeneration[12], improving the visibility, reducing the amount of anaesthesia required, offering a promising treatment for the ablation of oral leukoplakia[13] and minimizing trauma in second stage implant surgery[14] amongst its many other applications.
All in all, both scalpel and diode laser treatment modalities are effective, with the former preceding the latter in time taken for healing and the latter leading in terms of a clean surgical field, and minimal intra and postsurgical complications.
The main objective of this prospective study was to analyze the intraoperative and postoperative effects of both diode laser and scalpel in terms of pain, redness, bleeding swelling, and healing in the oral mucosa.

MATERIALS AND METHODS

This study compared the properties of intraoral soft tissue diode laser of 970 ± 10 nm (GaAlAs) and cold scalpel (Bard-Parker No. 15) done during the tenure of 2020 to 2023 in the Department of Oral and Maxillofacial Surgery. We selected sample size of 100 patients and divided equally into two groups, where Group I (50 patients; study group): was treated by intraoral soft tissue diode laser and Group II (50 patients; control group): were treated by Bard-Parker No. 15 blade and scalpel.

Operative technique: For the laser group, we applied 2W power in continuous mode and removed the tissues in slow, sweeping motion. Charring, if visible, was gently removed by a gauze piece soaked in saline solution(FIG 1,2)**.** For the scalpel group, incisions were placed with a No, 15 blade in a firm continuous stroke on the mucosa (FIG 4,5). The rest of the surgical procedure is similar in both groups. After the placement of incision, a full thickness mucoperiosteal flap was reflected or exposed. For third molar extractions, Modified Ward's incision was applied and Coupland, Warwick James elevator and respective third molar forceps were used. For alveoloplasty, after crestal incision, we used bone file and rongeurs and for orthodontic exposures, semicircular incision was placed treatment was rendered up to mucoperiosteal tissue removal and the case was furthered by an orthodontist. After the procedure, copious irrigation was done using 0.9% saline 5% w/v povidone iodine solution and closure was done 3-0 black braided silk sutures. The patients were recalled on the 7th day for the removal of sutures.

Method of Data Collection

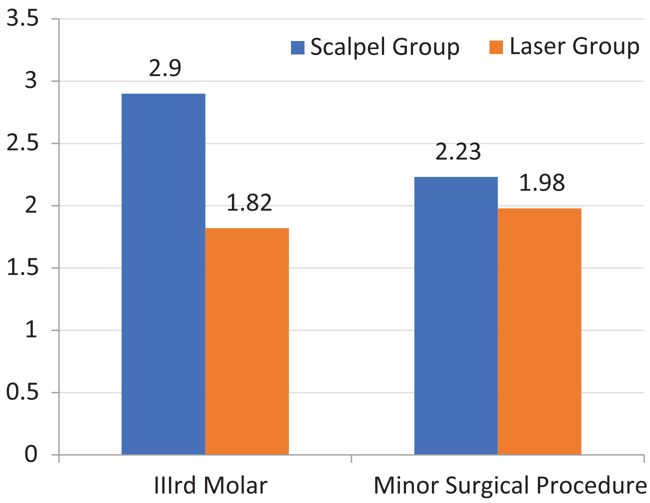
Our preliminary research comprised of patient demographic data like name, age, gender and residential address. We took detailed medical, dental, family, and personal history of the patient. A thorough intraoral examination of soft tissue was done to assess the treatment need and informed consent of the patients was taken for their voluntary participation in the study.
To fulfil our inclusion criteria, we selected healthy individuals without any uncontrolled disease/condition. Those who had clinically diagnosed intraoral soft tissue lesions/growth indicative of tissue ablation, incision, excision, or biopsy were sampled for this study.
We excluded patients who, abled or otherwise, did not consent to be a part of the study.
Patients with systemic diseases (uncontrolled diabetes mellitus and hypertension, respiratory or cardiovascular problems, chronic kidney disease, etc, serious eye defects, having porphyria or on medications that cause photosensitivity (eg. Chloroquine, methotrexate etc) and immunocompromised and non-cooperative patients were not involved in this study.

RESULTS

In this clinical prospective study, 100 cases between 14 and 73 years (Male, n=44, Female, n=56) with a mean age of 36.37 years were evaluated. 50 cases were treated with the conventional scalpel and 50 cases with the 970±10 nm diode laser. Out of the scalpel cases, 40 cases were treated for impacted third molar extractions and10 were treated by minor oral surgery, for cases like alveoloplasty (n=4), surgical extraction (n=3), orthodontic exposure (n=2) and implant placement (n=1). In the laser group, 26 cases were treated for impacted third molar extractions and 24 cases underwent minor oral surgery, for alveoloplasty (n=10), surgical extraction (n=3), orthodontic exposure (n=9) and implant placement (n=2). The swelling percentage preoperatively for scalpel cases is 2.90±1.59 and the laser cases are 1.82±0.75 in the third molar group. The P value is significant between the scalpel and laser cases in the third molar (P=0.001). In the minor oral surgical group, the swelling percentage is 2.23±1.03 for the scalpel and 1.98±0.89 for laser cases respectively. The P value is significant between the scalpel and laser cases in the minor surgical groups (P=0.042). The mean values of the mean bleeding scores in the third molar group are 3.394 in the scalpel and 1.291 in the laser cases respectively. The P value is significant between the scalpel and laser cases (P=0.001) In the minor surgical group, the

		Pre Op	Day 3	% Swelling	P value	Significance
IIIrd Molar	Scalpel Group	13.33±0.81	13.72±0.83	2.90±1.59	0.001	Significant
	Laser Group	13.35±0.53	13.59±0.52	1.82±0.75		
Minor Surgical Procedure	Scalpel Group	13.25±0.72	13.55±0.76	2.23±1.03	0.042	Significant
	Laser Group	13.10±0.81	13.35±0.83	1.98±0.89		

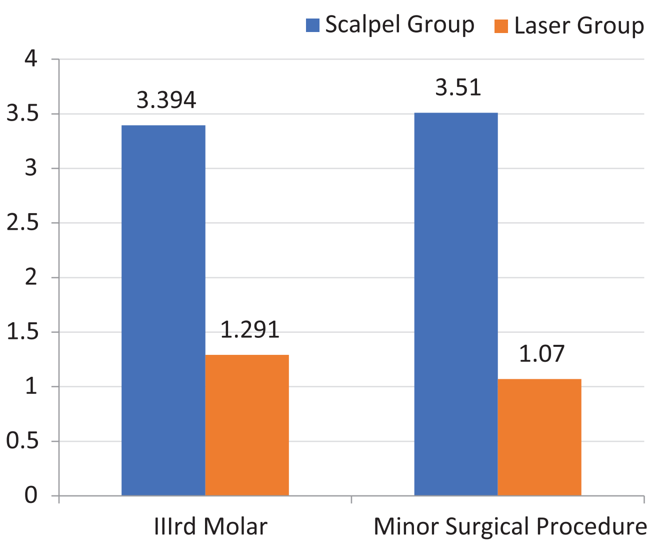
Table-1: Intergroup comparison of mean percentage change in swelling scores between the groups



mean value of scalpel cases is 3.51 and the laser cases is 1.07. The P value is significant between the scalpel and laser cases (P=0.001). On the first postoperative day, the mean values of the mean pain scores in the third molar group are 1.925 in the scalpel and 1.846 in the laser cases respectively. The P value is non-significant between the scalpel and laser cases on the first postoperative day (P=0.623). On the seventh postoperative day, the mean values of the mean pain scores in the third molar group are 0.6500 in the scalpel and 0.2308 in the laser cases respectively (FIG 3,6). The P value is significant between the scalpel and laser cases on the first postoperative day (P=0.001). On the first postoperative day, the mean values of the mean pain scores in the minor surgical molar group are 1.93 in the scalpel and 1.66 in the laser cases respectively**.** The P value is non-significant between the scalpel and laser cases on the seventh postoperative day (P=0.315). On the seventh postoperative day, the mean values of the mean pain scores in the minor surgical group are 0.70 in the scalpel and 0.20 in the laser cases respectively. The P value is significant between the scalpel and laser cases on the seventh postoperative day (P=0.001). The mean values of the mean bleeding scores in the third molar group are 4.52 in the scalpel and 4.5385 in the laser cases respectively. The P value is non-significant between the scalpel and laser cases (P=0.754). In the minor surgical group, the mean value of scalpel cases is 4.20 and the laser cases is 4.25. The P value is non-significant between the scalpel and laser cases (P=0.915). In the third molar group, 25% cases showed redness in the scalpel group and 75% did not. In the laser cases, 26.9% showed redness and 73.1% did not. P value was found to be non-significant

		Mean	SD	Std Error	P value	Significance
IIIrd Molar	Scalpel Group	3.394	0.887	0.140	0.001	Significant
	Laser Group	1.291	0.507	0.099		
Minor Surgical Procedure	Scalpel Group	3.51	0.893	0.282	0.001	Significant
	Laser Group	1.07	0.478	0.097		

Table-2: Intergroup comparison of mean bleeding scores between the groups



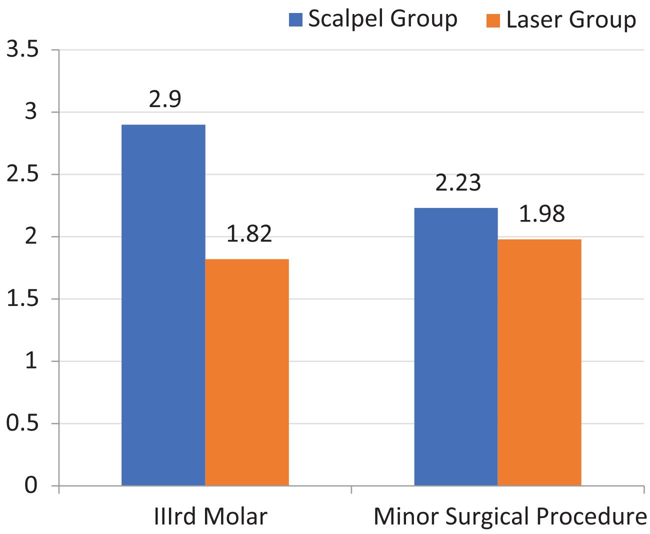
		Mean	SD	Std Error	P value	Significance
At 1st day	Scalpel Group	1.925	0.655	0.103	0.623	Non-Significant
	Laser Group	1.846	0.612	0.120		
At 7th day	Scalpel Group	.6500	.62224	.09838	0.001	Significant
	Laser Group	.2308	.42967	.08427		

Table-3: Intergroup comparison of mean pain scores between the groups in IIIrd molars in the third molar group (P=1.000). In the minor oral group, 30% cases showed redness in the scalpel group and 70% did not. In the laser cases, 25% showed redness and 75% did not. P value was found to be non-significant in the minor oral group (P=1.000).

STATISTICAL ANALYSIS

The data for the present study was entered in the Microsoft Excel 2007 and analyzed using the SPSS statistical software 23.0 Version. The descriptive statistics included mean, standard deviation frequency and percentage. The level of the significance for the present study was fixed at 5%.

The intergroup comparison was done using the independent t tests/Mann Whitney U test depending upon the normality of the data. The categorical variables were compared using the Chi Square test The Shapiro–Wilk test was used to investigate the distribution of the data and Levene's test to explore the homogeneity of the variables.



DISCUSSION

The knife was the most commonly used tool and the first one to be developed.[20] Evidence of knives used in medicine goes back as far as the Mesolithic period (the Middle Stone Age)—around 8000 BC when flint knives were used as scrapers to cut through the skull.[21]

Hippocrates was the first to describe the surgical knife. Which he named macairion, from machaira, an old Lacedaemonian sword, which had a broad cutting blade on a single edge and a sharp, straight point. Therefore, even in Hippocrates' time, the shape of the scalpel was much the same as it is today. The Romans used the Latin "scallpellus," from which the English "scalpel" is clearly derived.[20]

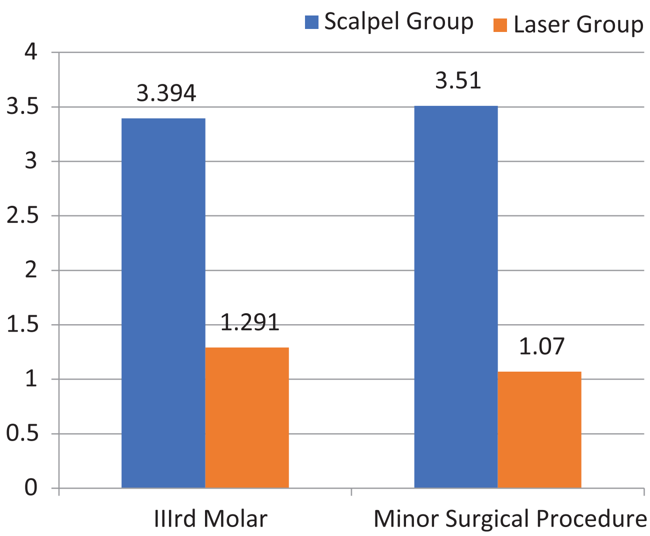
The development of the modern scalpel with a disposable blade, as we know it today, was largely the result of Mr. King Gillette's invention of the safety razor (patented in 1904). In 1910, the eminent Dr. John B. Murphy of Chicago perfected special handles for both single- and double-edged razor blades, assuring the surgeon of ready access to a very sharp knife blade.[21]

Morgan Parker, in 1915, patented a new 2-piece scalpel, with a blade and handle held together by overlapping metal parts which provided rigidity and enabled the exchange of old blades for new ones after each use. Together with Charles Russell Bard, Parker formed the Bard-Parker Company and developed a method of cold sterilization that would not dull the blades, as did the heat.[20] The present design of the Rib-Back blade was introduced in 1936.[21]

In 1917, the development of lasers began when Albert Einstein proposed a theory of stimulated emission whose

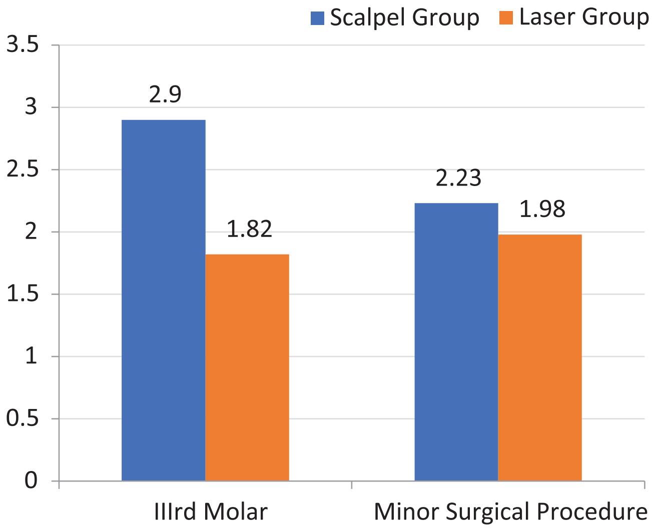
		Mean	SD	Std Error	P value	Significance
At 1st day	Scalpel Group	1.93	0.737	.23333	0.315	Non-Significant
	Laser Group	1.66	0.564	.11526		
At 7th day	Scalpel Group	0.70	0.483	0.152	0.001	Significant
	Laser Group	0.20	0.414	0.084		

Table-4: Intergroup comparison of mean pain scores between the groups in minor surgical procedures



		Mean	SD	Std Error	P value	Significance
IIIrd Molar	Scalpel Group	4.52	.93336	.14758	0.754	Non-Significant
	Laser Group	4.5385	.90469	.17742		
Minor Surgical Procedure	Scalpel Group	4.20	1.31656	.41633	0.915	Non-Significant
	Laser Group	4.25	.94409	.19271		

Table-5: Intergroup comparison of mean healing scores between the groups



significant heat that caused pulpal damage.[25]

In 1962 Nick Holonyak Jr. laid the foundation for semiconductor laser diode[26] responsible for the emission of visible light. Romanos et al [16], in their study, have found that the incision margin using the diode laser is more precise compared to the other systems. Over the past few decades, diode lasers have proved to be versatile and reliable tools based on their myriad wavelengths and photobiological properties.

Postoperative swelling is a common occurrence after any surgical procedure. In our study, we found that there was marked swelling on the third day, postoperatively, seen more in the scalpel treated group. Pirnat et al [5] mentioned in their study that when using NIR (near infrared) lasers on soft tissue there is minimal or no bleeding due to a combination of the sealing of small vessels through tissue protein denaturation and stimulation of Factor VII production in clotting. The heat build-up also allows for the sealing of small lymphatic vessels which results in reduced postoperative oedema. This observation has been further confirmed in the studies of Azma E et al [27], Elanchezhiyan et al. [2], Yasmeen et al. [18]. Kashyap et al have mentioned that after a laser excision, the associated lymphatics and blood vessels are sealed which results in insignificant extravasation of fluids and limited inflammatory reaction.[18] However, in the wound following scalpel excision, there is continued extravasation of blood and lymph fluid, which is manifested as a greater degree of swelling and inflammatory reaction. This is the reason for the longer resolution period.[5]

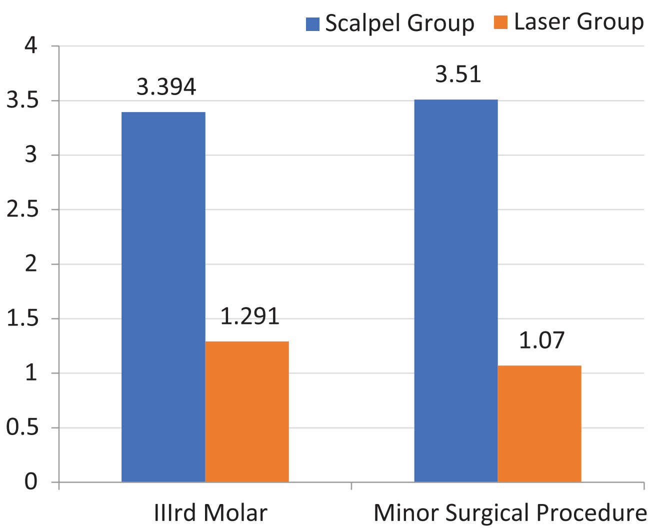
It has also been found that an adjunct treatment modality of providing low-level laser therapy (LLLT) to patients has led to a marked reduction in swelling post-operatively. Aras et al.,[29] Kahraman et al.[29] and Hawkins et al.[30] have all vouched for a positive outcome of postoperative LLLT in their patients where they have found a significant reduction in swelling, pain, and trismus.

In 1988, Wong and Baker [32] suggested various scales and charts record the degree of pain according to the patient perspective of young children. Although their study did not involve adult subjects, research made later included adult and geriatric patients and the Faces Pain Scale proved to be a valuable method for noting the magnitude of pain.

In our study, we found that in the intergroup comparison of mean pain scores between the groups on the first

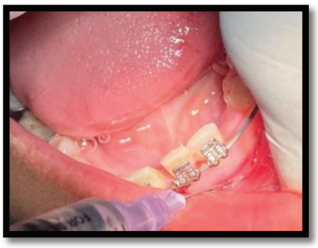
		Absent	Present	P value	Significance
IIIrd Molar	Scalpel Group	30	10	1.000	Non-Significant
		75.0%	25.0%		
	Laser Group	19	7		
		73.1%	26.9%		
Minor Surgical Procedure	Scalpel Group	7	3	1.000	Non-Significant
		70.0%	30.0%		
	Laser Group	18	6		
		75.0%	25.0%		

Table-6: Intergroup comparison of redness between the groups



concept of this theory was based on the quantum theory, that described light being composed of small energy packets called quanta. Maiman implemented the use of Ruby laser, using the experience he gained while working with the army corps. A pulsed flashlamp was used to pump a ruby optically and the first LASER working model was developed. On May 16, 1960, the first laser was successfully tested, pioneered by Theodore H. Maiman, based on the study of masers by Schawlow and Townes.[4]

Stern and Sognnaes in 1964 investigated the possible use of a ruby laser to reduce subsurface demineralization.[15,22-24] However, Adrian et al found that the ruby laser produced



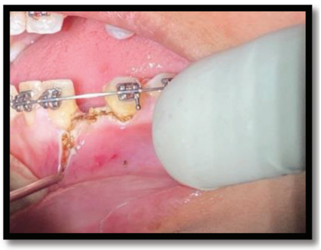


Figure 1 (a) **Figure 1 (b)**

Figure 1 (c)

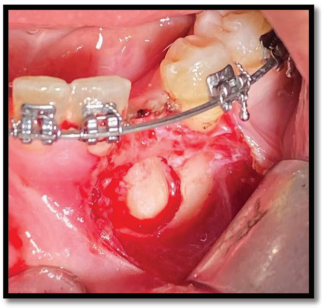


Figure 1 (d)

Figure-1: Intraoperative procedure in Group I Patients. (a) Local anaesthesia administration (b) Laser incision (c) Incised area (d) Surgical exposure done

Figure-2: Closure

Figure-3: Postoperative 3rd day Redness

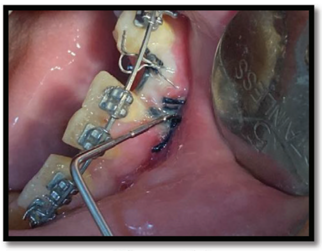


Figure 4(a) **Figure 4(b)**

Figure-4(a)-(b): Postoperative 7th day Healing

Figure 5(a)

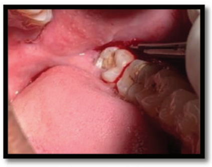


Figure 5(b)

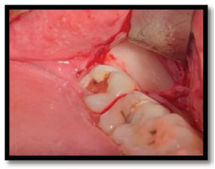


Figure 5(c)

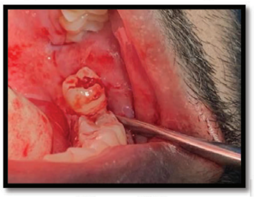


Figure 5(d)

Figure 5(e)

Figure-5: Intraoperative procedure in Group II patients. (a) Local anaesthesia administration (b) Scalpel incision (c) Mucoperiosteal flap elevation (d) Luxation of the tooth (e) Extracted tooth

Figure-6: Closure

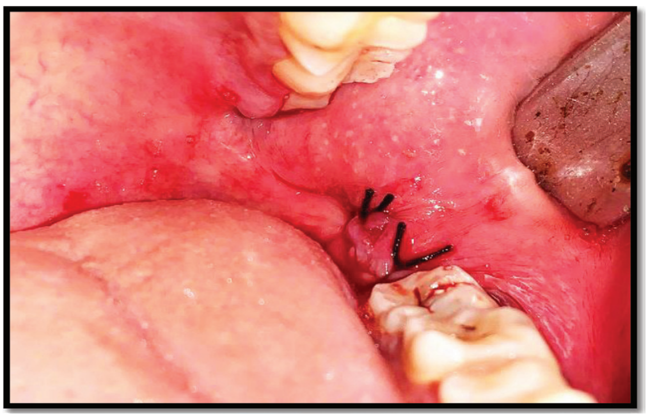


Figure-7: Postoperative 3rd day Redness

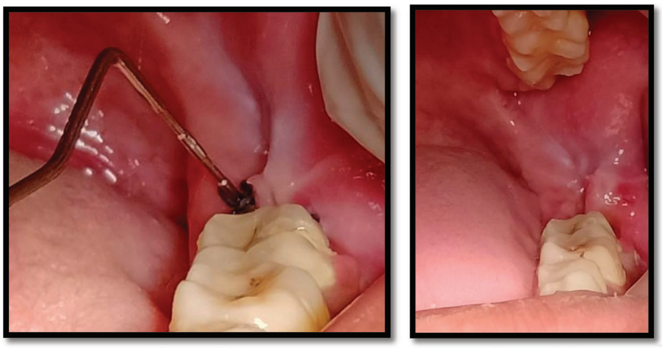


Figure 8(a) Figure 8(b)

Figure-8(a)-(b): Postoperative 7th day Healing

postoperative day scalpel cases showed more incidence of pain than lasers. On the seventh postoperative day, this difference was statistically non-significant. Singh et al[36] describe that in their study, the pain was significantly less for the diode laser. They say that the reason for less or no post-operative pain is due to the sealing of the sensory nerve endings with the heat of the laser beam. Lasers also bring about the sealing of lymphatics and fibrin clot is formed which protects it from external trauma.

Laser poses a "non-threatening" aesthetic to the patient with its slim and fine tip and therefore patients are more at ease during laser surgery than scalpel operations where patients are intimidated by the sharpness of the instrument and perceive the procedure as a painful one. Reduced postoperative pain has been observed in the laser-treated groups in a multitude of research such as the ones conducted by Ahad et al,[9] Qafmolla et al,[10] Gabric et al,[19] Patel et al,[17] Bhatsange et al [2] and Shahnaz et al.[12]

Kashyap et al [18] have stated that although the mechanism of analgesic effects of laser therapy is not well understood, an increased pain threshold through the alteration of neuronal stimulation and firing pattern, and the inhibition of the medullary reflexes are thought to be involved. In addition, the laser effect is seen in prostaglandin synthesis, resulting in an increased conversion of prostaglandin G2 and prostaglandin H2 into prostaglandin I2 (prostacyclin). Ize-Iyamu et al[8] found that there was a significant association between treatment type and post-operative pain where laser cases had less pain than scalpel cases. Çayan et al[33] have noted that in their study, postoperative pain was reduced gradually from the 1st postoperative day to the 10th postoperative day and all patients reported either no pain or only mild pain on the 2nd postoperative day. Moreover, no significant difference in postoperative pain was found between the groups. Therefore, it may be considered that the perception of pain in patients is highly subjective and an individual point of view, as compared to a generalized opinion.

Intraoperative blood loss is almost inevitable during surgery. The gravimetric technique is an important tool to collect blood by weighing the swabs to record bleeding during surgery. In our research, we found A statistically significant outcome in the intergroup comparison of mean bleeding scores between the groups (P=0.001) where there was more bleeding in the scalpel groups than laser. It is evident that the scalpel wounds bleed and the laser does not because of the coagulation of proteins in the tissues. A similar outcome has been found in a study by Jayesh et al.[35] where haemostasis was compared by measuring the change in the weight of gauze pieces, and the swabs in the scalpel group weighed significantly more than that of the laser group. This was further confirmed in a recent study by Gundlapalle et al.[34].

The heat and light from the laser beam interact with the tissues causing denaturation of protein and coagulation. Jayesh et al[35] have mentioned in their study that dental lasers use chromophores like haemoglobin, melanin, water and hydroxyapatite crystals with the diode laser used in the present study (980nm) the chromatophores are melanin, haemoglobin (Hb), and oxyhaemoglobin. The oral cavity is highly vascularized and pigmented. The use of a diode laser offers significant advantages in cutting efficiency and getting a bloodless field. Azma E et al.[9] stated that laser transmits energy to the cells causing warming, welding, coagulation, protein denaturation, drying, vaporization and carbonization. The power settings of the laser determine the size of the coagulum ring formed during the incision. A higher wattage results in a bigger coagulum ring formation during the surgery.

While visually assessing the redness, on the postoperative third day, we found a significant difference between the scalpel and the laser-treated groups (P=0.001) with scalpel cases showing more redness than laser ones. Tissue redness has a direct correlation with healing. In similar research done by Singh et al [36] where they checked for redness immediately after surgery, they found that the scalpel cases had more redness as compared to the laser cases. This is attributed to the presence and absence of bleeding caused by the scalpel and laser respectively. During our research, we noticed a whitish membrane-like appearance in the mucosa of the surgical site. This may be due to the denaturation of protein in the tissues exposed by laser.

There is a controversy in the literature regarding the postoperative healing of lasers versus scalpels. Similar to our study, Ize-Iyamu et al[8] found no significant difference in the healing of soft tissue in their study. This was confirmed by Patel et al [17], who also observed that the wound healing on the 7th day and after 1 month for the scalpel and laser cases showed no statistical significance between groups. Singh et al [36] observed that improved wound healing was present in laser cases on both first and seventh days after surgery. They state that because laser-induced wounds, are definite and clean, they heal with secondary intention and there is no scar formation compared to scalpel incisions. This may be due to the minimal degree of wound contraction following laser irradiation which occurs through induction and formation of a smaller number of myofibroblasts and collagen. Jin et al. [37] observed that the thermal-induced damage in the laser has a proclivity towards producing more pronounced tissue change. Such changes are associated with increased inflammatory response and an initial delay in the healing response. The quantitative analysis of proinflammatory cytokines, such as tumour necrosis factor (TNF)-a, in wound extracts can contribute to the determination of vitality and wound age, in particular in the very early post-traumatic interval. Transforming growth factor (TGF)-b is composed of a family of multifunctional polypeptide growth factors involved in embryogenesis (cell growth and differentiation), inflammation, regulation of immune response, cell adhesion and migration, extracellular matrix formation, angiogenesis, and wound healing.

The laser-treated area exhibits a fibrinopurulent membrane within 72 hours, following the loss of the superficial necrotic layer of tissue. Epithelial growth is seen to commence at the edges and gradually covers the entire wound. The newly formed epithelium in laser biopsy specimens is seen to be thinner and parakeratotic when compared with the epithelium formed after scalpel excision.[18] Post-laser wounds show an appreciably lesser quantity of myofibroblasts. This results clinically in a lesser degree of wound contraction and scarring and shows improved post-operative function, especially in critical areas of the tongue, the floor of the mouth, the soft palate, and the buccal mucosa.[38]

In conclusion, we can state that within the confines of our study, we have found that a diode laser is an impeccable option when it comes to reduction in postoperative swelling, pain, tissue redness and bleeding. Its haemostatic property allows increased convenience for the surgeon and renders better patient comfort and satisfaction. It is an effective treatment modality for approaching highly vascularized areas. A thorough knowledge of the power setting of the laser system is imperative to cause minimal lateral tissue damage and promote better healing. The only drawback of laser is that it is expensive and at higher power settings, poses a risk of tissue necrosis. Thus, the diode laser is an effective and versatile surgical tool and can be used at par with the scalpel in intraoral procedures in maxillofacial surgery.

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