

Lasers Versus Scalpel in Third Molar Surgery: A Split Mouth Randomized Study

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ABSTRACT

Background: The purpose of this study is to relate and evaluate the efficacy of lasers assisted surgical incision with the conventional scalpel incision in third molar surgery.

Materials & Method: A split mouth comparative study was conducted comprising of 40 healthy patients who were diagnosed clinically and radiographically with identical bilateral impacted lower third molars and required their surgical removal. The right side of the patient was designated as the test side where the surgical incision for the removal of impacted third molars was performed using surgical laser and the left side of the patient was designated as control side where the surgical incision for the removal of impacted third molars was performed with the aid of a surgical scalpel. All surgical interventions for the removal of impacted third molars were performed using a modified Ward's incision. The efficacy of lasers assisted surgical incision and the conventional scalpel incision were evaluated and compared using parameters like ease of surgical incision, bleeding, VAS score for pain, post-operative analgesic intake and postoperative healing.

Results: The results of this study reveal that the ease in making the surgical incision was almost similar with laser and scalpel but the surgical field was better when incisions were made using a laser than a scalpel. Less blood loss was encountered with laser and pain in the immediate postoperative phase was relatively less with lasers than scalpel. The amount of postoperative analgesic intake was same at the first postoperative day in both groups but less at the 3 – 5th postoperative days in laser than scalpel. However, the wound healing at the 7th postoperative day was better for scalpel than lasers.

Conclusion: Based on the results of this study it can be concluded that lasers are very effective than scalpel in providing clear field of surgery, ease of surgical incision and minimal intraoperative bleeding facilitating in performing minor oral surgical interventions with minimal hassle and better clinical outcome.

Keywords: lasers, scalpel, third molars.

INTRODUCTION

Surgical removal of an impacted tooth is undoubtedly the most frequently performed minor oral surgical intervention by an oral & maxillofacial surgeon. Previous studies have shown that the

incision design as well as the cutting instruments used for making an incision play a critical role in influencing the postoperative sequelae like pain, swelling trismus etc.^{1,2} Literature reveals that

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surgical scalpel, electro surgery and laser are the three means that can be employed for making incisions in the oral cavity.³ Achieving hemostasis, providing better visibility to the surgical field, causing no detrimental effects to the surgical area and surrounding normal tissues, post-operative comfort and fast healing are the factors to be considered for selecting a cutting instrument.⁴ Scalpel is frequently used for intraoral incisions due to its ease of use, accuracy, minimal damage to tissues and it being economical. However, it fails in achieving hemostasis, which is particularly essential when performing surgical interventions in highly vascularized areas like the oral cavity.⁵ Lasers have been widely employed for soft tissue procedures with better clinical outcomes in the recent past due to its anti-inflammatory, bio stimulant and regenerative effects.^{6,7} Literature has shown that lasers are effective for soft tissue procedures like gingivectomy; gingivoplasty, frenectomy, biopsy, operculectomy, vestibuloplasty and uncovering implants.⁸⁻¹² Hence, this study was intended to relate and evaluate the efficacy of lasers assisted surgical incision with the conventional scalpel incision in third molar surgery.

MATERIALS & METHOD

A split mouth comparative study was conducted comprising of 40 healthy patients (age 18–30; 18 males, 22 females) who were diagnosed clinically and radiographically with identical bilateral impacted lower third molars and required their surgical removal to relate and evaluate the efficacy of lasers assisted surgical incision with the conventional scalpel incision in third molar surgery. The right side of the patient was designated as the test side where the surgical incision for the removal of impacted third molars was performed using surgical laser and the left side of the patient was designated as control side where the surgical incision for the removal of impacted third molars was performed with the aid of a surgical scalpel. Patient was subjected to thorough clinical and systematic evaluation and consents were obtained. A final diagnosis was arrived at with the aid of Winter's classification for impacted mandibular third molars. A treatment plan was formulated and surgical intervention for the removal of impacted third molar in all patients was performed using a modified Ward's incision.

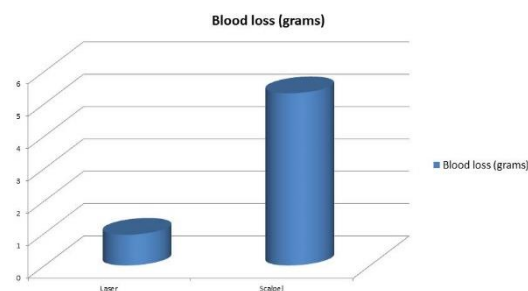


Fig 1: Figure showing the amount of intraoperative blood loss in terms of weight between laser and scalpel.

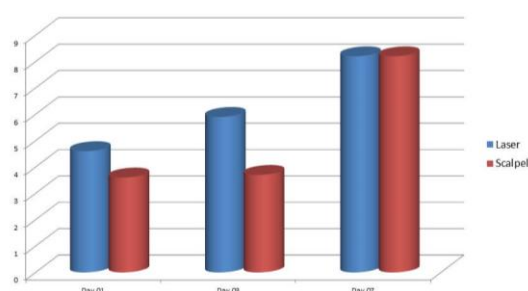


Fig 2: Figure showing the VAS score between laser and scalpel.

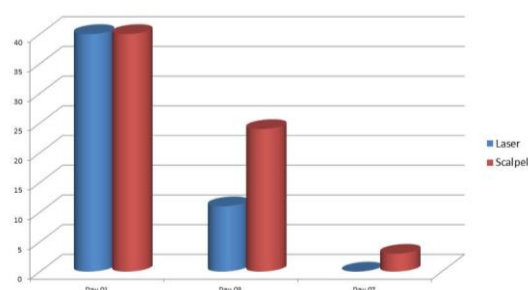


Fig 3: Figure showing the need for analgesics in the postoperative phase between laser and scalpel.

The procedures were carried out under local anesthesia with adrenaline (1:80,000) under strict aseptic conditions. Surgical incision on the control side was given with the aid of 15 number BP blade whereas a diode laser (810 nm wavelengths, PICASO, Denstply) was used to make a surgical incision on the test side. An initiated tip of 300 m diameter at 0.7 W continuous mode was used in contact mode for making an incision. The parameters valuate are shown in table - 1: The results were tabulated and analyzed.

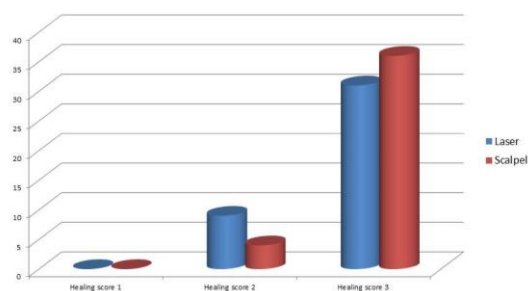


Fig 4: Figure showing the healing score between laser and scalpel.

Table – 1: Parameters used in the study

S. No	Parameter	Evaluation
1.	Clear surgical field during the intervention	Yes / No
2.	Ease in making surgical incision	Yes / No
3.	Blood loss during the intervention	Estimated by weighing the blood-soaked swabs pre- and post-operatively using digital weighing machine.
4.	Wound healing score (1 week)	3 - GOOD: No inflammation, No signs of infection, No wound gaping, Colour of scar matching the surrounding mucosa. 2- SATISFACTORY: Mild to moderate inflammation, No signs of infection, No wound gaping. 1- BAD: Severe inflammation, Wound gaping, Other signs of infection present (pus, slough, fever, and lymphadenopathy)
5.	Pain— on 1 st , 3 rd , 7 th postoperative day	VAS (visual analogue scale) 1 – 3: Severe 4 - 7: Moderate 8 – 10: Mild
6.	Post-operative analgesic intake—on day of surgery, 1 st , 3 rd , 7 th postoperative day	Frequency

RESULTS

With regards to ease in making surgical incision it was observed that both on the test side as well as the control side, the surgical ease was present in all 40 patients and there was no difference noted between the scalpel and the laser. However, pertaining to the clear surgical field during the surgical intervention it was seen that on the test side where the laser was employed the field of surgery was clear in all 40 patients whereas on the control side it was clear in only 18 patients (45%) and was not clear in 22 patients (55%). This result was statistically significant (p value was 0.002).

With regards to the intra-operative bleeding / the blood loss during the surgical intervention it was observed that on the test side the mean was 0.95 ± 0.50 grams, whereas on the control side it was 5.32 ± 1.23 grams. This result was statistically significant (p value was 0.003). Pain on the first day on the control side was a mean 3.62 ± 1.30 , whereas on the test side it was a mean 4.62 ± 1.11 . This result was statistically insignificant (p value was 0.060). On the 3rd postoperative day, pain the control side was a mean 3.70 ± 0.85 , whereas on the test side it was a mean 5.90 ± 0.65 . This result was statistically insignificant (p value was 0.090). On the 7th postoperative day, in both the sides the mean was 8.20 ± 0.20 . This result was statistically insignificant (p value was 1.040).

With regards to the post-operative analgesic intake it was observed that all patients on both the occasions were given paracetamol 325 mg and ibuprofen 400 mg at 1st post-operative day. No statistics are calculated since post-operative analgesic intake on the 1st postoperative day was same. It was observed when scalpel was used 24 patients required analgesics at 3–5th post-operative day, whereas when lasers were used only 11 patients required analgesics at 3–5th post-operative day while the rest did not require an analgesic. This result was statistically significant (p value was 0.002). On the 7th post-operative day, only 3 patients in whom scalpel was used required analgesics whereas none in the laser required analgesics.

With regards to the healing scores, when lasers was employed 31 patients had a healing score of 3, with 09 patients having a score of 2 and none with score

of 1 whereas when scalpel was employed, 36 patients had a healing score of 3, with 04 patients having a score of 2 and none with score of 1. This result was statistically insignificant (p value was 0.317). It was also observed that in all 40 patients, healing score at 4th week was similar, i.e. 3 (good) in both test side and control side.

DISCUSSION

Literature has shown over the years that the surgical scalpel is the cutting tool of choice owing to its accuracy, maintenance of tissue integrity and non-interference with tissue healing.¹³ However, inability to achieve hemostasis remains its greatest weakness. Lasers are considered as pioneers in combating the weakness of the former technique. The equipment is compact and relatively inexpensive in addition to producing immediate effects.¹⁴ Hence, this study was intended to relate and evaluate the efficacy of lasers assisted surgical incision with the conventional scalpel incision in third molar surgery.

The results of this study illustrate that the ease in making surgical incision was relatively similar with both the surgical scalpel as well as the laser. However, previous studies have shown that surgical incision assisted with a laser achieves hemostasis during cutting thereby aiding in the safety, swiftness and efficient surgical cutting with an excellent field of visibility.¹⁵ Few studies have highlighted the fact that the electrode cuts on its side as well as on its tip and the surgical incisions are made with ease in addition to instant and reliable haemostasis.¹⁶

The results of this study show that the surgical field during the intervention was significantly clear when working with laser when compared to scalpel blade surgery. This is in accordance with previous studies.¹³ It is a well-known fact that soft tissue procedures yield a greater blood loss and hence surgical incision assisted with a scalpel can result in excessive bleeding. Hence, lasers become handy in causing less blood loss thereby resulting in greater visibility.⁴

Few studies have shown that the major drawback with lasers is that it generates an unpleasant odour of coagulated tissues during the surgical intervention which is uncomfortable to patient as

well as the operator.^{17,18} However, the use of a high-velocity suction apparatus can counter this drawback.¹⁹ The results of this study reveal that the amount of intra-operative blood loss was significantly less with the aid of a laser when compared to a scalpel blade. Literature shown that a laser cuts, coagulates and sterilizes simultaneously thereby generating a sealed blood clot.¹³ Another study stated that the use of lasers result in almost no bleeding and clear surgical field since it causes sealing of capillaries by protein denaturation and stimulation of clotting factor VII production.²⁰

With regards to postoperative pain at 1st, 3rd and 7th postoperative day, pain was relatively less with laser when compared to scalpel. Literature shows that postsurgical pain perception is less with lasers because it stimulates the production of β -endorphins, thus causing pain relief. It has a profound effect on C fibers leading to decreased activity of these fibers and altering the pain threshold.^{12,21}

The results of this study reveal that the post-operative analgesic intake at 1st day is not a significant factor either with laser and scalpel blade surgery. Analgesic intake at 3–5th post-operative day was statistically significant with laser assisted surgery requiring less analgesic intake when compared to scalpel blade surgery. Analgesic intake at 7–10th post-operative day is not a significant factor with laser and scalpel blade surgery. The results of this study reveal that there was a delay in healing of intra-oral wounds assisted by laser which was accompanied by considerable post-operative discomfort. These findings are in accordance with previous studies.²² this could be attributed to the fact that a significant amount of heat is generated in adjacent soft tissue during surgical incisions assisted with lasers which may result in a wide margin of tissue damage, leading to both delayed wound healing and increased scarring.^{23,24}

CONCLUSION

This study was intended to relate and evaluate the efficacy of lasers assisted surgical incision with the conventional scalpel incision in third molar surgery. The results of this study reveal that both lasers and scalpel blade have their own uniqueness and benefits pertaining to surgical cutting instruments in minor oral surgical interventions. However, the

choice of use should depend predominantly on the surgeons' expediency, skill and patient comfort. Long-term longitudinal studies with larger sample size are needed to establish the exact efficacy/superiority of laser over scalpel technique in minor oral surgical interventions.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

REFERENCES

- 1) Uppada UK. A Modification of Ward's Incision for Third Molar Surgery. *J Dent Res Rev* 2019;6:77-8.
- 2) Malik NA. Minor oral surgical procedures. In: Malik NA (ed) *Textbook of oral and maxillofacial surgery*, 2012, 2nd edn. Jaypee Brothers Medical Publishers, New Delhi, pp 138-159
- 3) Ramirez A. M., Silvestre F. J., Simo J. M. Oral biopsy in dental practice. *Med Oral Patol Oral Cir Bucal*. 2007; 12(7):504-10.
- 4) Manivannan N, Ahathya RS, Rajaram PC. Scalpel versus electrosurgery: comparison of gingival perfusion status using ultrasound Doppler flowmetry. *J Pharm Bioallied Sci* 2013;5(2):5154-5159
- 5) Christensen G. J. Soft-tissue cutting with laser versus electrosurgery. *J Am Dent Assoc*. 2008;139: 981-982
- 6) Asnaashari M, Mohebi S, Paymanpour P. Pain reduction using low level laser irradiation in single-visit endodontic treatment. *J Lasers Med Sci* 2011;2(4):139-43
- 7) Asnaashari M, Moeini M. Effectiveness of Lasers in the Treatment of Dentin Hypersensitivity. *J Lasers Med Sci* 2013;4(1):1-7
- 8) Deppe H., Horch H. Current status of laser applications in oral and craniomaxillofacial. *Medical Laser Application* 2007; 22:39-42
- 9) Butchibabu K, Koppolu P, Mishra A, Pandey R, Swapna LA, Uppada UK. Evaluation of patient perceptions after labial frenectomy procedure: A comparison of diode laser and scalpel techniques. *Eur J Gen Dent* 2014;3:129-33.
- 10) Butchibabu K et al. Evaluation of Patient Perceptions After Vestibuloplasty Procedure: A Comparison of Diode Laser and Scalpel Techniques. *J Clin Diag Res*. 2016;10(5): ZC96-ZC100
- 11) Okudera H. Evaluation of laser surgery for implantation. *International Congress Series*. 2003; 1248: 413- 414.
- 12) Babu KB, Uppada UK, Koppolu P, Mishra A, Chandra CR, Pandey R. Management of ankyloglossia: Have lasers taken the sheen away from scalpel. *J Dent Lasers* 2014;8:56-9.
- 13) Kalia V, Siddiqui N, Kalra G. Comparative Analysis of Radiosurgery and Scalpel Blade Surgery in Impacted Mandibular Third Molar Incisions: a Clinical Trial. *J. Maxillofac. Oral Surg*. 2018; 17(4):458-465
- 14) Hainer BL. Fundamentals of electrosurgery. *J Am Board Fam Pract* 1991;4:419-426
- 15) Hasar ZB, Ozmeric N, Gokemnoglu C, Altan G. Comparison of radiofrequency and electrocautery with conventional scalpel incisions. *J Oral Maxillofac Surg* 2016;5(4):1-6
- 16) Funde S, Baburaj MD, Pimpale SK. Comparison between laser, electrocautery and scalpel in the treatment of drug induced gingival overgrowth: a case report. *Indian J Dent Assoc* 2015;1(10):27-30
- 17) Gordon JC. Soft tissue cutting with laser versus electrosurgery. *J Am Dent Assoc* 2008;139:981-9
- 18) Pant VA, Pandey S. A rare case report of grade III gingival enlargement associated with chronic periodontitis: comparison of two treatment techniques. *Nat J Maxillofac Surg* 2015;6(1):119-121
- 19) Fricke L, Rankine CAN. Comparison of electrosurgery with conventional fiberotomies on rotational relapse and gingival tissue in the dog. *J Orthod Dentofac Orthop* 1990;97:405-412

- 20) Snophia Suresh, Uma Sudhakar, Satyanarayana Merugu, Ranjit Kumar. Management of ankyloglossia by diode laser. J Interdiscip Dent 2012;2:215-7
- 21) Walsh LJ. The current status of low level laser therapy in dentistry. Part 1. Soft tissue applications. Aust Dent J 1997;42:247-54
- 22) Coelho DH, Cavallaro J, Rothschild EA. Gingival recession with electrosurgery for impression making. J Prosthet Dent 197533(4):422-426
- 23) Kenneth LK, Robert FK, Allen RE, Richard AR. Subjacent heat production during tissue excision with electrosurgery. J Oral Maxillofac Surg 1983;41:653-657
- 24) Kaminer R, Liebow C, Margarone JE, Zambon JJ. Bacteremia following laser and conventional surgery in hamsters. J Oral Maxillofac Surg 1990;48:45-48