Pink Aesthetics with Diode laser Vs Electrosurgery: A Split Mouth Clinical Study

Mohammad Sheema Tasneem[1*], Anil Kumar Kancharla[2], Nandigam Anwesh Reddy[3], Sowjanya Kantipaka[4], Billa Sowjanya Reddy[5], Shiva Shankar Gummaluri[6]

[1*]Corresponding Author: Associate Professor, Sree Sai Dental College and Research Institute, Srikakulam, Andhra Pradesh, India Email Id: sheema.tasneem@gmail.com

[2]Professor and Head, Sree Sai Dental College and Research Institute, Srikakulam, Andhra Pradesh, India Email Id: anilkanc@gmail.com

[3]Associate Professor, Sree Sai Dental College and Research Institute, Srikakulam, Andhra Pradesh, India Email Id: anweshperio@gmail.com

[4]Associate Professor, Sree Sai Dental College and Research Institute, Srikakulam, Andhra Pradesh, India Email Id: kantipakasowjanya@gmail.com

[5]Senior Lecturer, Sree Sai Dental College and Research Institute, Srikakulam, Andhra Pradesh, India Email Id: sowraba91@gmail.com

[6] Senior Lecturer, GITAM Dental College and Hospital, Visakhapatnam Andhra Pradesh, India Email Id: sivashankar.gummaluri@gmail.com

---

Abstract:

Objectives: The colour of the gingiva is determined by various factors, among them melanin, which contributes to the darkness of the gums. There are various treatment options available for depigmentation. The study was undertaken to evaluate the recurrence of pigmentation, pain, and wound healing following gingival depigmentation with diode laser and electrosurgery.

Methodology: Twenty-five patients were included in the study that had aesthetic consent due to their dark gums. Gingival depigmentation was performed on maxillary anterior teeth using diode laser (DL) on one side and electrosurgery (ES) on the other at the same appointment. Patients were evaluated for pain at 24 hours and one week post-procedure, and wound healing was evaluated one week later. Repigmentation was checked a week, 1, 3, 6, and 9 months postoperatively. Results were analysed using independent paired *t* test, unpaired *t* test and the chi-square test.

Results: Pain was reported to be less with DL one week postoperatively (*p 0.049).* Wound healing was also better with DL (*p 0.035*). Within the intragroup comparison for repigmentation, there was a significant reduction at all the reevaluated time intervals in both

procedures (*p 0.001*). On intergroup comparison of repigmentation, there was no statistically significant difference noted at all time intervals between both procedures.
Conclusion: Overall results disclose that both procedures were effective. The diode laser was better in terms of wound healing and postoperative pain. There was no considerable difference in repigmentation with either of the procedures by the end of nine months.

.

Key words: Diode Laser, Electrosurgery, Gingival melanin pigmentation, Pain, Wound Healing.

Introduction:

The harmony of the smile is not only determined by the shape, position, and colour of the teeth but also by the gingival tissue.[1] Gingival health and appearance are the most essential components of an attractive smile.[2] The colour of gingiva is determined by various factors like vascularity, epithelial thickness, quantity of keratinization, and pigment-containing cells within the epithelium. Melanin is a non-haemoglobin derived pigment; it is the most common endogenous pigment contributing to the colour of gingiva and is produced by melanocytes, which are present in the basal and spinous layers of the gingival epithelium. These cells are neuro-ectodermal in origin.[3]

As the gingiva is the most common pigmented intraoral site[4], removal of unattractive pigmentation is in high demand for a pleasant smile. Various methods to improve pink aesthetics have evolved, among which depigmentation with a scalpel[5] is the most preliminary and still popular because of its low cost and effectiveness. But bleeding, post-operative pain, and faster repigmentation were common shortcomings with it. In order to overcome these, many advanced techniques like electrosurgery[6], cryosurgery[7], and lasers have been developed with varied degrees of success.

Electrosurgery in dentistry has been in use since 1914.[8] It is the intentional passage of high-frequency current through tissues to achieve a controlled surgical effect.[9] Various electrodes are available for ease of use. Needle, loop, and ball electrodes are regularly used for incision, depigmentation, and hemostasis, respectively.

Lately, lasers have been recognised as one of the most effective, comfortable, and reliable techniques for depigmentation due to their selective ablation capacity. Laser beams have wavelengths that are specifically absorbed by the melanocytes and effectively destroy them. The diode laser is most frequently used for depigmentation because of its wave length of 800 to 980nm[10], which is a close match with the melanin absorption spectrum (351–1064 nm).[11] Many advantages of laser, including hemostasis with a clear operating field, which increases the efficacy of work, less post-operative pain, a bactericidal effect, and good acceptance by the patients, make it easier for depigmentation. Lasers have an added effect on wound healing because of the biostimulatory action of low-level laser therapy (LLLT).[12]

There are many case series and case reports in the literature comparing various depigmentation procedures. Very few randomised clinical studies have evaluated the comparative effects of laser and electrosurgery in treating gingival pigmentation. Hence, in the present study, an attempt was made to compare the effectiveness of electrosurgery [ES] and diode laser in the treatment of gingival pigmentation.

Material and methods:

This clinical trial was conducted at the Department of Periodontology and Oral Implantology. A sample size determination was carried out based on a study by Chandna S. and Kedige SD [13]. To obtain more accurate results, a total of 25 participants were included. The clinical procedure was carried out in the maxillary arch, as it is aesthetically more important. A split-mouth design was adopted; the maxillary arch was divided into 2 segments, and randomization was done by the coin toss method. Therefore, $n = 25$ for both groups, out of which 16 were females and 9 were males. The study was conducted in accordance with the Helsinki Declaration of 1975, as revised in 2000. The mean age of patients was 21.92 years. The institutional ethical committee (D149306053) has approved the study. All the patients completed an informed consent document explaining all procedures involved in the protocol and the possible benefits associated with the proposed study.

Subjects who are systemically and periodontally healthy and have a melanin pigmentation score of 2[14] on the maxillary anterior region were included. Patients who were smokers, medically compromised, pregnant, or lactating women were excluded. Patients with any associated syndrome with pathological pigmentation were also excluded. Clinical parameters like gingival index (GI), plaque index (PI)[15], melanin pigmentation index (Takashi et al., 2005)[14], wound healing index (Daniel SA Rosa *et al.,* 2007)[16], and pain were recorded with the help of VAS.

Oral prophylaxis was performed before the depigmentation procedure, and oral hygiene instructions were given. The depigmentation procedure on the first quadrant from the right central incisor to the canine was performed using a semiconductor diode laser (ZOLAR®); on the second quadrant, depigmentation was done using an electrosurgery unit (SATELLEC®).
At the laser site, topical anaesthesia (NUMMIT®, lignocaine USP 15% w/w) spray was sprayed initially before infiltrating the surgical area with local anaesthesia (LINGNOX 2%, lignocaine with adrenaline in 1:80000 concentration). The laser tip was in contact mode with the operating site, and it was moved in an apico-coronal direction in the pre-selected area [Figure 1]. The laser was adjusted to 1 W in continuous mode, emitting 810 nm of wave length at the working tip. Dampen sterile gauze was used to wipe the blaze after irradiation, and saline irrigation was performed. A periodontal dressing was applied to the ablaze area to prevent post-surgical uneasiness for the patients. Laser safety was followed.[17, 18]

On the other hand, after achieving anaesthesia similar to that at the laser operating site, electrosurgery was used with fully rectified current (50% cut and 50% coagulated). The utmost care was taken to avoid contact of the electrode with the tooth to prevent unwanted damage (Figure 1). Thorough saline irrigation was done to dissipate the lateral heat produced during the treatment; the area was cleaned using damp, sterile gauze. A post-surgical periodontal dressing was placed to avoid discomfort for the patient.

Routine post-operative instructions were given; antibiotics and analgesics were not prescribed. Patients were instructed not to brush over the surgical area for one week. Participants were instructed to rinse their mouths with 0.2% chlorhexidine gluconate mouthwash daily for 2 weeks. At the one-week postoperative recall, the periodontal dressing was removed.

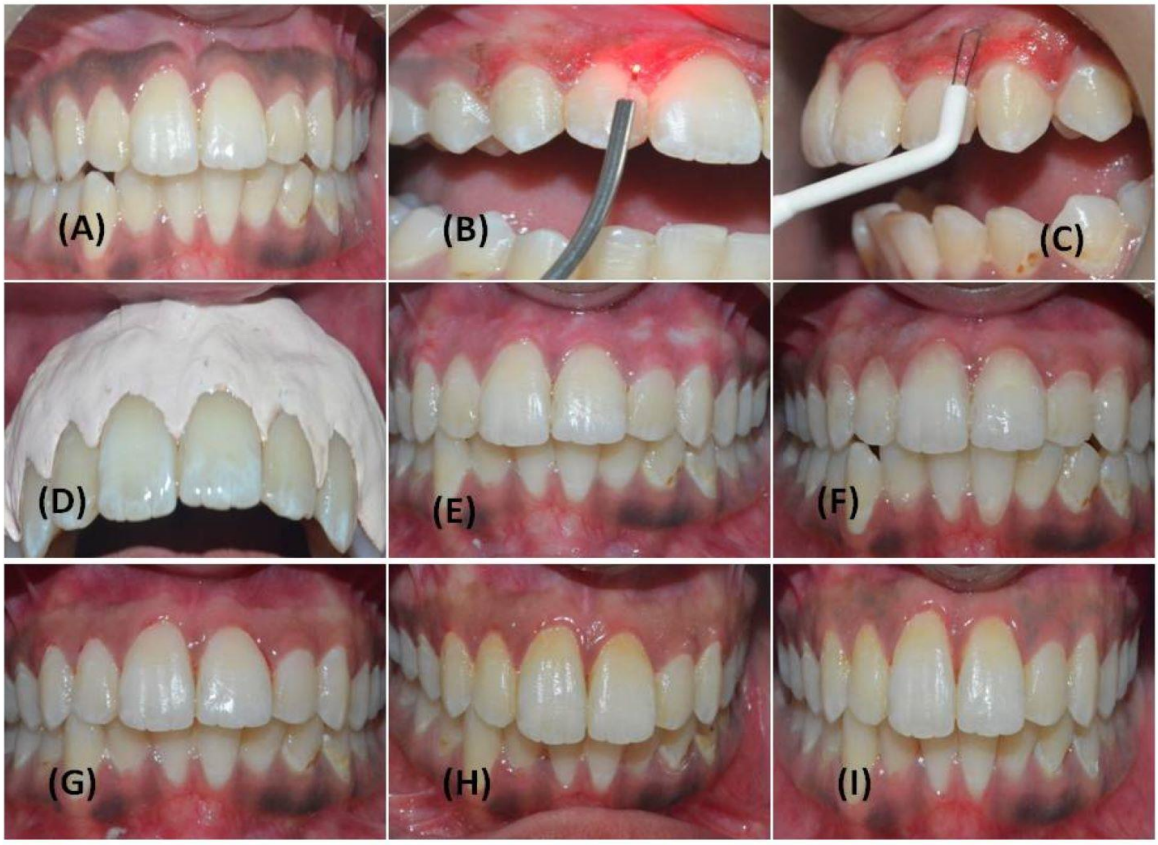

Figure 1: **[A]** Baseline pre-operative image, **[B]** Depigmentation using laser, **[C]** Depigmentation using electrosurgery, **[D]** Periodontal dress of surgical site**, [E]** One week post-operative, **[F]** One month post-operative, **[G]** Three months post-operative, **[H]** Six months post-operative, **[I]** Nine months post-operative.

Statistical analysis:

The entire data was statistically analysed using the statistical package for social sciences (SPSS), version 22.0, IBM Private Limited, Chicago, USA. A paired *t* test was used for intragroup comparison of pain at 24 hours and one week postoperatively and repigmentation (one week, 1, 3, 6, and 9 months postoperatively). An independent *t* test has been used to examine the intergroup comparison of repigmentation and pain. The chi-square test has been used for comparison of healing scores between laser and electrosurgery (ES) at one week postoperatively. A p value < 0.05 was considered significant.

Results:

Pain scores 24 hours after the surgery were higher, which gradually decreased by the end of one week. The mean pain score with laser and ES at 24 hours and one week postoperatively showed high statistical significance with p values of 0.003** and p - 0.001**, respectively [Table: I].On an intergroup comparison of mean pain scores, they were not statistically significant at 24 hours post-surgery. But less pain in laser-treated areas was reported one week post-operatively [Table II]. A significant difference was observed in terms of wound healing in the intergroup comparison, with a p value of 0.035* [Table III]. The mean melanin

pigmentation scores of the laser and ES treated areas at baseline were 2, according to Takashi et al.[14] This has been decreased to '0.00' after one week postoperatively in both regions. On intragroup comparison for both sites at all time intervals mentioned, there was a significant difference with a *p* value less than 0.001** in mean melanin pigmentation scores. The mean difference was less between one week and nine months postoperatively, stating that the repigmentation has gradually increased [Tables IV and V], but has not reached the complete baseline values by the end of the study in either region. On intergroup comparison, there was no statistically significant difference among the two procedures regarding all time intervals [Table VI].

Discussion:

The intensity and distribution of pigmentation in oral mucosa are variable[19] not only between races but also between different individuals of the same race and within different areas of the same oral cavity. The presence of dark gums is a huge aesthetic concern, which motivated researchers to uncover the ways for depigmentation. Studies have shown that the anteriorly attached gingiva is more pigmented than the posterior as it is more exposed to light.[20] The effect of sunlight on the anterior segment has been quoted as the reason for more pigmentation in this area.[6]

The most effective method for gingival depigmentation has been surgical de-epithelialization. Uncontrolled bleeding is the procedure's principal drawback. Other methods would result in an unsightly appearance, such as the use of free gingival grafts[21] and acellular dermal grafts[22] after grafting. The semiconductor diode laser has emerged as the best option for depigmentation because it’s adsorption by haemoglobin and other pigments readily. As previously established, the melanin absorption spectrum spans the wavelengths of 351 to 1064nm.[23] The 810nm diode laser utilised in the present investigation causes a significant amount of absorption into the melanin.

A monopolar electrosurgical unit (SATELEC®) was employed in the current study. The electrode could be twisted to accommodate clinical requirements, facilitate application, and ensure reliable cutting.[9] Although it has certain drawbacks as well, such as concern over bone injury and inadequate post-operative recovery, The application of electricity to tissue for an extended period of time or repeatedly can causes heat build-up and unwanted tissue damage.

A study done by Chandna S. and Kedige SD compared the pain during depigmentation with laser and electrosurgery (ES). The laser-treated area reported significantly less pain at twenty four hours postoperatively.[13] The results obtained by the author were in accordance with the results of the present study. Agha MT[24] has compared post-operative pain, bleeding, wound healing, and repigmentation using 3 different laser wave lengths and stated that all parameters considered were better at the 940nm wave length. Pranitha S. et al. concluded that pain with laser depigmentation was less compared with traditional scalpel technique.[25] Gurumoorthy K et al., in their study, compared pain after depigmentation procedures using scalpels and laser and revealed a significant difference in the patients pain levels; the laser group expressed less pain.[26] The results of the above-mentioned studies support the present study's stating laser treated sights had a lower pain score. A study conducted by Grover HS et al. compared the pain levels after depigmentation with surgical blades and lasers. The study reported a statistically insignificant difference in pain by the end of day one and one week postoperatively.[1]

Several studies were reported comparing the outcomes of scalpel and electrosurgical gingival depigmentation. Patients' satisfaction with the depigmentation with scalpel and electrosurgery was assessed in a study.[27] There was a sense of unpleasant smell due to tissue burning from the use of ES, which was also reported by the patients in the present study. From the study conducted by Gupta G et al.[28], it was clear that pain-associated electrosurgery was more inconvenient in comparison with scalpel surgery during depigmentation. This finding that project pain was severe while operating with ES is in accordance with the present study. In the present study, laser-treated sites reported lower pain scores compared to electrosurgery. This analgesic effect of the diode laser can be credited to its action in disrupting the Na+ K+ pump in the cell membrane, resulting in a loss of impulse conduction, or simply due to the ablation of nerve endings because of the formation of protein coagulum.[29]

Healing after depigmentation is a secondary intention. Grover HS et al. reported in their study an insignificant difference in the healing of depigmented areas by scalpel and diode laser, but mild pain and inflammatory changes were prominent at the scalpel site.[1] A study conducted by Chandra GB et al. revealed that healing when compared between scalpel and laser one week post-surgery didn't show any significant difference.[30] Another study has reported that electrosurgery showed unhealed ulcerations and slow epithelialization after a period of one week from the day of depigmentation.[31] A split-mouth study done by Chanda S. et al. stated that healing was uneventful on the scalpel surgical area compared to the electrosurgical area.[13] Healing in the present study was evaluated by the wound healing index (Daniel SA Roase et al.,[16] , whereas other studies have reported the use of peroxide tests; those studies reported less bubbling at the scalpel-treated area, pertaining to better epithelialization than the electrosurgery-treated site.[28]

In the present study, complete epithelialization was more evident in the laser-ablated region. The reason could be because of the laser plume; it creates a locally sterile condition, resulting in a reduction of bacteremia.[32] The rapid healing could be related to photo-biomodulation (PBM) or low-level laser therapy (LLLT), which is the application of electromagnetic energy in the red and near infrared regions of wave length at 630 to 980nm. It affects the fibroblasts and their locomotion, and this in turn may contribute to the higher tensile strengths of the healed wound.[33] Minimal wound contraction and minimal scarring are evident with laser surgeries. Compared with electrosurgery, lasers have a greater comfort level and better acceptance; also, better wound healing was reported with lasers in the present study.

The "migration theory," which contends that active melanocytes from the normal epithelial region migrate into the depigmented area, claims that repigmentation occurs despite the fact that the mechanism is not fully understood.[34] Studies by Ginwalla et al.[35] demonstrated that employing the abrasion technique after 24-56 days resulted in repigmentation in 50% of the instances. In a split-mouth research by Grover HS utilising a scalpel and laser for depigmentation, there was no sign of recurrence after three months [1].[1] Repigmentation was documented 18 months following the operation in a case series; the depigmentation was performed using a scalpel and electrosurgery.[36] According to data from a clinical investigation carried out by Kaur H.[37], the darker people showed signs of repigmentation more quickly. Repigmentation was described in the Doshi Y et al. study by the end of 6 months, with diode laser.[2]

Although the process of repigmentation was initially delayed in laser-treated locations by up to 6 months in the current study, there was no discernible difference between the two methods by the time the research was complete. Selective ablation may have contributed to

the initial delay in pigmentation advancement at the laser-treated region. However, electrosurgical methods lacked the additional advantages of targeted ablation. Clear, bloodless operating areas that are convenient for the operator are the key benefits of both techniques. The limitation of the present study could be a smaller sample size. Blinding of parameters didn't happen in the present study since a single operator followed up on the subjects.

Conclusion:

All of the patients were satisfied with the outcomes at the end of the trial period, despite the fact that a few locations had experienced repigmentation. Patients experienced less pain when using the laser and had more acceptance of it. Additionally, it has been demonstrated that employing lasers is a safer and more efficient treatment method that offers the best aesthetics and comfort. The success of the depigmentation procedure may be weighed only by the extent of depigmentation achieved and the time taken for the reappearance of pigmentation. However, additional data analysis with a bigger subject pool and longer follow-ups would be necessary for these comparison methodologies in order to guarantee the long-term prediction and efficacy of the depigmentation.

Acknowledgements: Nil

Conflicts of Interest: Nil

References:

1. Grover HS, Dadlani H, Bhardwaj A, Yadav A, Lal S. Evaluation of patient response and recurrence of pigmentation following gingival depigmentation using laser and scalpel technique: A clinical study. J Indian Soc Periodontol 2014;18:586-92. doi: 10.4103/0972-124X.142450

2. Doshi Y, Khandge N, Byakod G, Patil P. Management of gingival pigmentation with diode laser: is it a predictive tool. Int J Laser Dent 2012;2:29-32. 10.5005/jp-journals-10022-1013

3. Dummett CO, Barens G. Pigmentation of the oral tissues: a review of the literature. J Periodontol 1967;38[5]:369-78. doi: 10.1902/jop.1967.38.5.369.

4. Dummett CO. First symposium on oral pigmentation. J Periodontol 1960;31:356-60. https://doi.org/10.1902/jop.1960.31.5.345

5. Dummett C, Bolden T. Postsurgical clinical repigmentation of the cingivae. Oral Surg Oral Med Oral Pathol 1963;16:353-65. https://doi.org/10.1016/0030-4220(63)90299-8

6. Gokhale ST, Vatsala V, Gupta R, Gupta I. Treatment of gingival hyperpigmentation by scalpel surgery and electrosurgery: a split mouth design. Indian J Dent Sci 2011;3:10-1. https://www.researchgate.net/publication/235957994_Treatment_Of_Gingival_Hyperpigmentation_By_Scalpel_Surgery_And_Electrosurgery_A_Split_Mouth_Design

7. Yeh C-J. Cryosurgical treatment of melanin-pigmented gingiva. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 1998;86:660-3. doi: 10.1016/s1079-2104(98)90199-8.

8. Woolery-Lloyd H, Kammer JN, editors. Treatment of hyperpigmentation. Semin Cutan Med Surg; 2011: WB Saunders. doi: 10.1016/j.sder.2011.06.004.

9. Osman F. Dental electrosurgery: General precautions. J Can Dent Assoc 1982;48:641. https://pubmed.ncbi.nlm.nih.gov/6754035/

10. Murthy MB, Kaur J, Das R. Treatment of gingival hyperpigmentation with rotary abrasive, scalpel, and laser techniques: A case series. J Indian Soc Periodontol 2012;16:614-9. doi: 10.4103/0972-124X.106933.

11. Jain N, Shrivastava V, Gupta A. Esthetic Rehabilitation of Gingival Melanin Hyperpigmentation Using a 980-nm Semiconductor Diode Laser: Clinical Observations and 1-Year Follow-up. Am J Esthet Dent 2013;3:194–9. DOI: 10.11607/ajed.0069

12. Sagar G, Rajesh N, Kumar T, Reddy KKM, Shankar BS, Sandeep V. Comparative evaluation of two surgical techniques using conventional scalpel method and diode laser for treatment outcome of depigmentation: 6 months follow-up study. J Dent Lasers 2016;10:2-9. DOI: 10.4103/0976-2868.184600

13. Chandna S, Kedige SD. Evaluation of pain on use of electrosurgery and diode lasers in the management of gingival hyperpigmentation: A comparative study. J Indian Soc Periodontol 2015;19[1]:49-52 doi: 10.4103/0972-124X.145823.

14. Hanioka T, Tanaka K, Ojima M, Yuuki K. Association of melanin pigmentation in the gingiva of children with parents who smoke. Pediatrics 2005;116:186-90. doi: 10.1542/peds.2004-2628.

15. Löe H. The gingival index, the plaque index and the retention index systems. J Periodontol 1967;38:610-6. doi: 10.1902/jop.1967.38.6.610

16. Rosa DSA, Aranha ACC, de Paula Eduardo C, Aoki A. Esthetic treatment of gingival melanin hyperpigmentation with Er: YAG laser: Short-term clinical observations and patient follow-up. J Periodontol 2007;78:2018-25. doi: 10.1902/jop.2007.070041

17. Elavarasu S, Naveen D, Thangavelu A. Lasers in periodontics. J Pharm Bioallied Sci 2012;4:260-63. doi: 10.4103/0975-7406.100245

18. Midda M. Lasers in periodontics. Periodontal clinical investigations: official publication of the Northeastern Society of Periodontists 1992;14:14-20. PMID: 139250

19. Gorsky M, Buchner A, Fundoianu-Dayan D, Aviv I. Physiologic pigmentation of the gingiva in Israeli Jews of different ethnic origin. Oral Surg Oral Med Oral Pathol 1984;58:506-9. doi: 10.1016/0030-4220(84)90352-9.

20. Raut R, Baretto M, Mehta F, Sanjana M, Shourie K. Gingival pigmentation: Its incidence amongst the Indian adults. J Am Dent Assoc 1954;26:9-10.

21. Tamizí M, Taheri M. Treatment of severe physiologic gingival pigmentation with free gingival autograft. Quintessence Int 1996;27:555-58. https://pubmed.ncbi.nlm.nih.gov/9161259/

22. Pontes AEf, Pontes CC, Souza Sl, Novaes Jr AB, Grisi Mf, Taba Jr M. Evaluation of the efficacy of the acellular dermal matrix allograft with partial thickness flap in the elimination of gingival melanin pigmentation. A comparative clinical study with 12 months of follow-up. J Esthet Restor Dent 2006;18:135-43. doi: 10.1111/j.1708-8240.2006.00004_1.x.

23. Kumar S, Bhat GS, Bhat KM. Development in techniques for gingival depigmentation–An update. Indian J Dent Sci 2012;3:213-21. https://doi.org/10.1016/j.ijd.2012.05.007

24. Taher Agha M, Polenik P. Laser treatment for melanin gingival pigmentations: a comparison study for 3 laser wavelengths 2780, 940, and 445 nm. Int J Dent 2020; 3896386:1-11. doi: 10.1155/2020/3896386

25. Surve P, Mudda JA, Patil VA, Desai SR, Agarwal P, Mustafa M. Gingival Depigmentation Using Surgical Scalpel and Sieve Method of Diode Laser Techniques-A Comparative Clinical Intervention Study. Journal of Evolution of Medical and Dental Sciences 2020;9:2063-8. DOI: 10.14260/jemds/2020/449

26. Gurumoorthy Kaarthikeyan M, Jayakumar ND, Ogoti Padmalatha M, Sheeja Varghese M, Kapoor R. Pain assessment using a visual analog scale in patients undergoing gingival depigmentation by scalpel and 970-nm diode laser surgery. J Laser Dent 2012;20:20-3. Corpus ID: 29735293

27. Kathariya R, Pradeep A. Split mouth de-epithelization techniques for gingival depigmentation: A case series and review of literature. J Indian Soc Periodontol 2011;15:161-68. doi: 10.4103/0972-124X.84387

28. Gupta G, Kumar A, Khatri M, Puri K, Jain D, Bansal M. Comparison of two different depigmentation techniques for treatment of hyperpigmented gingiva. J Indian Soc Periodontol 2014;18:705-9. doi: 10.4103/0972-124X.147404

29. Ohshiro T, Caldenhead RG. Development of low reactive-level laser therapy and its present status. J Clin Laser Med Surg 1991;9:267-75. doi: 10.1089/clm.1991.9.267

30. Chandra GB, VinayKumar MB, Walavalkar NN, Vandana KL, Vardhan PK. Evaluation of surgical scalpel versus semiconductor diode laser techniques in the

management of gingival melanin hyperpigmentation: A split-mouth randomized clinical comparative study. J Indian Soc Periodontol 2020;24:47-53. doi: 10.4103/jisp.jisp_186_19

31. Kafle S. Gingival depigmentation and pink aesthetics: a case report. Journal of Chitwan Medical College 2020;10:108-10. https://www.nepjol.info/index.php/JCMC/article/view/33453

32. Wigdor HA, Walsh Jr JT, Featherstone JD, Visuri SR, Fried D, Waldvogel JL. Lasers in dentistry. Lasers Surg Med 1995;16:103-33. doi: 10.1002/lsm.1900160202.

33. Noble PB, Shields ED, Blecher PD, Bentley KC. Locomotory characteristics of fibroblasts within a three-dimensional collagen lattice: Modulation by a helium/neon soft laser. Laser Surg Med 1992;12:669-74. doi: 10.1002/lsm.1900120617.

34. Perlmutter S, Tal H. Repigmentation of the gingiva following surgical injury. J Periodontol 1986;57:48-50. doi: 10.1902/jop.1986.57.1.48.

35. Ginwalla T, Gomes B, Varma B. Surgical removal of gingival pigmentation (A preliminary study). J Indian Dent Assoc 1966;38:147-50. PMID: 5223321

36. Bhusari B, Kasat S. Comparison between scalpel technique and electrosurgery for depigmentation: A case series. J Indian Soc Periodontol 2011;1:402-5. doi: 10.4103/0972-124X.92580.

37. Kaur H, Jain S, Sharma RL. Duration of reappearance of gingival melanin pigmentation after surgical removal—a clinical study. J Indian Soc Periodontol 2010;14:101-5. doi: 10.4103/0972-124X.70828

Table I expresses the intra-group comparison of pain.

Group	Duration	n	Mean	Std. D	*p* value
Laser	24 hrs post op pain	25	0.36	0.490	0.003**
	1 week post op pain	25	0.04	0.200	
Electrosurgery	24 hrs post op pain	25	0.60	0.500	0.001**
	1 week post op pain	25	0.24	0.436	

**-Statistically Highly Significant ($p<0.01$); n - Number of subjects; Std. D – standard deviation

Table II expresses the intergroup Comparison of Pain.

Duration	Group	n	Mean	Std. D	*p* value
24 hrs post op pain	Laser	25	0.36	0.49	0.093
	Electrosurgery	25	0.60	0.50	[NS]
1 week post op pain	Laser	25	0.04	0.20	0.042*
	Electrosurgery	25	0.24	0.44	

NS – Not Significant, *Statistically Significant ($p<0.05$); n - Number of subjects; Std. D – standard deviation

Table III shows the comparison of healing in laser and electrosurgery.

Type	Parameter	
	Complete epithelisation n [%]	Incomplete epithelisation n [%]
Laser	18 [72%]	7 [28%]
Electrosurgery	12 [48%]	13 [52%]
Chi Sq	4.42	*p* - 0.035*

*-Statistically Significant ($p<0.05$); n - Number of subjects; %- Percentage of subjects

Table IV shows the intra group comparison of pigmentation at various time periods from baseline in Electrosurgery treated area.

Group	**Comparison**	**n**	**Mean**	**Std. D**	***p* value**
Electro Surgery	Baseline	25	2.00	0.000	-
	One week	25	0.00	0.000	
	Baseline	25	2.00	0.000	<0.001**
	one month	25.00	0.44	0.45	
	Baseline	25.00	2.00	0.00	<0.001**
	3 months	25.00	0.56	0.48	
	Baseline	25.00	2.00	0.00	<0.001**
	6 months	25.00	0.89	0.55	
	Baseline	25.00	2.00	0.00	<0.001**
	9 months	25.00	1.25	0.56	

**-Statistically Highly Significant (p<0.01); n - Number of subjects; Std. D – standard deviation

Table V shows the intra group comparison of pigmentation at various time periods from baseline in Laser treated area.

Group	**Comparison**	**n**	**Mean**	**Std. D**	***p* value**
Laser	baseline	25	2.00	0.000	-
	One week	25	0.00	0.000	
	baseline	25	2.00	0.000	<0.001**
	one month	25.00	0.29	0.39	
	baseline	25.00	2.00	0.00	<0.001**
	3 months	25.00	0.57	0.45	
	baseline	25.00	2.00	0.00	<0.001**
	6 months	25.00	0.85	0.50	
	baseline	25.00	2.00	0.00	<0.001**
	9 months	25.00	1.28	0.56	

**-Statistically Highly Significant (p<0.01); n - Number of subjects; Std. D – standard deviation

Table VI projects the inter group comparison of pigmentation according to duration.

Duration	**Group**	**n**	**Mean**	**Std. D**	***p* value**
Baseline	Laser	25	2.00	0.000	-
	Electrosurgery	25	2.00	0.000	
One week	Laser	25	0.00	0.000	-
	Electrosurgery	25	0.00	0.000	
one month	Laser	25	0.29	0.39	0.223 [NS]
	Electrosurgery	25	0.44	0.45	
3 months	Laser	25	0.57	0.45	0.919 [NS]
	Electrosurgery	25	0.56	0.48	
6 months	Laser	25	0.85	0.50	0.789 [NS]
	Electrosurgery	25	0.89	0.55	
9 months	Laser	25	1.28	0.56	0.866 [NS]
	Electrosurgery	25	1.25	0.56	

NS= Not Significant ($p>0.05$); n - Number of subjects; Std. D – standard deviation