

Gingivectomy by Diode Laser and Conventional Method (A Comparative Study)

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Abstract:

Background: Crown lengthening is a surgical procedure designed to increase the extent of supragingival tooth structure for restorative or esthetic purposes by apically positioning the gingival margin and/ or removing supporting bone. The aim of this study is to evaluate the effect of 940 nm Diode laser on healing of gingiva after gingival operations in addition to patient comfort, and compare it with conventional scalpel operation. The crown lengthening is done by gingivectomy.

Materials and Methods: Eighteen gingivectomy cases nine were operated by 940 nm Diode laser with output power = 1 W; the other nine cases were operated by scalpel method.

Results: Clinical findings show that there was no clinical difference in healing between the two groups, but patients operated by laser were more comfortable than patients operated by conventional method.

Key words: Diode laser, crown lengthening, gingivectomy, scalpel

Date of Submission: 08-07-2021

Date of Acceptance: 23-07-2021

I. Introduction:

Gingiva is a keratinized epithelium in the oral cavity that surrounds the residual ridge of maxilla and mandible, and extends to the mucogingival junction in the vestibule. (Bathla 2017).

Gingivectomy is the procedure of cutting and recontouring of the gingiva for esthetic, functional or conservative purposes, sometimes known as crown lengthening (Jill 2007). Gingivectomy has several advantages, which includes; elimination of supra-bony fibrous and firm pocket, elimination of gingival enlargement (Hadeel et.al 2017) and increase clinical crown height (Cohen 2009).

The term LASER is an abbreviation of (L)ight (A)mplification by (S)timulated (E)mission of (R)adiation). Laser is a device that emits light (electromagnetic photons) with a specific wavelength, range of power density and selected mode of frequency (Thayagarajan 2010)(5) (Kravitz et.al. 2008). Physically laser devices can be classified according to their active media into solid state laser, liquid state laser, gas laser and semiconductor laser. Medically they can be classified into soft tissue laser and hard tissue laser. (Coluzzi 2017).

When using laser for particular tissue, it is important to select the parameters of radiation suitable for that tissue, poor choice of radiation may lead to harmful effect to the tissue (Jelenkova 2013). In spite of that several wavelengths can be used for gingivectomy, but infrared and near infrared are more suitable (Coluzzi 2004). Wavelength in Diode laser ranges between 800 nm and 980 nm which is in infra-red spectrum (Genovese 2010). Diode laser doesn't interact with hard tissue, that makes it one of the best soft tissue lasers.

II. Materials And Method

Eighteen female patients aged 20-46 years were selected from patients attended to department of periodontics, department of dentistry at Al-Rafidain University College, Baghdad Iraq. All of the eighteen patients were undergone gingivectomy for crown lengthening after scaling and polishing and oral hygiene instruction, all of them are systemically healthy and neither smoker nor alcoholics. The eighteen patients were divided randomly into two groups, the first group were operated by pulsed 940 nm Diode laser (epic; Biolase) with output power = 1 W, while the second group were operated by the conventional surgical method by using scalpel. The ethical approval was taken from ethical committee in Al-Rafidain University College- Baghdad Iraq according to Helsinki consent.

The first group were given few drops of anesthesia (2% lidocaine with adrenalin), the second group were given full carpool of dental anesthesia (2% lidocaine with adrenalin). After surgery the first group left without dressing, while the second group dressed with COE-packperiodontal dressing (Zinc Oxide Pack) (fig 1).



Figure no. 1:COE-Pack periodontal dressing

Follow up were done after one week of the gingivectomy operation, with questions about taking analgesics, discomfort and any swelling have been occurred. The statistical analysis was calculated by taking the percentage records.

Table no. 1: Sample distribution

Age	No. of cases	sex	Operation type
20-25 y	1	F	Laser
20-25 y	4	F	Scalpel
26-30 y	2	F	Scalpel
26-30 y	2	F	Laser
31-35 y	2	F	Laser
36-40 y	1	F	Laser
35-40 y	2	F	Scalpel
41-45 y	3	F	Laser
41-45 y	1	F	Scalpel



a



b



c

Figure no. 2: localized gingivectomy by laser for lower right first and second premolars. a) preoperative, b) immediately after operation, c) one week postoperative.

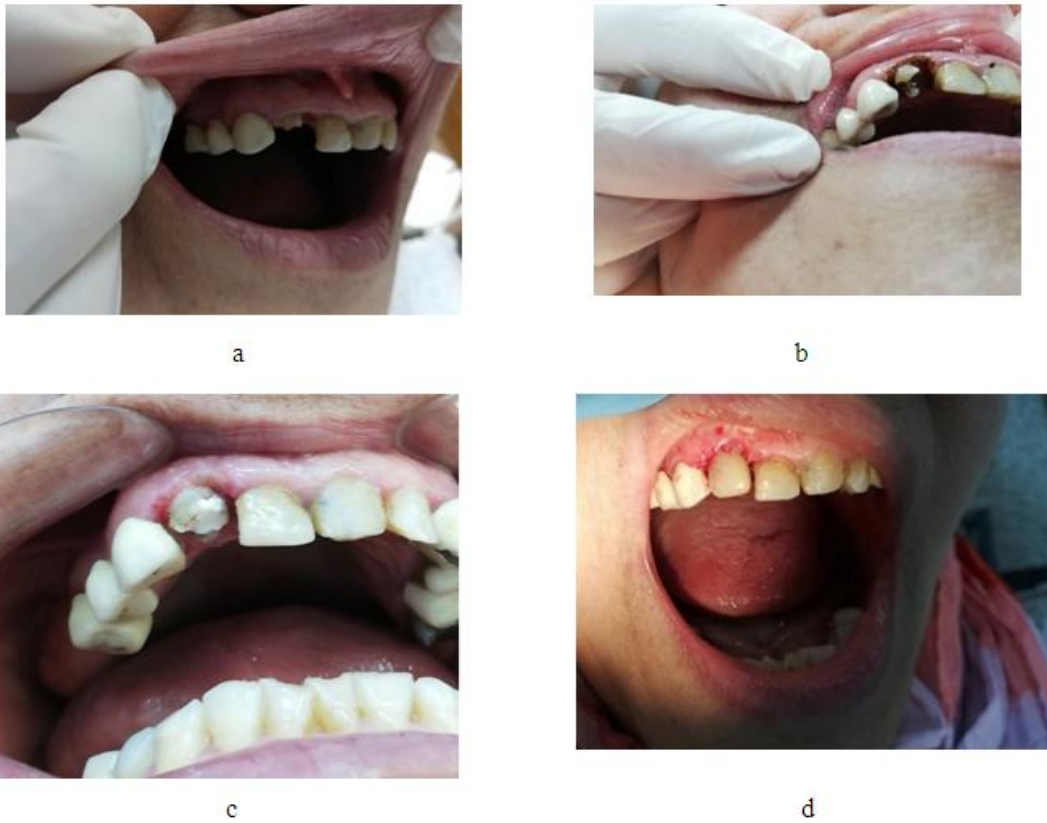


Figure no.3:localized gingivectomy by laser for upper right lateral incisor. a) preoperative, b) immediately after operation, c) one week postoperative. d) one week postoperative and immediately after tooth buildup.



Figure no.4:localized gingivectomy by scalpel for upper left and right central incisors. a) preoperative, b) immediately after operation, c) Coe-pack in place, d) one week postoperative.



Figure no.5: localized gingivectomy by scalpel for upper right canine. a) preoperative, b) immediately after surgery, c) Coe-pack in place, d) one week postoperative.

III. Results and discussion

During surgery, in spite of the few drops of anesthesia in the first group, only two patients out of nine which represents 22% were complained from mild pain without need to take analgesics while in the second group all patients were complained from moderate pain and they took analgesics. In the second group there was bleeding during surgery, while there was little oozing of blood in the first group, that is due to the fact that laser has effect to seal blood vessels (Mohan 2012).

Regarding postoperative pain; seven out of nine which represents 78% of the patients in the first group said that there was no pain, while all patients in the second group have to take analgesics after operation, that is due to the fact that laser has effect on prostaglandin release, in addition to the seal effect on nerve endings (Chan 2016).

In terms of postoperative swelling, there was no evidence of swelling in first groups, but six out of nine which represents 67% of the patients complained from mild swelling, and all patients in the second group feel discomfort during eating and speaking, because of the periodontal pack, this is in agreement with Hadeel et.al (Hadeel et.al 2017).

Concerning healing; after first week, seven out of nine which represents 78% of patients in the first group were completely heal, while none in the second group, this is in agreement with Hadeel et.al 2017.

Table no 2: Comparison between laser and scalpel gingivectomy at operation day.

Clinical finding	laser	percentage	scalpel	percentage
Swelling	None	0%	None	0%
discomfort	None	0%	All	100%
Inflammation	None	0%	None	0%
Pain	2/9	22%	All	100%
Healing	None	0%	None	0%

Table no 3: Comparison between laser and scalpel gingivectomy after one week

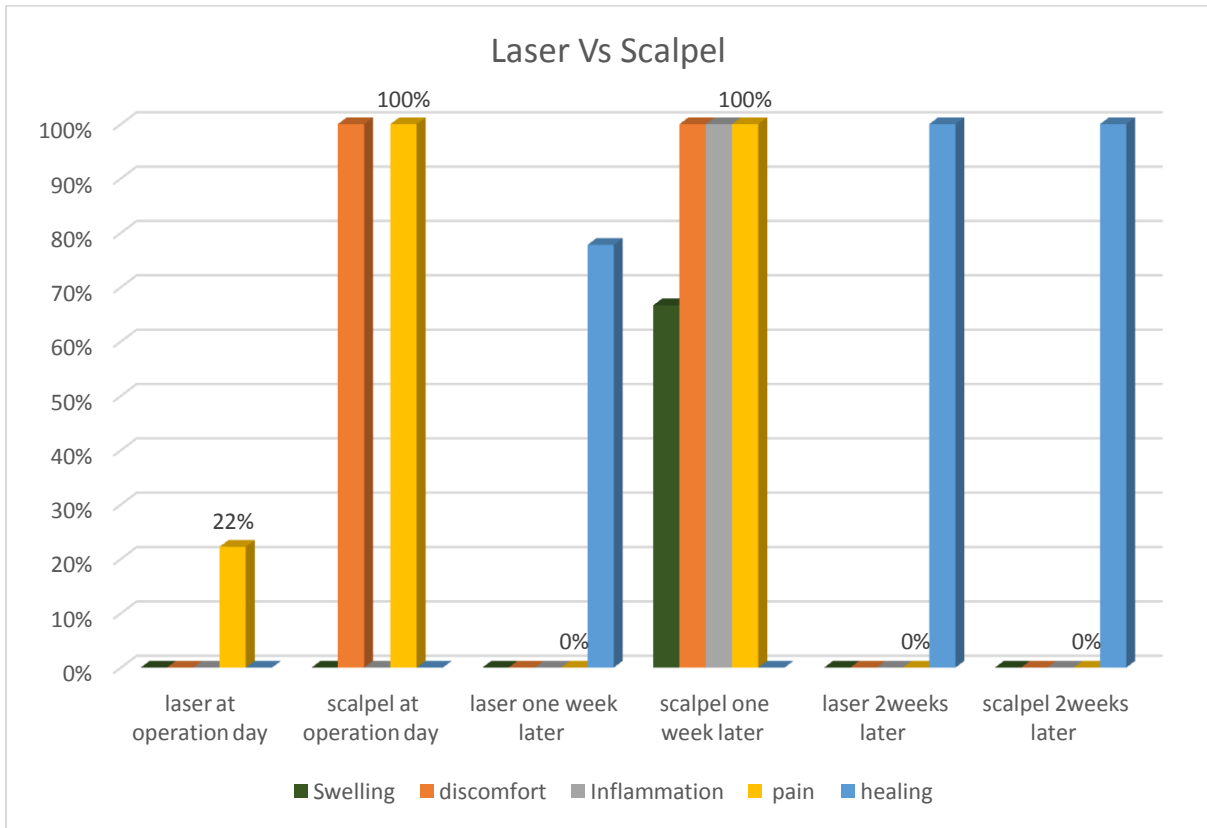
variable	laser	percentage	scalpel	percentage
Swelling	None	0%	6/9	67%
Discomfort	None	0%	All	100%
inflammation	None	0%	All	100%
Pain	None	0%	None	0%
Healing	7/9	78%	None	0%

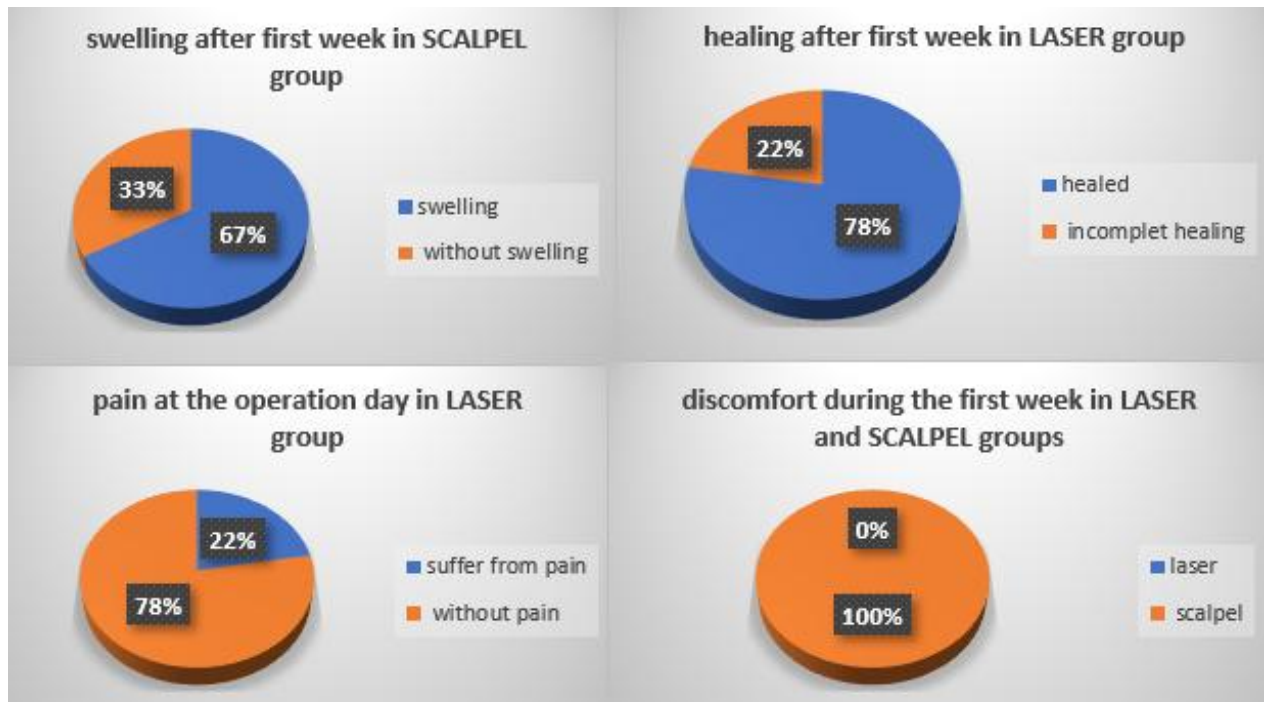
Table no 4: Comparison between laser and scalpel gingivectomy after two weeks

variable	laser	percentage	scalpel	percentage
Swelling	None	0%	None	0%
Discomfort	None	0%	None	0%
Inflammation	None	0%	None	0%
Pain	None	0%	None	0%
Healing	All	100%	All	100%

Table no 5: Clinical finding after Laser and scalpel gingivectomy

	At operation day		1week later		2weeks later	
	Laser	Scalpel	Laser	Scalpel	Laser	Scalpel
Swelling	None	None	None	6/9	None	None
Discomfort	None	All	None	All	None	None
Inflammation	None	None	None	All	None	None
Pain	2/9	All	None	None	None	None
Healing	None	None	7/9	None	All	All





IV. Conclusion:

This study shows that gingivectomy by pulsed 940 nm Diode laser with power density 1W has more advantages than conventional gingivectomy using scalpel including pain during and after operation, discomfort after operation, and bleeding during surgery.

Conflict of interest: There is no conflict of interest for this research

Financial support: Nil

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Abdulkareem Hussain Alwan, et. al. "Gingivectomy by Diode Laser and Conventional Method (A Comparative Study)." *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(07), 2021, pp. 56-61.