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COMPARISON BETWEEN DIODE LASER AND CONVENTIONAL SURGICAL TECHNIQUE TO PERFORM LABIAL FRENUM SURGERIES IN CHILDREN : A RANDOMIZED CLINICAL TRIAL

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ABSTRACT

Background: Abnormal labial frenum may interfere with plaque removal and cause tension, and also may provoke diastema. Frenectomy is the complete removal of the frenum that can be made by scalpels or with soft tissue lasers. The aim of this study was to compare the degree of postoperative pain, as well as intraoperative bleeding experienced by patients after two Frenectomy techniques one by soft tissue laser and one by conventional surgery. **Methods:** Thirty patients with abnormal labial frenum were randomly assigned to have treatment either with a conventional technique or with a diode laser. The postoperative pain ratings of each patient were recorded using a facial pain scale revised (FPS-R) on days 1 and 7, and intra operative bleeding with WHO score criteria. **Results**: The results indicated patients treated with the diode laser had less postoperative pain and required fewer analgesics as well as less intraoperative bleeding compared to patients treated with the conventional scalpel technique. **Conclusion:** Diode laser procedure would always be more accepted for frenectomy procedure with minimal postoperative pain and less intraoperative bleeding by the children patients than the conventional one.

INTRODUCTION

Frenectomy is the complete removal of the frenum that involves many indications such as presence of hypertrophic labial frenum or when the frenum provokes diastema or interfere with maintenance of proper oral hygiene [(1)].

Frenectomy can be accomplished either by the routine scalpel technique, electrosurgery or by using lasers, however, dental surgery in pediatric dentistry is a special challenge for the child, the parents, and the dentist. That, it usually accompanied with dental fear, anxiety [(2)]. Electrocautery has offered the advantage of no need of sutures, but the temperature rise in the tissue may cause tissue damage, and Insufficient intensity of current can result in tissue pulling or tearing [(3)].

Laser-assisted frenectomy offers a treatment alternative for children, providing a more convenient therapy. Lasers, such as the 980-nm diode work on only soft tissues, claimed to have a very good surgical and hemostatic action on soft tissues [(4-8)].

The present study was designed to compare between diode laser and conventional surgical technique to perform labial frenum surgeries in children.

SUBJECTS AND METHODS

Thirty children patients with highly attached labial frenum 18were included in this study selected from Outpatient Clinic of the Department of Pedodontics and Oral health, (Faculty of Dental Medicine, Boys, Cairo, Al-Azhar University).

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Intervention

o Group 1 (conventional surgery)

The conventional surgery was done using Archer technique.[5] The area was anaesthetized with a local infiltration. The frenum was engaged with a hemostat, and the triangular resected portion of the frenum with the hemostat was removed. A blunt dissection was done on the bone to relieve the fibrous attachment. The edges of the diamond shaped wound were sutured by using 4-0 black silk with interrupted sutures. The area was covered with a periodontal pack. The pack and the sutures were removed 1 week post-operatively (Fig 1and 2).

o Group 2 (laser assisted).

Frenectomy was performed using 980 nm. The area was anaesthetized with a local infiltration. The laser was operated at a power of 3.0 watt in continuous wave mode with 320-micron quartz optical fiber (Fig.3) The lip was lifted to stretch the frenum and the fiber was held in light contact with the tissue, in gentle sweeping brushing strokes for cutting and also used to remove any adhesions to the periosteum, and the remnants of the ablated tissue were removed using sterile gauze dampened with saline. After end of laser exposure, the surgical site was wiped off with normal saline wet cotton roll. No sutures were placed after diode laser treatment and patients recalled after one

Pain measurement

Assessment of pain was done using the Facial pain scale -Revised,7 the severity of pain was assessed using Scores that chosen the faces **0**, **1**, **2**, **3**, **4,** or **5**, counting left to right, so "0" = "no pain" and "5" = "very much pain". And In addition, postoperative pain was assessed according to systemic analgesic usage all patients instructed to take the same analgesics (Brufen®), and parents are instructed to record if the child take an analgesic or not.

Bleeding assessment

Postsurgical bleeding was determined in both groups according to the WHO bleeding criteria: (8) (grade 0) no bleeding, (grade 1) bleeding under the skin and petechial class, (grade 2) mild bleeding, (grade 3) gross bleeding, (grade 4) mortal bleeding or annoying bleeding.

RESULTS

30 patients, 13 were females and 17 were males with mean age of 9 and they are randomly divided into two equal groups. The analysis showed that FPS-R score of pain on day 1 and 7 were significantly lower in the laser group as compared to the

Surgical Group. The difference was statistically significant as shown in table 1.

Table 1: Analysis of FPS-R

	Surgical group	**Laser group**
Mean of FPS-R on first day	2.73 ± 0.96	1.13 ± 0.92
Mean of FPS-R on seventh day	0.8 ± 0.86	0.0 ± 0.0
Statistical significance (P *value*)	0.001	0.004

Comparison of bleeding during procedure was assessed using WHO score (Laser Group showed relatively less bleeding than Surgical Group and the difference was statistically significant*)* as shown in figure 4, Numbers of analgesics used by surgical group were significantly higher than laser group.

DISCUSSION

In the present study, children treated with diode laser showed significantly less postoperative pain on day 1 assessed by FPS-R. These results came in harmony with the study of Ize-Iyamu et. al. [9] who use 810nm diode laser in comparison with conventional surgery for management of soft tissue mucogingival problems associated with orthodontic

Fig. (1) Pre-operative abnormal labial frenum

Fig. (2) Immediate postoperative

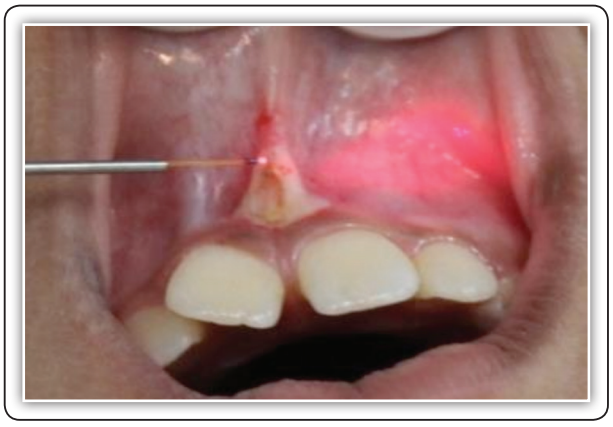

Fig. (3) Frenectomy with laser

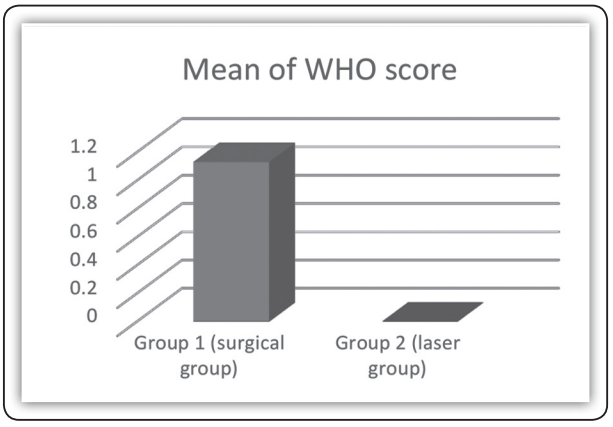

Fig. (4) Comparison between WHO score for both groups

treatment. They showed that post-operative pain assessed by visual analogue scale (VAS) was significantly reduced in all cases treated with the diode laser, which compared favorably with this study.

Moreover, the study results were compatible with Shalawe et al [10] who, compared post-operative pain for the diode laser with different wave length (1064nm) and conventional surgery after oral soft tissue biopsy in the first day, and they found the mean of the pain score using visual analog scale was statistically significant.

On assessment of postoperative pain on the seventh day the present study, showed that children treated with diode laser had significantly less postoperative pain assessed by FPS-R. fortunately this result came also in agreement with the study result of Kaur, et al [11] who demonstrated that postoperative pain was reduced significantly on the 7th day compared with conventional surgery as assessed by VAS.

In view of that most of studies similar to this research were found to be favorably compared with this study on children in which the diode laser with many different wave lengths showed less postoperative pain. That due to the ability of lasers to seal lymphatic channels which attributed in reduction of postoperative edema, and which in turn results in less postoperative pain and discomfort, also the sealing of nerve endings play a role in reducing inflammatory response, and the formation of a fibrin clot over the surgical wound that protects

the wound from external irritation, causing less pain after surgery and avoiding the use of analgesic drugs. Patients treated with laser surgery have no functional complications since there was no damage to adjacent healthy tissues, with less wound contraction during healing; meaning that there is less mucosal scarring, resulting in satisfactory mobility of the soft tissue and consequently, there is a minimal oral dysfunction.

On regard to bleeding assessment this result came in harmony with Pick et al, [12] Panagiotis et al [13] and Fornaini et al [14] who recorded that the operating time with the use of the laser reduced as a result of reduced bleeding during surgery and rapid post-operative hemostasis.

The generated heat coagulates the tissue at the wound edges, and generally it is desirable to have no bleeding but it is also desirable to have the coagulated region as thin as possible. Hemostasis occurs because of denaturation of plasma proteins, hemoglobin and perivascular tissue locally. Also, coagulation produces hemostasis by contraction of the vessel wall.

CONCLUSION

Diode laser 980 nm procedure would always be more accepted for frenectomy procedure with minimal postoperative pain by the children patients than the conventional one. Moreover, diode laser 980 nm has proven to be effective in soft-tissue incision like frenectomy with minimal or no bleeding during procedures.

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