



CASE STUDY

DIODE LASER ASSISTED CHELIOPLASTY

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ABSTRACT

Aesthetics has been the “flavor of the season” since ages. Lips being one of the most important parts of the lower central face are the hallmark of aesthetics of an individual. Any deformity associated with the lips not only hampers the aesthetics of a person but also interfere with the phonetics. A number of techniques were used in the past by plastic surgeons with varying success. Lasers are a relatively new modality of treatment which can be added to the existing list. They possess the advantages of being painless, having a bloodless field and promoting wound healing with minimal scarring. The case describes the treatment of one such unaesthetic growth with a 940nm soft tissue diode laser.

Key words: Aesthetics, phonetics, painless, bloodless, minimal scarring, diode laser.

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INTRODUCTION

The lips are the primary aesthetic feature of the lower central face. Fullness of the lips, color, size and shape vary amongst different ethnicities. Their functions requirements include speech, accommodation of the components of the oral cavity and kissing. The lips are essentially important in producing the labial sounds "b," "m," "w," "p," as well as the labial-dental sounds "f" and "v." Ancient civilizations including the Egyptians, Assyrians, Sumerians, Etruscans, and Romans all used paints and rouges to tint the lips. The use of lip accessories in the 21st century range from lip sticks, stains, gloss, liners to lip piercing (Corson, 1972). With such a glamorous social background, any unaesthetic lip mark / lesion or growth on the lip could be a factor for decrease in self confidence. In the past many surgical repair techniques have been advocated with different flap designs and suturing methods by plastic surgeons with varying degrees of success. With the advent of lasers in dentistry, lasers are being tried out in various cases other than the conventional periodontics, endodontic and oral surgical practices. This is one such case of which literature with the use of lasers is very scarce. In this case a fibrous swelling was to be excised aesthetically from the lip. The predisposition to use lasers as a tool for this case was that they possess the advantages of having painless and bloodless effect on their site if action.

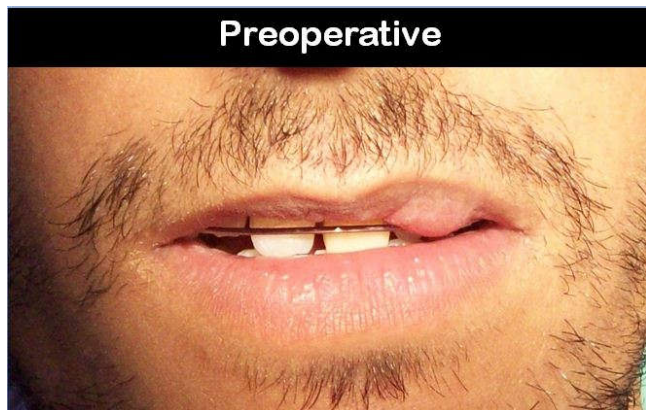
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More importantly suturing was not required in this case thereby enhancing the chances of predicting a more aesthetic outcome with minimal scarring. Faster wound healing with lasers also was an assurance that the patient could visit public and work places without suffering the embarrassment of being questioned about the procedure carried out on his lips. Oral competence is the most important aspect of surgical lip repair amongst all others (Luce, 1986).

Case report

An 18 year old male patient came to the dental office with the complaint of an unaesthetic upper lip on the left side. History of the patient suggested that the patient was involved in a road traffic accident approximately 1 year back. In the accident the patient was apparently knocked over by a car off a flyover bridge at a significant speed which made him land on a car's front glass below the flyover. During the collision many of the glass splinters got stuck in the patient's body, which also involved the left side of the upper lip. The patient suffered multiple fractures including a Lefort class-III fracture in the accident. During his casualty treatment the glass splinter was removed from the upper lip and the torn lip was sutured with a non- resorbable suture material. Gradually the area developed a growth which was unaesthetic in appearance. On examination the swelling was approximately 1.5cms in size, soft, fibrous in consistency, non fluctuant, and non tender in nature. There was no change in color; however the growth blanched on palpation. Since the growth was big in size and on the upper lip, the patient developed a wasteful tendency to

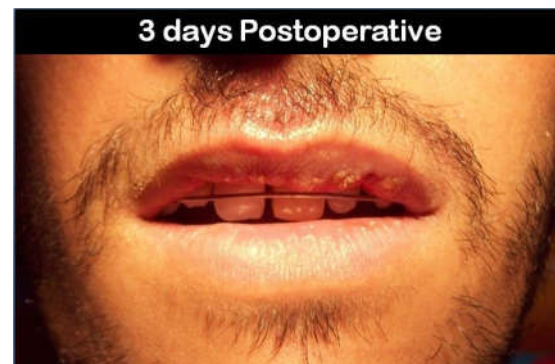
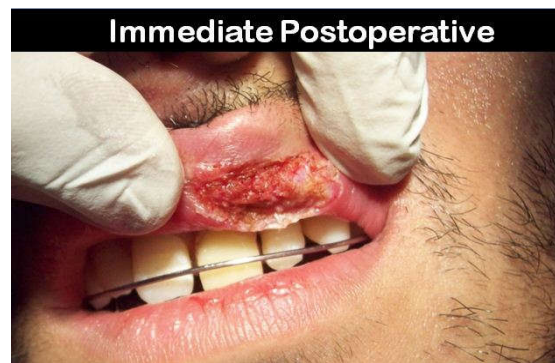
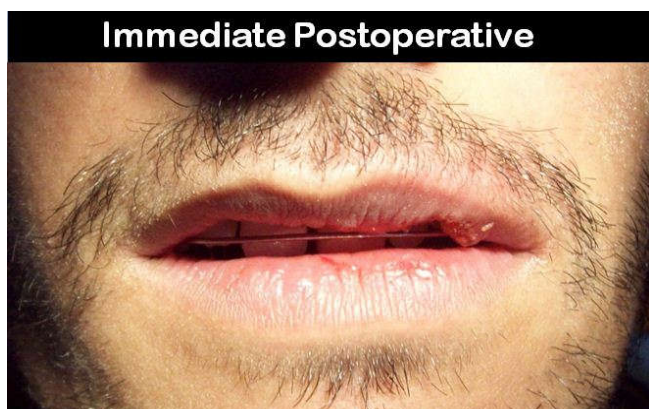
engage it within the anterior teeth and squeeze it. The patient also complained of discomfort in pronunciation of the alphabets b, p, and m. The patient desired an aesthetic lip contour without any anesthesia as he had undergone numerous surgeries in the recent past.



Treatment planning

Based on the clinical findings and history of its etiology, a fibroma/hypertrophic scar were the forerunners for the differential diagnosis. As the growth was small in size, it was planned to excise the growth. The procedure was explained to the patient verbally and informed written consent was obtained. Routine blood investigations were carried out before the procedures. Local or general anesthesia was not administered to the patient; however topical anesthesia (Lignox 2% spray- Warren pharmaceuticals, Maharashtra, India) was applied. A 940nm diode laser (Biolase inc. San Clemente, Irvine, California, USA) was selected for the procedure. Initially a power setting of 1W in continuous mode was used with a 300 μ m, 4mm initiated tip to mark the borders of the growth. The tip was initiated with an initiation cork. Then the power was increased to 2.5W in pulsed mode and the sessile growth was undermined to convert it to a pedunculated one and excised eventually.

Here the pulse interval and pulse length was 0.5ms hence the duty cycle was 50%. During the whole procedure the patient experienced a slight burning sensation while the lasing was carried out but this sensation was transient and well within the tolerable limits. The patient had no pain postoperatively and did not take any analgesics, though they were prescribed. The patient was also prescribed topical application of vitamin E gel for 3 days. The patient was recalled after 3 days and 1 week for the follow ups.



DISCUSSION

Lasers have been used previously in various fields of dentistry like (Gutknecht *et al.*, 2004) root canal sterilization, (Andreas Moritz *et al.*, 1998; Cobb, 2006; Aoki *et al.*, 2008) elimination of the periodontal pockets, (Haytac *et al.*, 2007) gingival recontouring (Yogesh Doshi *et al.*, 2012; Esen *et al.*, 2004) gingival depigmentation, (Yogesh Doshi *et al.*, 2010) ankyloglossia, (Gontijo *et al.*, 2005) frenectomy, (Arnat-Dominguez *et al.*, 2003) implants, (Parker, 2007; Parker, 2007; Bornstein *et al.*, 2005) incisional and excisional procedures etc. ¹⁶The diode laser works on the principle that when the tissues are irradiated with laser energy, the chromophores in these tissues absorb the energy and tissue interaction takes place. The main target chromophores of the 940 nm diode laser are hemoglobin and melanin. The 940nm diode lasers are also absorbed in water to some extent. In this case more power was required to excise the tissue as the tissue was fibrous in nature and had scarce quantity of melanin and hemoglobin as the site was hypoperfused. Here water and hemoglobin content of the tissues had a major role to play. The 940nm wavelength was selected over the 810 and 980 nm wavelengths as they are absorbed excellently in hemoglobin and moderately well in water.

In order to control thermal damage to the collateral tissues the laser was operated in a pulsed mode with 50% duty cycle. The diode laser was used in this case due to the versatility of this laser to different applications in dentistry. It is also the most economical laser by far when compared to its rivals Erbium and carbon dioxide lasers. Since the diode lasers exercise most of their actions in contact mode it is easier to control and the procedures can be done accurately. Furthermore they have biomodulatory effects which accelerate the wound healing process. In this particular case local or general anesthesia was not administered as the use of lasers eliminates post operative pain and discomfort on account of laser sealing effect on the nerve endings (Walsh and Ivanoviski, 1997). The painless character of the lasers is also attributed to the transitory anesthetic effect due to blocking of nervous conduction in Na/k pump (Jacobson *et al.*, 2003). Only topical anesthesia was administered to attenuate the tactile sensation caused by the contact of the tip to the tissue to be excised. Thus it is more patient friendly as compared to the conventional scalpel (Strauss *et al.*, 2006). Lasers exhibit excellent haemostatic properties on account as it seals the peripheral blood vessels thus giving a clear surgical field and better working efficiency (Mordon *et al.*, 2002).

The haemostatic property is also attributed to the increased activation of platelets by lasers. No suturing was required during this case. The patient was followed up after 3 days for monitoring the healing of the wound. The wound was covered with a whitish yellow film which was the fibrin layer which enhances the wound healing and also protects the underlying wound from external irritants which may delay the wound. The patient was asked to apply vitamin E gel as it is the major lipid soluble, membrane preserving antioxidant that protects cells from oxidative stress (Nachbar and Korting, 1995). Oxygen radicals are produced in response to injury and decrease healing by damaging DNA, cellular membranes, proteins, and lipids. Antioxidants are thought to enhance wound healing by reducing the damage by free oxygen radicals that are released by neutrophils in the inflammatory phase of the healing process (Martin, 1996). Tanaka showed that reactive oxygen

species alter the biosynthesis of collagen and glycosaminoglycans (GAGs) in cultured human dermal fibroblasts (Tanaka *et al.*, 1993). In comparison to that of an electrocautery, laser wounds heal better as the power settings used in an electrocautery are in the range of 300-350Watts which cause collateral damage to up to 1000 cell layers whereas the power settings used by a diode laser do not exceed 3 watts which restrict the damage up to 10-20 cell layers when used appropriately (Lippert *et al.*, 2003; Romanos *et al.*, 1995; Walsh, 1997). The wound healing of the laser is much faster as compared to the conventional surgical techniques as lasers promote the phagocytic activity of the repair response (6 hours after trauma) (Walsh *et al.*, 2006). There is direct evidence that the 940 nm diode laser can trigger mast cell degranulation which promotes leukocyte infiltration. Lasers further have an advantage that they sterilize the operating field on account of its strong bactericidal effect which prevents secondary infection (Schoop, 2006). One week post operatively the wound had healed comfortably and uneventfully. There was no scarring or depigmented patch seen postoperatively and the healing was uneventful.

Conclusion

Ever increasing aesthetic concerns of patients have compelled the dental practitioners to practice procedures which are not only restricted to the teeth and gingiva. Cases like Chelioplasty not only improve the smile aesthetics of the smile but also are a huge booster of the patients self confidence. The advantages of diode laser over the conventional scalpel and cautery is incontrovertible. Minimal use of anesthesia, reduction of post operative medication and painless nature of the procedure and faster wound healing makes it an exceptionally patient compliant tool. Thus this case report suggests a positive application of lasers in cases of lip revision. Although the case shows good results a consensus for the power settings and other parameters should be developed with further studies to ensure the predictability and outcome of these procedures.

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