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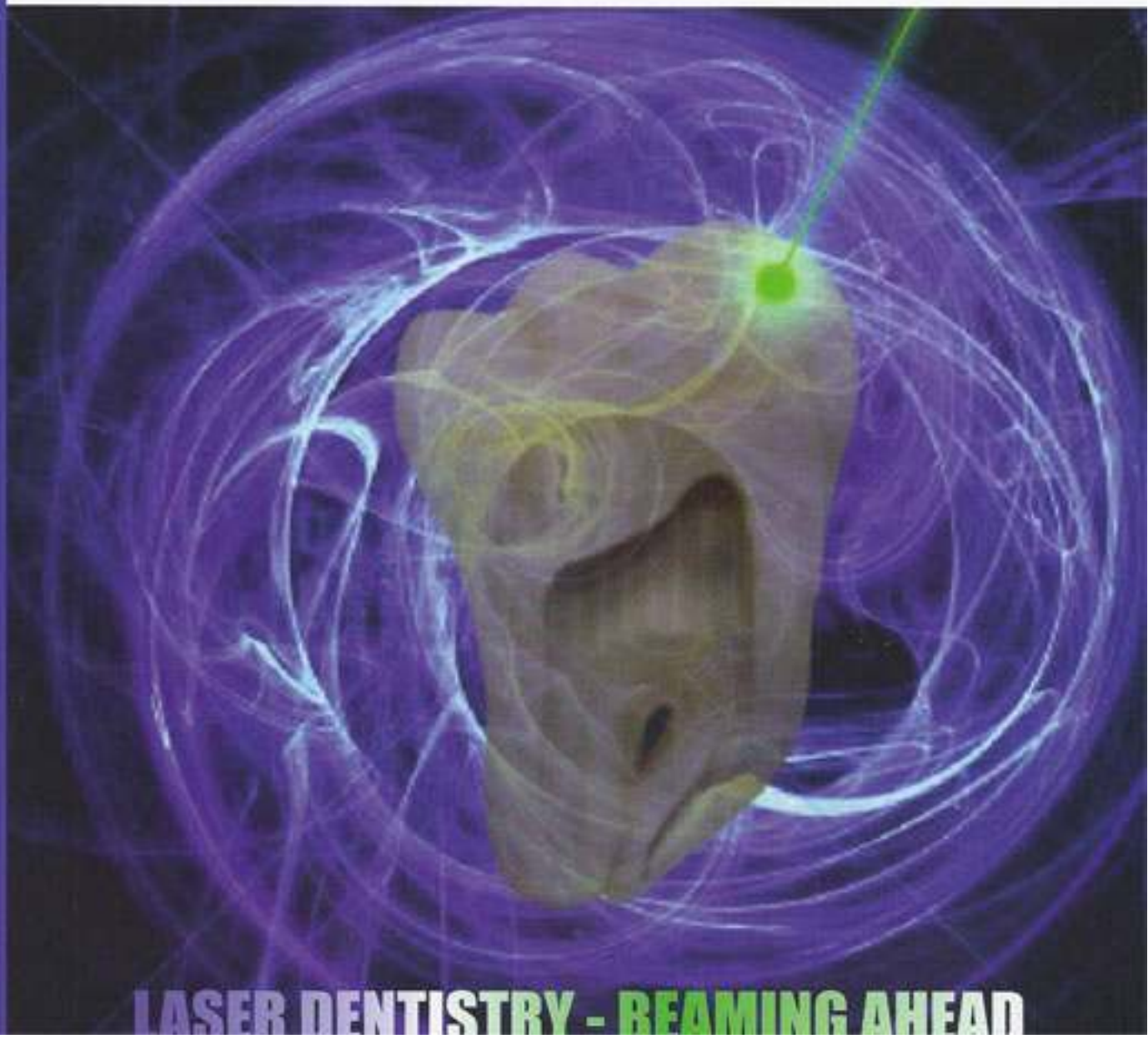

LASER DENTISTRY - BEAMING AHEAD

Soft tissue lasers in Orthodontics

DR. GURKEERAT SINGH AND DR. DEEPAK RAI

INTRODUCTION

Laser is an acronym for "Light Amplification by Stimulated Emission of Radiation." A laser is a single wavelength (or color) of light traveling through a collimated tube delivering a concentrated source of energy.

A soft tissue laser offers numerous advantages over traditional scalpel surgery. Soft-tissue excision is more precise with a laser than with a scalpel.[1] Laser coagulates blood vessels, seals lymphatic's, and sterilizes the wound during ablation, maintaining a clear and clean surgical field.[2,3] In addition; minor aphthous and herpetic ulcerations can be vaporized. Moreover, Laser surgery is routinely performed by using only topical anesthetic, which is particularly beneficial in an open orthodontic clinic.[2,4] Minimal post-operative swelling and no need for irritating sutures or unsightly periodontal dressing[5] is also a definite advantage. A report suggested that laser excisions produce less scar tissue than conventional scalpel surgery[6]. Post surgically, patients report less discomfort and fewer functional complications (speaking and chewing), and require fewer analgesics than do patients treated with conventional scalpel surgery.

There are also studies which indicate that soft tissue lasers can increase the rate bone regeneration in the mid-palatal suture after rapid maxillary expansion procedure[7-9]. This could possibly be due to its stimulating effect on the synthesis of collagen, which is mainly responsible for the osteoid matrix.[10] Circumferential Supracrestal Fibrotomy, which is an effective procedure to decrease relapse after tooth rotation, can also be effectively carried out by Lasers with minimal damage to the supporting periodontal structures.[5] Lasers have also been shown to stimulate the rate of orthodontic tooth movement, as demonstrated by Youssef *et al.*[11] and Cruz *et al.*[12]

FIG 1a: Inadequate space for bonding brackets

FIG 1b: Adequate space created for bonding brackets

FIG 2a: Pre treatment

FIG 2b: Post treatment

FIG 2c: 2 weeks post treatment

PRINCIPLES

Lasers cut by thermal ablation - decomposition of tissue through an instantaneous process of absorption, melting, and vaporization. Soft tissue lasers deliver concentrated energy through the fine tip of the optical fiber to tissue, where the energy is absorbed. The optical fiber, or cutting end of the laser, is protected with an insulated layer that helps to collimate the light energy[1]. Thus, ablation occurs only at the tip of the optical fiber. Attempting to cut from the sides of the laser will only drag the optical fiber against the gingival tissue, impeding tissue excision and damaging the laser tip. The degree of absorption, of the energy, varies with the wavelength of the laser (measured in nanometers), the power or energy output selected by the clinician, and the optical characteristics of the target tissue, including its water content. With the absorption of energy by the target tissue, the temperature increases at the surgical site.

The laser tip cuts soft tissue through ablation of tissue. This means that the cellular temperature rises rapidly by absorption of the laser energy by the melanin in the cells, and the cells virtually explode. This characteristic is useful in both cutting and contouring gingival tissues and will be illustrated in this article. Postoperatively, patient is instructed to use salt water rinses the day of the procedure and to clean the site after 24 hours[13]. It is important to understand that lasers function with an "end cutting" action (that is, laser energy is emitted from the end of the laser), while most other dental instruments are "side cutting," with the cutting edges or abrasive surfaces located on the lateral surface.[14]

The most common soft tissue lasers used in orthodontics today are 810nm, 940nm and 980 nm[2].

Figure 1: Intraoral view of large midline diastema

Figure 2: Orthodontic anterior space closure

Figure 3: Micoimplants for anchorage to retract anteriors

Figure 4: Diode laser

Figure 5: Healing after two weeks

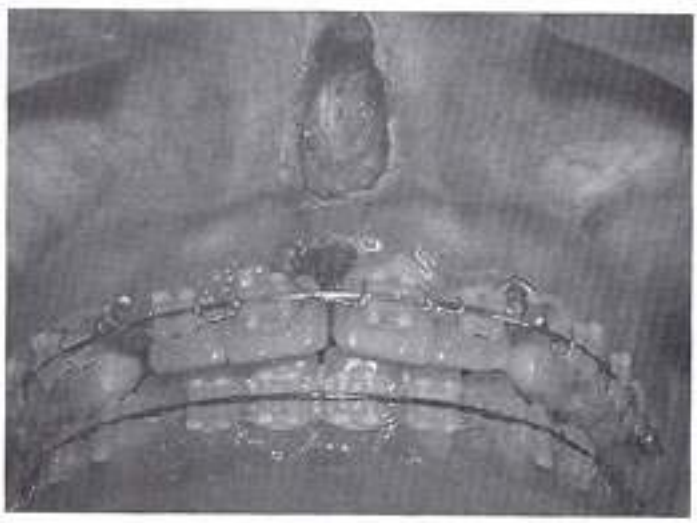

Figure 6: Frenectomy with pappilectomy

It has been observed that patients perceptions like apprehension before laser procedure and discomfort after the procedure is negligible as compared to other surgical modalities.[4]

Treatment plan

1. Orthodontic redistribution of spaces: Objective was to close anterior spaces [Figures 2-3] and distribute them distally in the arch. The mechanics used were to ensure retraction and closure of anterior spaces by sliding method over ceramic braces, using

[Figure 5].

2. Frenectomy of thick labial frenum-The upper labial frenum was thick and flabby and after the orthodontic space closure was achieved the frenum was excised using diode

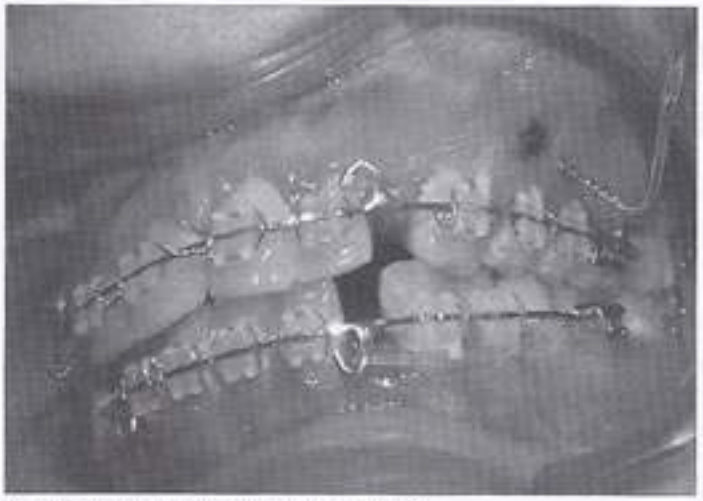

Figure 7: Mucositis around microimplant

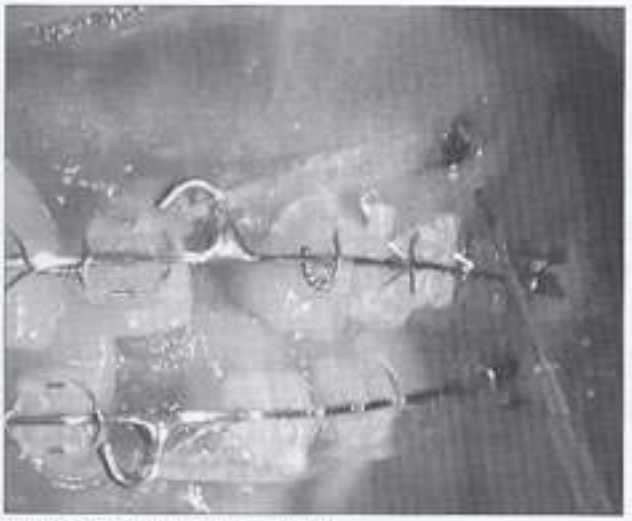

Figure 8: Diode laser biostimulation

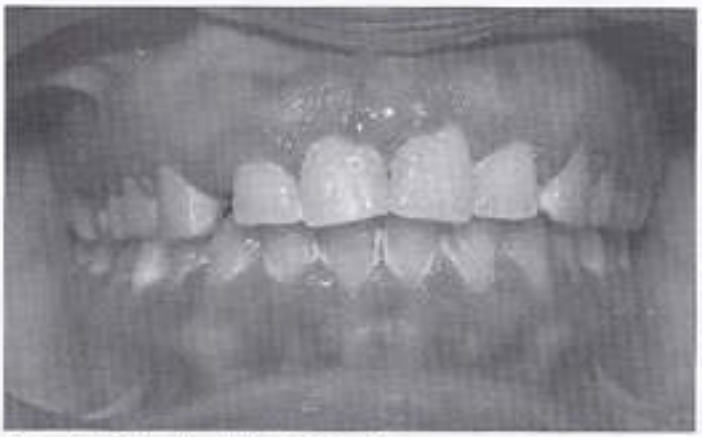

Figure 9: Post orthodontic treatment

Figure 10: Post-operative healed site

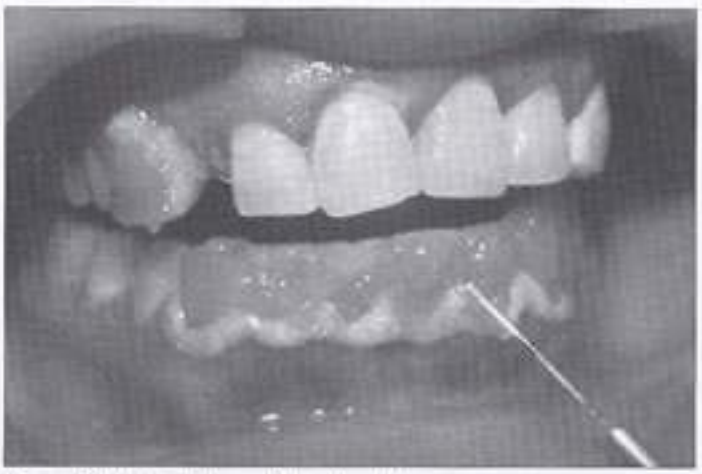

Figure 11: Mandibular anterior bleaching

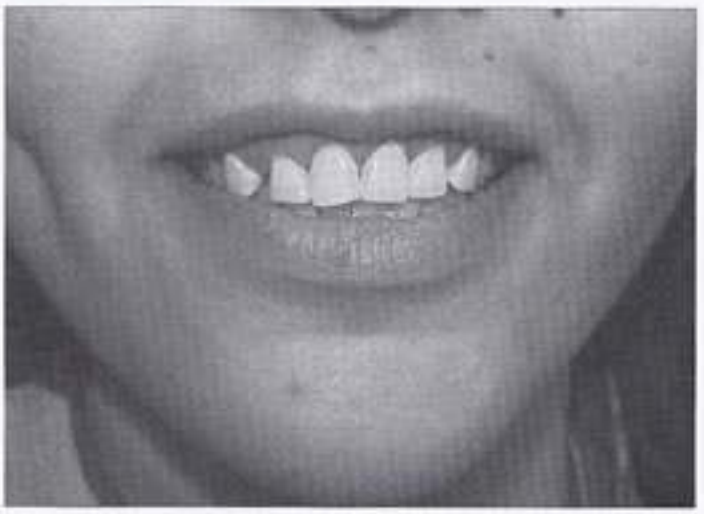

Figure 12: Post bleaching smile, post treatment intraoral comparison

BLVD. INDIANAPOLIS,IN46240 www.amdlasers.com) [Figure 4 and 6]. Post frenectomy healing was uneventful and patient expressed satisfaction with the least discomfort postoperatively.[Figure 6].

3. Retraction of anteriors using microimplants- The orthodontic microimplants were used as anchorage to retract anteriors after spaces had closed and frenectomy site had healed [Figure 6].

The microimplants often develop mucositis at site of entry and diode laser was used to salvage these microimplants using laser at biostimulatory mode (0.8watts noncontact mode).[Figures 7 and 8]. After retraction orthodontic appliance was debonded and a permanent retainer was bonded from palatal

aspect.[Figure 9]

4. Crown lengthening- The smile of patient revealed small clinical crown height with excessive gingival display. Clinical evaluation revealed possibility of gingivoplasty with diode laser and the results were encouraging as has been reported in literature.[5] [Figure 10]

By this time patient had developed immense faith in the success of soft tissue lasers as part of treatment plan and wished to have her teeth bleached. Pola office bleach (POLA OFFICE, SDI LIMITED, 3-13 BRUNDSON STREET, BAYSWATER,VICTORIA 3153, info@sdi.com.au) was used and upper and lower arches were bleached at custom setting of 7 watts 10 sec each tooth with two applications per tooth [Figure 11]. Postbleaching the results was encouraging. [Figure 12] are comparison of before treatment and after treatment smile. An elated patient after Multidisciplinary treatment using diode laser for varied applications. All essential protocols for laser safety were strictly adhered to in clinical use of diode laser.[6]

Discussion

The management of complex cases requiring multidisciplinary treatment is bound to have benefits by soft tissue diode lasers which are now becoming the routine technological acquisition by every major dental practice. Laser dentists are often questioned by those who haven't yet braced this modality as to what are the situations you use this treatment modality, and often the ones who are ahead in the learning curve feel difficulty in enumerating the benefits as the benefits of using diode lasers are more than one can count on fingers. They are truly a practice builder as quoted by Parkins.[1]

Orthodontists have embraced this modality and there perceptions of lasers are highly positive as stated by Burke[2] in there survey. Handling clinical situations like midline diastema as reported in this clinical case report requires a multidisciplinary effort.[3]

Proper case presentation and formulating a plan that enables patients participation in understanding benefits is a must and offering the new technology like diode lasers often elicits favorable response by patients as observed by authors in a study done on comparison between lasers and radiosurgery.[4]

Diode lasers have been used successfully in varied treatment options and the real success comes by proper understanding of clinical and laser parameters and judicious and safe use of this modality.[6]

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