Diode laser (810 nm) applications in clinical Orthodontics

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_Dentistry has changed exponentially, osseo-integration, dental bonding & kinetic energy tooth preparation are current clinical buzzwords. The arena of Dental Esthetics has expanded to cover more than just simply restoring compromised teeth, but involves revamping smiles in entirety. Soft tissue harmonization have become paramount to overall development of Dentofacial Esthetics.

Case report 1

Frenectomy for midline diastema correction

Labial thick & high attached frenum is commonly regarded as contributing etiology for maintaining midline diastema. It is an accepted contemporary view that midline diastema first should be corrected with Orthodontics and then frenectomy so that scarring that results after conventional scalpel based frenectomy doesn’t interfere with tooth movement. With diode laser the proce-
Treatment can be done before complete closure or after as healing of laser wound doesn’t involve any scarring. The following patient had large diastema (Fig. 1) and was treated with fixed appliances to first close the diastema (Fig. 2) followed by frenectomy (Figs. 3 & 4). The healing was uneventful (Fig. 5).

**Case report 2**

*Canine exposure in labial sulcus*

Labially erupting canines are common malocclusion (Fig. 6). Conventional exposure with scalpel based method leads to extensive bleeding (Fig. 7) and the field of operation requires special hydrophilic moisture insensitive primers to bond orthodontic attachments. Use of diode laser 810 nm ensures easy exposure with minimal bleeding and least patient discomfort (Figs. 8, 9 & 10). The clear bloodless field ensures fast predictable bonding (Fig. 11), thus enabling fast correction of malocclusion (Fig. 12).

**Case report 3**

*Canine exposure on palatal aspect*

Palatally impacted canines are difficult situation requiring surgical raising of an extensive mu-
**Case report 4**

**Gingivoplasty**

Orthodontic fixed appliances are generally associated with issues of good oral hygiene maintenance. In many cases we notice gingival hyperplasia (Fig. 15). Such enlargement further impedes good hygiene and is commonly associated with bleeding. Diode laser can be used effectively in such situations (Figs. 16 & 17).

**Case report 5**

**Palatal gingival hyperplasia**

Lingual orthodontic appliances are generally associated with gingival hyperplasia, preventing us from the access to gingival hooks to engage elastomeric attachments (Fig. 18). It is difficult to sculpt gingiva around lingual braces with scalpel due to poor

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**Fig. 14.** Orthodontic attachment for alignment.

**Fig. 15.** Gingival hyperplasia during orthodontic treatment.

**Fig. 16.** Diode laser assisted gingivoplasty.

**Fig. 17.** Healed site.

**Fig. 18.** Palatal gingival hyperplasia with lingual appliance.

Coperiosteal flap, with sutures at the end and an extensive postoperative discomfort and swelling.

Diode laser allows exposure without any extensive flap (Fig. 13) and generally no sutures are required after the procedure. Patient experiences minimal pain or discomfort. Bloodless field ensures instant bonding of orthodontic attachment (Fig. 14).
access and poor visibility. Even electrocautery would not be indicated due to chance of sparking on contact with metal braces. Diode Laser (2 W Repetitive mode) allowed us to sculpt the hyperplastic gingiva easily without any bleeding or discomfort allowing easy access to engage elastic attachments (Fig. 19).

_case report 6_

Diode laser assisted removal of odontome in maxillary anterior region preventing eruption of permanent incisor

Patient was a 10 year old girl with unerupted central incisor (Fig. 20). Radiographic evaluation suggested mesiodens (Fig. 21). Diode laser was used to give primary incision and simultaneous frenectomy at 2 W repetitive mode, followed by 2.3 W continuous mode, ensuring bloodless field of operation (Fig. 22). The tooth like mass was removed (Fig. 23) and orthodontic eruption appliance was bonded (Fig. 24). Histologic examination revealed it to be an odontome (Fig. 25, 13, 14). The tooth erupted in few months with orthodontic active guidance (Fig. 26).

_case report 7_

Laser assisted circumferential supracrestal fibromy/LACSF/percision

Control of tooth rotation correction in Orthodontics from relapse is always a challenge. Perma-

Fig. 19. After diode laser gingivoplasty.

CASE 6

Fig. 20. Unerupted incisor with high frenum in 10 year old girl.

Fig. 21. RVG image showing tooth like mass.

Fig. 22. Diode laser 610 nm assisted incision.

Fig. 23. Extraction of tooth like mass and orthodontic attachment bonded.

Fig. 24. Post extraction RVG.

Fig. 25. Histological section: compound composite odontome.
In Case 7, the case report discusses the importance of using diode laser for circumferential supracrestal fibrotomy to allow elastic fibres to reorganize favorably without causing relapse of correction. Conventional scalpel assisted CSF is associated with bleeding and requires infiltration anaesthesia. The authors are currently evaluating the success of this laser assisted circumferential supracrestal fibrotomy (LACSF) (Fig. 27).

In Case 8, the case report discusses the use of diode laser for salvaging orthodontic microimplants. The patient received two orthodontic microimplants for retraction (Fig. 28), but one on the left side was rigid and showed some inflammation of tissue around the implant (Fig. 29). Diode laser was used at 0.5 W to decontaminate and allow healing of tissue around microimplant. The implant survived and served its orthodontic purpose (Figs. 30 & 31).

In Case 9, the case report discusses vestibuloplasty in a patient with mucogingival problem before undergoing Lingual Orthodontics. The patient had severe deep bite, associated with extensive mucogingival damage, with poor oral hygiene (Figs. 32 & 33). After initial scaling and root planning (Fig. 34), Diode laser was used to perform vestibular extension (Fig. 35). Lingual appliances were bonded and spaces were consolidated with good oral hygiene maintenance (Figs. 36 & 37). Diode laser can also be used as low level therapy during orthodontic tooth movement and especially during situations where heavy orthopedic forces are applied as in rapid maxillary expansion. This is an area where the authors are guiding a postgraduate research project in their department.

The incorporation of lasers in routine orthodontic practice is the order of the day. The practices that embrace this technology will surely flourish and will have satisfaction of providing best dental care to their patients.

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**Fig. 26** Erupted tooth.  
**Fig. 27** Laser assisted circumferential supracrestal fibrotomy.  
**Fig. 28** Orthodontic microimplant for anchorage.  
**Fig. 29** Inflammation around microimplant.  
**Fig. 30** Decontamination and biomodulation with laser at low power.  
**Fig. 31** Corrected malocclusion with healed site.  
**Fig. 32** Severe deep bite, class II DIV 2, missing upper 12,22.  
**Fig. 33** Extensive mucogingival destruction.  
**Fig. 34** After preliminary scaling.  
**Fig. 35** Laser assisted vestibuloplasty.  
**Fig. 36** Lingual appliance to consolidate spaces.  
**Fig. 37** Improved gingival attachments.