Diode laser (810 nm) applications in clinical Orthodontics

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CASE 1

Fig. 1_Large midline diastema with thick frenum.

Fig. 2_Orthodontic closure of diastema.

Fig. 3_High labial frenum.

Fig. 4_Diode laser frenectomy.

Fig. 5_Healed site after 7 days.

_Dentistry has changed exponentially, osseointegration, dental bonding & kinetic energy tooth prepration 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.

Unique versatility and vast potential of dental lasers allows many procedures that enhance overall treatment success. Lasers have become an indispensable clinical tool in Orthodontist's armamentarium.[1] Diode lasers allow safe fast efficient incisions with better field of visibility as there is minimal bleeding, and above that patient perceives a pressure less cut which often requires no suturing.[2] This article will present clinical case reports where diode laser* has been used for benefit of orthodontic patients.

_Case report 1

Frenectomy for midline diastema correction

Labial thick & high attached frenum is commonly regarded as contributing etiology for maintaining midline diastema.[3] 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.[4] With diode laser the proce-


Fig. 1


Fig. 2


Fig. 3


Fig. 4


Fig. 5


Fig. 6


Fig. 7


Fig. 8


Fig. 9


Fig. 10


Fig. 11

dure can be done before complete closure or after as healing of laser wound doesn't involve any scarring.[5] 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).[6,7] 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[8] are difficult situation requiring surgical raising of an extensive mu-

CASE 2

Fig. 6_Labially erupting 43.
Fig. 7_Conventional scalpel surgery.
Fig. 8_AMD Picasso diode laser* 2.3 W, rep mode.
Fig. 9_Diode laser bloodless incision.
Fig. 10_Exposed 23.
Fig. 11_Orthodontic attachment bonded in dry field.
Fig. 12_23 Orthodontically extruded.

CASE 3

Fig. 13_Palatal 23 exposure.


Fig. 12


Fig. 13

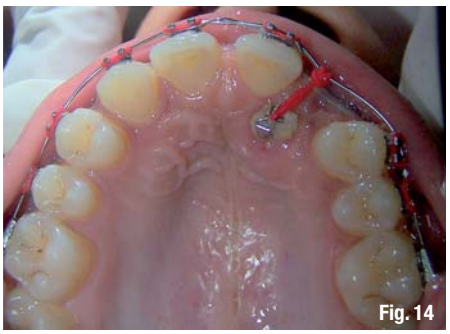
Fig. 14


Fig. 15


Fig. 16


Fig. 17

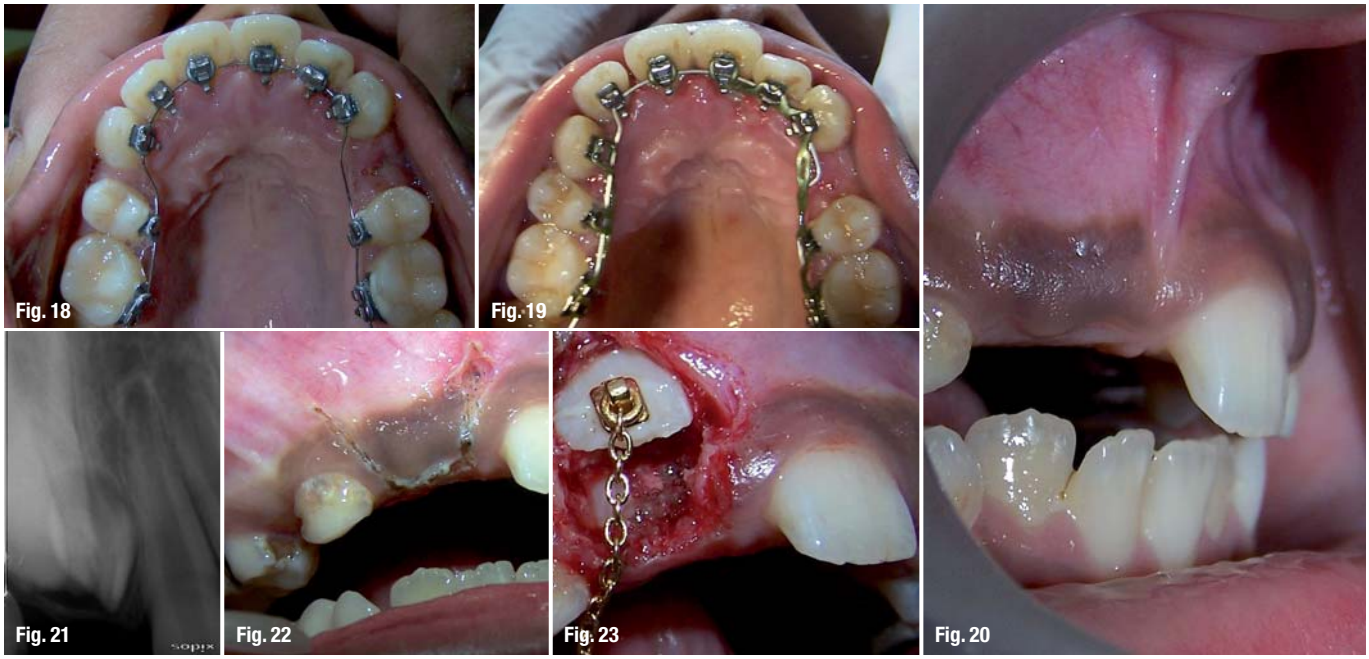

Fig. 14_Orthodontic attachment for alignment.

CASE 4

Fig. 15_Gingival hyperplasia during orthodontic treatment.

Fig. 16_Diode laser assisted gingivoplasty.

Fig. 17_Healed site.

CASE 5

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).

_Case report 4

Gingivoplasty

Orthodontic fixed appliances are generally associated with issues of good oral hygiene maintenance.[9] In many cases we notice gingival hyperplasia (Fig. 15). Such enlargement further impedes good hygiene and is commonly associated with bleeding.[10,11] 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

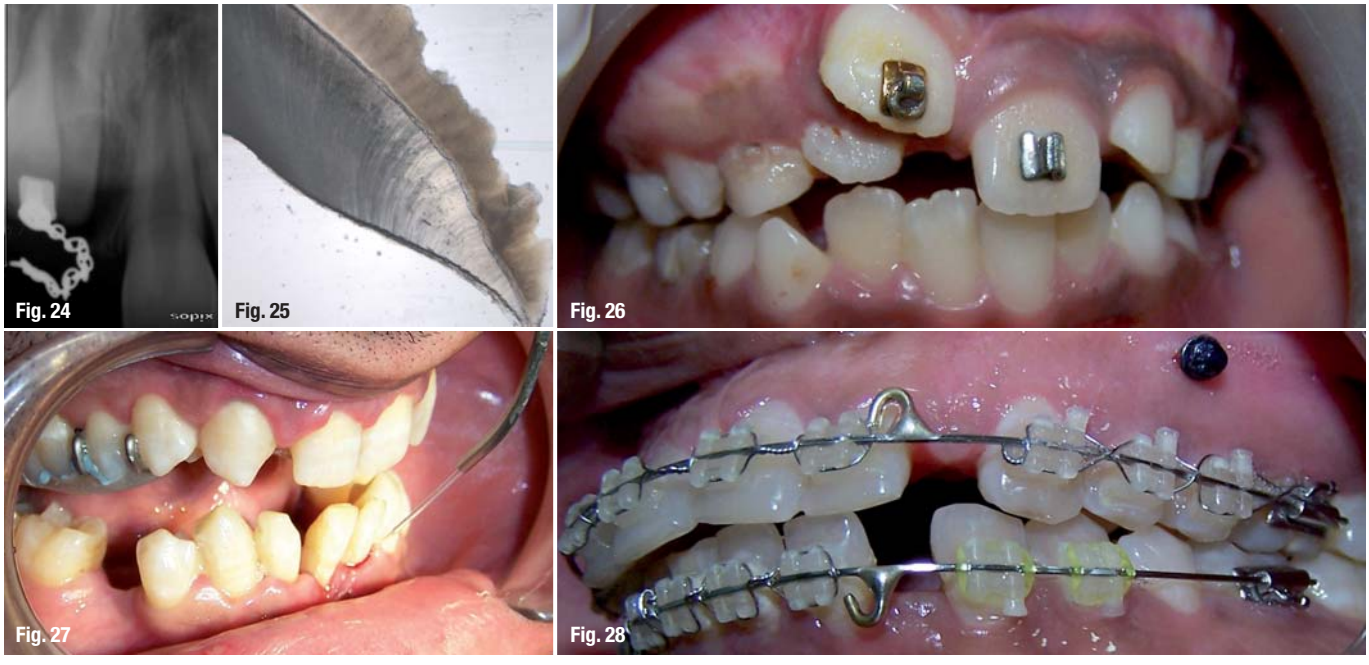


Fig. 29

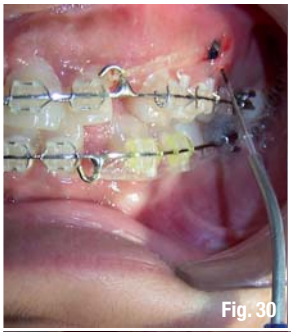
Fig. 30


Fig. 31


Fig. 32


Fig. 33


Fig. 34

poor access and poor visibility. Even electrocautery would not be indicated due to chance of sparking on contact with metal braces.[12] 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). Radiovisiographic 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 continous 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 fibrotomy/ LACSF/ pericision

Control of tooth rotation correction in Orthodontics from relapse is always a challenge. Permanent lingual bonded retention is essential. It is also suggested to do circumferential supracrestal fibrotomy to allow elastic fibres to reorganize favorably without causing relapse of correction.[15,16,17] Conventional scalpel assisted CSF is associated with bleeding and requires infiltration anaesthesia .The authors are trying diode laser at different settings of power & are currently evaluating success of this laser assisted circumferential supracrestal fibrotomy(LACSF) (Fig. 27).

_Case report 8

Diode laser assisted salvaging of orthodontic microimplant

Extensive work is being done on use of lasers in salvaging osseointegrated dental implants.[18] We tried using diode laser for orthodontic microimplant which is used for short term. The patient received two orthodontic microimplants for retraction (Fig. 28), the one on left side was rigid but 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).

_Case report 9

Vestibuloplasty in patient with mucogingival problem before undergoing Lingual Orthodontics

The patient had severe deep bite, associated with extensive mucogingival damage, with poor oral hygiene[19] (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).

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 810 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.
Fig. 26_Erupted tooth.

CASE 7

Fig. 27_Laser assisted circumferential supracrestal fibrotomy.

CASE 8

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.

CASE 9

Fig. 32_Severe deep bite, class II DIV 2, missing upper 12,22.


Fig. 35


Fig. 36


Fig. 37

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.

Diode laser can also be used as low level therapy during orthodontic tooth movement[20] and especially during situation 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 there patients.

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