

Gallium Arsenide Aluminium Laser in Esthetic Dentistry

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Abstract

The greatest discovery in dentistry is local anaesthesia which takes away the pain the second greatest discovery is the development of lasers which takes away both needle and drill. A healthy gingival tissue with proper contour is essential for the retention of any prosthesis. In the present case Gallium Arsenide Aluminium laser was used for the correction of gingival profile, recontouring the gingival zenith line with the adjacent tooth and cross bite correction in both right and left upper premolar using all ceramic crowns.

Keywords: Gallium arsenide aluminium laser; Gingivoplasty; All ceramic crowns; Zenith line

Introduction

Smile is an important component of dental esthetics which deals with maintaining an harmonious relationship with the adjacent gingival tissue. The proper colour, texture, contour, festooning of the gingiva is the important component of gingival esthetics. The esthetic treatment done for gingival tissue are depigmentation, gingivectomy, gingivoplasty, crown lengthening.[1] Improper dento gingival relationship will have a negative effect on the facial appearance of the patient.[2] The first laser was introduced by Maiman in the year 1960 but their use in dentistry was in the year 1977.[3] Gingivoplasty can be done by various methods which include the scalpel, electrosurgery, chemosurgery and laser. The advantage of using soft tissue diode laser over the conventional method is less odema, post operative swelling less discomfort to the patient and faster healing. The target tissue of diode lasers are melanin and haemoglobin present in the soft tissue which helps in gingival recontouring. The depth of incision for a diode laser is 0.5-6 mm depending on the settings ie power, wattage and time. The effect of lasers on soft tissue is coagulation, protein denaturation, vapourization and carbonization which seal the blood vessels and blocks the pain receptors at the site of incision [4]. The present case reports the use of gallium arsenide aluminium laser for gingivoplasty to create a value addition of smile line by decreasing the dark area distal to the canines.

Case Report

A 20yrs old female patient walked into the dental speciality clinic with the request of improvement in the smile by correction of tooth position. On clinical examination the first premolar on both right and left side were in cross bite and the gingival zenith line was at a lower level compared to canine leading to gummy smile appearance on lateral side of the face (Figures 1 and 6) and smile line cut of distal to canine. Radiographic examination did not reveal any abnormalities and the patient was given option of orthodontic and esthetic treatment. The patient opted for esthetic treatment since her profession was marketing and lack of time.

Treatment plan

The esthetic treatment plan included gingivoplasty, recontouring the premolars with all ceramic crowns and establishing. Gingivoplasty was

planned the gingival zenith line was marked with the marker pen on both the premolars in accordance with the profile of the canine (Figures 3 and 8). The tooth was not completely erupted therefore pseudo pocket was seen with the sulcus depth of 4 mm. Gingivoplasty was done using Gallium Arsenide Aluminium laser (kavogentle e ray980) at wavelength of 980 nm, 1.5 w, at continuous mode of 30 sec. Following infiltration and local anaesthesia (2% lidocaine, 1:80,000 epinephrine) 300 micrometer fiber was placed at 45 degree angulation to long axis of tissue, the gingival tissue was incised by placing the laser tips on gingiva with gentle back and forth brush strokes gradually going deeper in planes on the marked line. [5] During the procedure, special eye glasses were worn by the patient and the operator to fulfill with the FDA laser safety rules. The bleeding point where connected followed by use of tweezer to remove the excised tissue. After the excision the 300 micro meter fiber was used in non contact mode on the gingival margins to stimulate gingival healing and depigmentation of the surface.

Tooth preparation procedure

Tooth preparation was done for tooth 14 and 24 for full coverage



Figure 1: Preoperative picture showing isolated cross bite in tooth 24 and zenith line at lower level compared to the canine



Figure 2: Marking of incision



Figure 5: Post operative 3yr follow up



Figure 3: Immediate post operative temporary crown



Figure 6: Preoperative picture showing isolated crossbite in tooth 14 and zenith line at lower level compared to the canine



Figure 4: Two days postoperative after Removal of temporary crown

restoration. Equigingival shoulder preparation was done all around the tooth with additional reduction on the occlusal and lingual surface for placement of the premolar after rehabilitation. After the crown preparation disinfection was done with chlorhexidene 2% followed by impression using double wash putty impression technique (Figure 11). Shade selection and bite registration was done. Die stone was poured and

the model was sent to the lab for all ceramic IPS emax crowns (ivoclar vivadent) (Figure 12). Detailed description of the modification required was written as lab instruction. Immediate temporary crowns was done using light cure composite resin on the model and cemented using zinc oxide eugenol temporary cementing paste (Figures 3 and 8). Next appointment the temporary crowns were removed (Figures 4 and 9), chlorhexidine irrigation was done to clean out the gingival margin and tooth surface and cementation of all ceramic crown with Ketac cem luting cement (3M ESPE) Prescription of diclofenac and serratiopeptidase was given with instructions to be taken only if discomfort and pain persist post-anesthesia. Post operative picture shows the correction the cross bite and the zenith line was at the same level compared to that of canine as seen in (Figures 5 and 10). The patient visited for check up after 2 days and Post operative recall every year till 3yrs. The follow up showed the healthy merged gingiva at the margin of ceramic crown.

Discussion

Gingivoplasty is a procedure done to restore the normal shape and contour of the gingival tissue by correcting the gingival enlargement, unesthetic appearance and asymmetry with the evidence of normal bony configuration [6]. Esthetic dentistry approach to this case was more predictable due to the use of lasers and all ceramic crowns since the other option orthodontic treatment would have left the gingival zenith line at a lower level compared to canines and second premolar due to pseudo pocket



Figure 7: Marking of incision



Figure 10: Postoperative picture after 3yrs



Figure 8: Immediate post operative temporary crown



Figure 11: Double wash putty impression



Figure 9: Two days postoperative after removal of temporary crown



Figure 12: All ceramic crown fabrication

and would have appeared as gummy smile which would further required rehabilitation by gingivoplasty after the treatment period of one year. The advantage of use of this technique is decreased chair time, decreased medication and increased acceptance by the patient by use of lasers. The soft tissue lasers have an excellent incision and seals the small blood and lymphatic tissue resulting in decreased bleeding and postoperative oedema (Figures 2 and 7).Gingival tissues heals with no or minimum scarring due to the disinfection and stimulation of healing by the Gallium Aresenide Aluminium laser. Consequently the use of sutures is eliminated. The low level lasers have photo biostimulation effect i.e. it attacks the

mitochondria present in the cells and enhance the ATP production. This effect can lead to increased wound healing through increased fibroblast proliferation and collagen formation; thus, low-level biostimulation can promote gingival healing or reduction of gingival inflammation, increased release of growth factors, and pain relief. The use of Gallium Arsenide Aluminium laser (Figure 13) has completed the case in single setting for gingivoplasty, tooth preparation and temporization which would otherwise take weeks time due the use of knives in conventional method. There is no drift in the attachment apparatus by use of laser [7]. Gallium Arsenide Aluminium laser is a soft tissue laser which do not have any



Figure 13: Gallium arsenide aluminium laser

effect on the hard tissue of the tooth like the cementum hence can be used safely for gingivoplasty. The diode laser has a hot tip at the end of the fiber which produces a relatively thick coagulum at the treated surface. [8] The all ceramic system presents advantages like favourable esthetics than metal ceramic, decreased thermal sensibility, higher flexural strength than dentin and enamel, biocompatibility, surface that avoids bacterial plaque, high functional strength [9]. From this case report it can be concluded that the soft Gallium Arsenide Aluminium laser can be used in the treatment of gingival enlargement and smile correction in maintaining the esthetics of the patient.

Conclusion

There are various methods to correct the esthetic appearance of the patient. The use of Gallium Arsenide Aluminium laser can be used as one

of the method in correcting the gingival enlargement with least amount of discomfort to the patient. The patient was satisfied with the treatment outcome and the treatment was completed in a shorter duration of time with improved esthetics and function.

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