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Laser Assisted Periodontal Aesthetics: A Case Report

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Abstract:- The increasing emphasis on facial aesthetics and a growing public awareness of oral health have driven a surge in demand for cosmetic periodontal treatments. Excessive gum display is often a primary aesthetic concern in the periodontium when evaluating smile attractiveness. Clinical crown lengthening procedures are designed to expose more tooth structure for restorative or aesthetic purposes. Gingival hyperpigmentation is a common aesthetic concern among young patients seeking dental care. Gingival depigmentation is a periodontal surgical technique designed to reduce or eliminate excessive pigmentation. The present case report showcases the effectiveness and thoroughness of gingival depigmentation and crown lengthening carried out with a diode laser.

Keywords:- *Periodontal Aesthetics, Hyperpigmentation, Depigmentation, Crown Lengthening, Smile Designing, Gummy Smile, Excessive Gingival Display, Laser, Laser Ablation.*

I. INTRODUCTION

The aesthetic appeal of a smile can significantly impact interpersonal relationships, emotional expression, self-esteem, mental health, and ultimately, both personal and professional life.[1] A visually appealing smile, characterized by perfectly aligned teeth and a harmonious balance of pink and white, is a fundamental component of facial aesthetics.[2] Excessive gingival display, often referred to as a "gummy smile," can significantly impact oral health-related quality of life and negatively influence a patient's perception of their attractiveness and self-confidence.[3] The gingiva is the most frequent site of pigmentation within the oral cavity, making it a primary target for aesthetic treatments.[4]. Gingival hyperpigmentation is a primary aesthetic concern for many young patients, particularly those with excessive gingival display.[5] Treatment options for excessive gingival display have been varied, encompassing crown lengthening, orthodontic intrusion, restorative dentistry, and surgical techniques like lip elongation, myotomy, or botulinum toxin injections. Clinical crown lengthening is a periodontal surgical procedure that involves partially removing supporting periodontal tissues to expose more of the tooth's crown.[6] Gingival depigmentation is a periodontal surgical procedure designed to reduce or eliminate excessive gingival pigmentation. successful treatment of gingival hyperpigmentation for aesthetic purposes using surgical, chemical, cryosurgical, and electrosurgical techniques with varying degrees of success have been documented.[7] Recently, laser ablation has emerged as one of the most effective, comfortable, and reliable techniques for treating gingival hyperpigmentation and performing crown lengthening procedures. Various lasers have been successfully employed for these aesthetic treatments. The diode laser, a solid-state semiconductor laser introduced to dentistry in recent years, typically employs a combination of Gallium (Ga), Arsenide (Ar), and other elements like Aluminum (Al) and Indium (In). It operates at a wavelength between 810 and 980 nanometers.[5] This clinical case demonstrates the efficacy and precision of diode laser assited treatment for gingival depigmentation and crown lengthening procedure.

II. CASE REPORT

A 25-year-old female patient came to the out patient department with a concern of dark gums and excessive gum display while smiling and speaking. medical history was non-contributory.

On examination Generalized supragingival calculus, Short clinical crown wrt maxillary and mandibular anteriors, Excessive gingival display wrt maxillary arch, Ellis class 1 wrt 31, High frenal attachment irt mandibular labial frenum, Shallow vestibule wrt mandibular arch was seen. (fig 1)

(a)

(b)

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(c)

Fig 1: pre operative (a) full mouth (b)(c) lateral aspects

(a)

(b)

Fig 2: Assessment of Gingival Aesthetic Line

(a)

(b)

Fig 3: Smile Line Assessment

An assessment of gingival aesthetic line was made (fig 2). smile line assessment according to LIEBART AND DERUELLE (2004) was also conducted (fig 3) Preoperative crown measurements were recorded. oral pigmentation index according to Dummett and Gupta in 1964 was also recorded.

(a)

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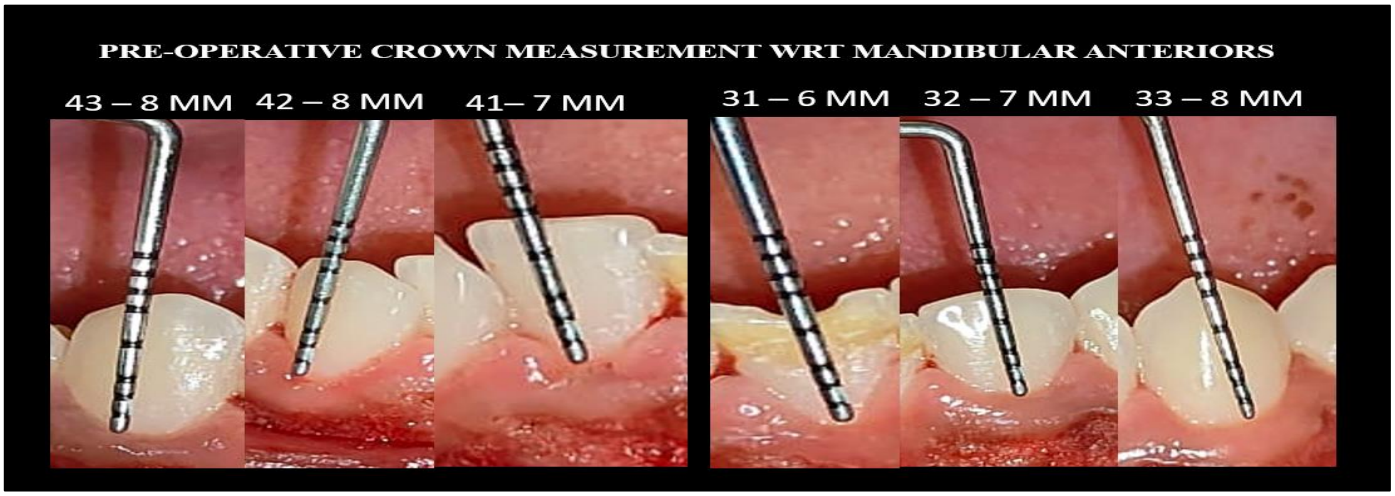

(b)

Fig 4: Pre-Operative Clinical Crown Measurements

A provisional diagnosis was made as Chronic Generalized Gingivitis with hyper pigmented gingiva (DOPI SCORE 2) and excessive gum display (CLASS 1 SMILE LINE)

Comprehensive medical evaluation, including a thorough history and blood tests, was conducted to determine if there were any underlying health conditions that could interfere with the surgical procedure.

A phase I therapy was planned, which included scaling and root planing (SRP) and oral hygiene education.

Following the phase I therapy a phase II therapy was carried out which included Depigmentation using LASER, Crown lengthening using LASER, Vestibuloplasty and Frenectomy in relation to mandibular labial frenum using scalpel.

Procedure:

A topical anesthetic gel was applied to the surgical area. Special eye protection was worn by both the patient and the staff to comply with FDA laser safety regulations. Extra and intra oral asepsis was performed. (fig 5)

Fig 5: Extraoral and Intraoral Asepsis

For the depigmentation a de-epithelialization procedure was performed using a strippable fiber using pulse wave mode (fig 7). Any remaining tissue after laser ablation was gently cleaned with saline-soaked gauze every 3-5 minutes, and the area was carefully inspected to ensure complete removal of pigmented tissue.

Fig 6: Pre Operative

Fig 7: Depigmentation Done Using Laser

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Fig 8: Immediate Post Operative.

For the crown lengthening procedure, bleeding points were marked (fig 8). a diode laser unit was used in Continuous Wave (CW) mode. the diode laser tip was positioned at a 45-degree angle and applied in a sweeping motion, gradually increasing the depth of the incision, to remove the tissue from the maxillary and mandibular anteriors.(fig 9)

Fig 8: Bleeding Points

Fig 9: Crown Lengthening Using Diode Laser WRT Maxillary Arch.

Fig 10: Immediate Post Operative

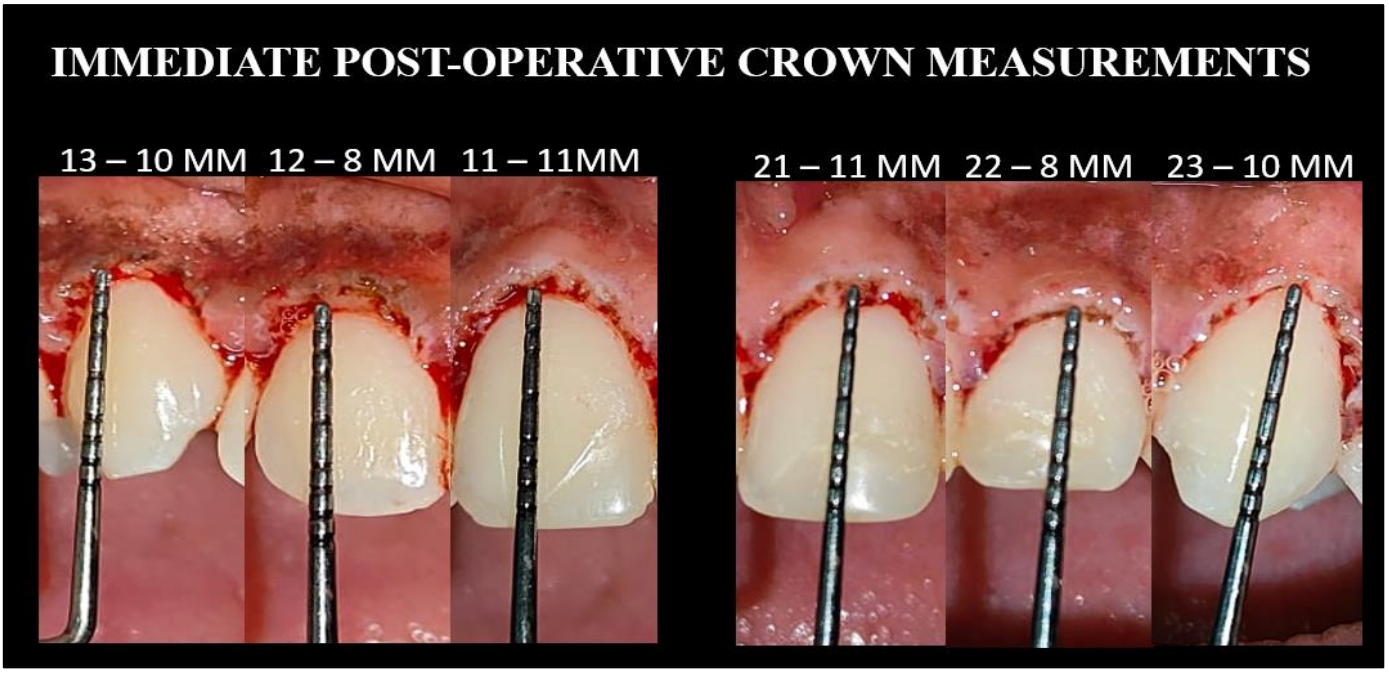

Fig 11: Immediate Post Operative Crown Measurements

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Fig 12: Immediate Post Operative Smile Line

Fig 13: Crown Lengthening Done WRT Mandibular Anterior Using Diode Laser

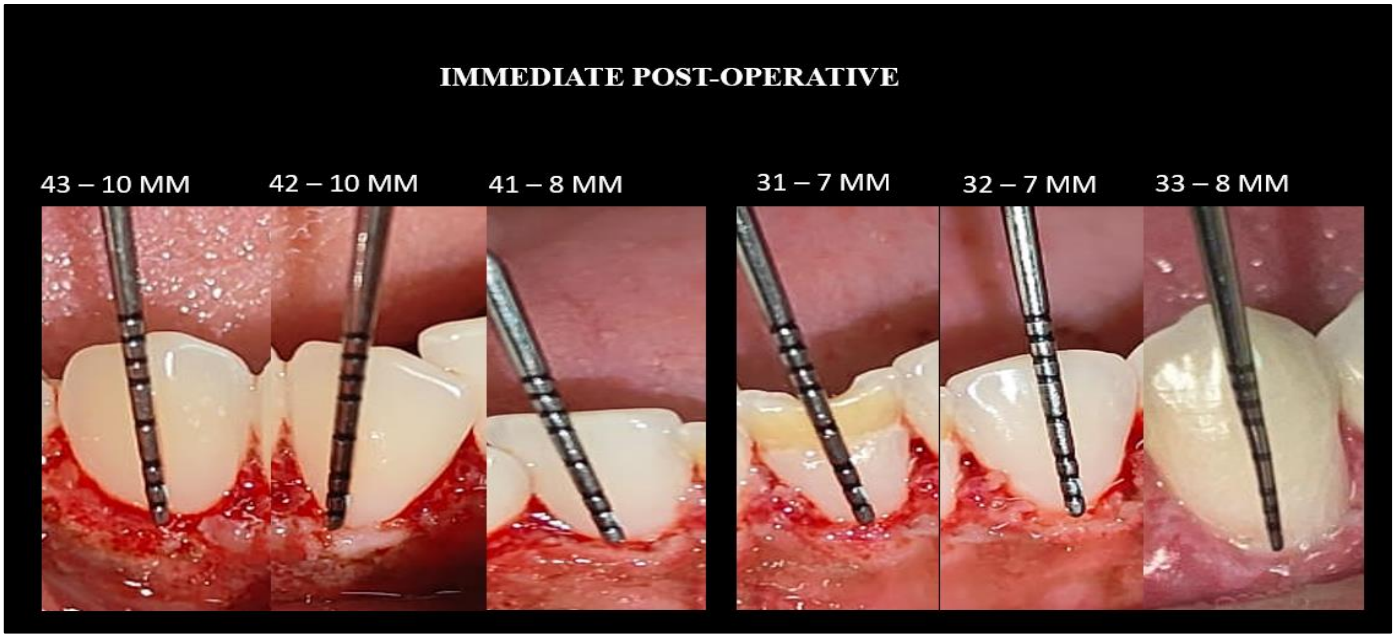

Fig 14 : Immediate Post Operative Crown Measurements WRT Mandibular Anteriors.

A procedure of vestibuloplasty and frenectomy was done in the mandibular vestibule using a scalpel (fig 15).

Fig 15: Vestibuloplasty and Frenectomy Using Scalpel

The patient was provided with analgesics and given instructions for post-operative care. A review at one week showed that the healing was proceeding without any complications. Patient had no complaint of pain or discomfort.

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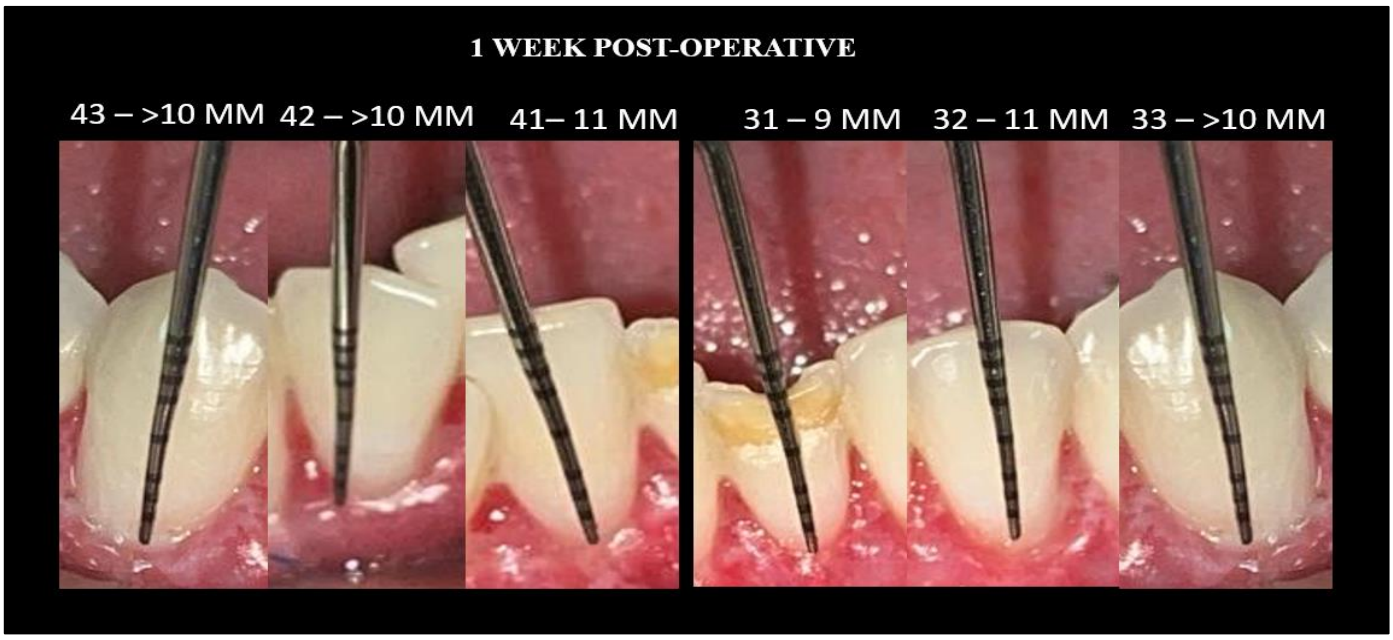
Fig 16: 1 Week Post Operative WRT Maxillary Arch

Fig 17: 1 Week Post Operative Smile Line

(a)



(b)

Fig 18: 1 Week Post Operative Crown Measurements (a) Maxillary Anterior. (b) Mandibular Anterior

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Fig 19: 1 Week Post Operative Vestibuloplasty and Frenectomy

A composite restoration was done wrt 31 which enhanced the aesthetic requirements of the patient (fig 20).

Fig 20: Composite Restoration WRT 31

The patient was recalled for evaluation after 21 days where healing was found to be uneventful. the patient was completely satisfied with the treatment.

Fig 21: Day 1 Pre-Operative

Fig 22: Day 21 Post-Operative

DISCUSSION

While not medically concerning, excessive gingival display can significantly impact a person's smile aesthetics[4]. Many patients are concerned about excessive gum display and gingival depigmentation. While there are various treatment options Lasers and cryosurgery may offer a less painful recovery.[8,9] The diode laser is a versatile tool that has been effectively used at different wavelengths, including 980 nm, 810 nm, and 940 nm. It has a wide range of applications in soft tissue procedures, such as frenectomy, crown lengthening, gum depigmentation, and troughing. The diode laser uses a semiconductor to produce a coherent light beam, making it a compact and cost-effective option.[10] The diode laser is effectively absorbed by the pigments found in periodontal disease, such as melanin and hemoglobin.[11] The diode laser's ability to cut, coagulate, ablate, and vaporize tissue with minimal trauma, along with faster healing and recovery, makes it a versatile tool for a wide range of clinical applications due to which it was a highly preferred choice for the treatment of the following case.[12]

III. CONCLUSION

The diode laser was successfully used to address gingival pigmentation and crown lengthening. Patient experienced minimal pain and was highly satisfied with the aesthetic outcome. The gingiva healed smoothly without any infection, swelling, or scarring.

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