

## Aesthetic Smile Makeover in Periodontics Using Three Techniques – Crown Lengthening, Depigmentation and Modified Lip Repositioning: A Case Report

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**Abstract:** This case report describes the successful use of three techniques - Crown lengthening, depigmentation and lip repositioning for reduction of excessive smile display as well as dark pigmented gums. A gummy smile along with melanin hyperpigmentation of the gingiva are a major concern for a large number of patients visiting the dentist as it can often determine the beauty of a smile and how well a person can function in the society. In this case, a perfect balance of the pink (gingival) display and white (teeth) was managed with three different treatment modalities, which was based on proper diagnosis. Crown lengthening procedure was performed to correct excessive gingival display due to altered passive eruption where in the gingiva fails to migrate apically in order to attain position 1 mm coronal to CEJ, depigmentation for reduction of hyperpigmentation of the gingiva and upper lip hypermobility was corrected by lip repositioning surgery.

**Key Words:** lip repositioning, aesthetic clp, depigmentation, perio-esthetics.

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### I. Introduction

The final esthetic success of the case is greatly affected by the gingival health since the gingiva acts as a frame for teeth and establishing the correct gingival levels for each individual tooth is the key for creation of harmonious smile. Under ideal conditions, the gingival margin and the lip line should be compatible with each other or conservative marginal gingival display of approximately 1-2 mm is generally considered as part of the ideal esthetic smile. An excessive gingiva-to-lip distance of 4 mm or more makes the smile look gummy and unattractive.<sup>1</sup> Such cases often requires cosmetic periodontal recontouring to achieve an ideal result. There are various techniques to correct the gummy display such as lip repositioning, crown lengthening procedures, orthodontic leveling of the gingival margins of maxillary teeth, maxillary teeth intrusion, orthognatic surgery and nonsurgical procedures like the use of the botulinum toxin to<sup>2</sup>. Dentoalveolar extrusion cases in the maxillary anterior are treated with orthodontic intrusion and cases of vertical maxillary excess are treated with orthognatic surgery. However, in cases with minor vertical discrepancy, such procedures cannot be carried out due to increased post-surgical morbidity, high cost and invasiveness of such procedures.

Gingival pigmentation due to melanin varies from light to dark brown or black. It can either be physiologic such as racial pigmentation or pathologic due to systemic diseases such as Addison's disease, Peutz Jegher's syndrome, Albright's syndrome etc. It is essential for clinicians to understand the cause of gingival pigmentation before planning the treatment.<sup>3</sup> The physiological hyperpigmentation due to melanin usually does not present as a medical problem and if the patient complains of unaesthetic appearance, these conditions can be treated with depigmentation procedures with surgical scalpel technique, use of rotary diamond finishing burs, electrosurgery, laser ablation, cryosurgery or gingival grafting.

Presented here is a case of gingival hyperpigmentation along with excessive gingival display due to altered passive eruption and hypermobile upper lip. The aim of this case report was to describe the surgical treatment sequence of aesthetic crown lengthening in order to apically reposition the dentogingival complex along with lip repositioning to limit the retraction of the elevator smile muscles (orbicularis oris, levator labii superioris, zygomaticus minor, levator anguli oris) and depigmentation using soft tissue diode laser to reduce the dark appearance of gums.

### II. Case Report

A 27 year old female patient reported to the Department of Periodontology, Government Dental College And Hospital, Aurangabad, Maharashtra with the chief complaint of gummy smile and black gums.( figure 1 ) On thorough examination, it was found that she had deeply pigmented gingiva suggestive of physiologic melanin pigmentation as her detailed medical history was non-contributory. There was no contraindication for surgery. Examination also revealed she had an excessive display of gingiva attributed to

altered passive eruption where the clinical crown was much shorter than the anatomic crown, and the patient expressed the desire to have “longer looking teeth” along with correction of gingival hyperpigmentation. Before undertaking any of the surgical procedures, a written informed consent was obtained from the patient after a discussion of risks, benefits, and treatment alternatives. She underwent a full mouth scaling, following which oral hygiene instructions were given to her.



**FIGURE 1:** Pre-operative picture showing heavily pigmented gingiva in the maxillary anterior region and excessive gingival display with improper zenith position from canine(left) to canine(right)

Smile Line (According to classification given by Liebart and Deruelle in 2004)<sup>4</sup> : Very High smile line (exposing all of the clinical crowns plus a contiguous band of gingival tissue i.e more than 4mm) (FIGURE 1)

Lip length: 21mm (measured from the base of the nose to edge of upper lip) Average lip length : 20mm-22mm in young women and 22mm-24mm in young men.

TABLE NO. I (PRE-SURGICAL MEASUREMENTS): A comprehensive clinical and radiographic examination was done to assess clinical crown length, gingival zenith position, root length, keratinized gingiva height, and the location of the alveolar crest. (TABLE NO. I)

TOOTH NUMBER	13	12	11	21	22	23
GINGIVAL ZENITH POSITION	DISTALLY	DISTALLY	CENTRALLY	CENTRALLY	CENTRALLY	DISTALLY
CLINICAL CROWN HEIGHT	10	5.5	6	7	6	10
RADIOGRAPHIC CROWN HEIGHT	10	9.5	10.5	10.5	9.5	10
RADIOGRAPHIC ROOT LENGTH	20	13	14	14	13	20

Maintaining the width : length ratio i.e the repeated ratio between 0.75-0.80 and the golden proportion for the anterior teeth, a transparent surgical guide (stent) was prepared in order to tailor a proper treatment approach. (FIGURE 2)

Expected treatment outcome after aesthetic crown lengthening procedure:

- III. Gingival margins of central incisors should be symmetric and 1 mm apical to the lateral incisor margins.
- IV. The maxillary canines should be 1 mm apical to lateral incisors and the central incisors.
- V. A horizontal line which connects the gingival margins of central incisors and canine should be parallel to the interpupillary line.
- VI. For gingival zenith - The apex of the gingival height of contour peaks towards the distal for the central incisors and canines whereas it is in the middle of the lateral incisors.
- VII. The lengths of the central incisor and canine crowns range from 9.4 mm (females) -10.2 mm (males) up to 11-13 mm. The laterals are on average around 10mm i.e 1.5 mm shorter than the centrals.<sup>3</sup>



**FIGURE 2:** Surgical guide ( stent) was prepared pre-surgically and markings done with an indelible pencil

**SURGICAL PROCEDURE:**

Pre-operatively patient was asked to rinse with 0.12% chlorhexidine for one minute. Local infiltration anesthesia was given i.e 2 ml of Lignocaine with adrenaline in the ratio 1:100000 by weight. Markings according to the surgical guide (stent) were made on the gingiva with an indelible marking pencil. (FIGURE 2) Gingivectomy was done with a #15 blade to remove the excess gingiva to the level of the anticipated CEJ without disturbing the interdental papilla. (FIGURE 3) Sulcular incisions were made at each tooth extending inter proximally and each papilla was split. A full thickness mucoperiosteal flap was raised by blunt dissection to expose the underlying osseous crest. Osseous recontouring was done to establish an osseous crest about 2mm from the CEJ and maintain the biologic width to prevent relapse. #6 round diamond burs, bone chisels and end cutting surgical burs were used for ostectomy and osteoplasty. Interrupted sutures were placed using 5-0 absorbable vicryl sutures followed by COE- pack. (FIGURE 5) Post-operative medications were given and patient was instructed to ice the area for 24 hours to decrease swelling. The patient was placed on a 0.12% chlorhexidine rinse , twice a day for 14 days and she was instructed not to brush and floss the area for two weeks. Sutures were removed after 2 weeks, follow up taken and normal oral hygiene was reinstated. She was called after 1 month for a follow up and it was found that there was an impressive reduction in the gingival display when compared to pre-operative levels. (FIGURE 6). The patient was quite pleased with the post-surgical results but requested to get treatment done for her dark pigmented gums.



**FIGURE 3 :** Incisions given by preserving the papilla.



**FIGURE 4 :** After gingivectomy and osseous recontouring



**FIGURE 5 :** Interrupted sutures given and COE pack placed



**FIGURE 6 :** Follow-up after 1 month

**LASER TECHNIQUE FOR GINGIVAL DEPIGMENTATION:**

Local anaesthesia was administered and the procedure was Depigmentation in the maxillary and mandibular anterior region was done using a soft tissue diode laser with 980nm wavelength (Zolar diode laser) (FIGURE 7,8,9). The soft tissue diode laser was used in continuous and contact mode at a power output of 2W in cervico-apical direction with paint brush strokes on all pigmented areas. Precautionary postoperative instructions were re-enforced and patients was prescribed analgesics as needed, if she experienced any pain. On 2 weeks follow up, the laser ablated wound healed completely and after 3 months, the gingiva appeared healthy and pink in colour without any areas of re-pigmentation.(FIGURE 10)



FIGURE 7 : Laser depigmentation by diode laser in maxillary anterior region



FIGURE 8 : Laser depigmentation by diode laser mandibular anterior region



FIGURE 9 : ZOLAR soft tissue diode laser



FIGURE 10 : After 3 month follow-up

Since there was still a gingival display of 4mm, lip repositioning was planned for further reduction of gummy smile. Moderate gingival display which does not have a skeletal origin and vertical maxillary excess that ranges between 4 and 8 mm can effectively be treated performing surgical repositioning of upper lip which further limits the retraction of muscles such as zygomaticus minor, orbicularis oris, levator anguli oris and levator labi oris.<sup>4</sup>

**SURGICAL PROCEDURE FOR MODIFIED LIP REPOSITIONING:**

Written informed consent was obtained after discussion with the patient about the treatment benefits, possible complications, and alternative treatments to surgical lip repositioning. Local anesthesia (2 ml of Lignocaine with adrenaline in the ratio 1:100000 by weight) was administered at the vestibular mucosa and lip from the maxillary right to left second premolar. With the help of an indelible pencil, markings were made at the mucogingival junction, which served as a guide to carry out the first incision. A second marking was made in the labial mucosa that ran parallel to the first marking (at the mucogingival junction) which was 8mm–10 mm apical of the mucogingival junction. ( FIGURE 11) It should be noted that the amount of partial-thickness flap which needs excision should be either double the amount of gingival display that needs to be reduced or a maximum of 10-12 mm tissue should be removed to prevent the involvement of labial minor salivary glands which may lead to the formation of a mucocele. The markings were connected at the central incisor region without involving the maxillary labial frenum and at the premolar molar region creating a quadrilateral outline. ( FIGURE 11)





FIGURE 11 : Marking made with an indelible marking pencil, creating a quadrilateral outline.



FIGURE 12 : Removal of epithelium leaving the underlying connective tissue exposed

A partial thickness incision was made according to the markings and the epithelium was carefully dissected within this quadrilateral outline, leaving the underlying connective tissue exposed. (FIGURE 12) About 8 mm of partial thickness tissue was removed from either side of the maxillary labial frenum. (FIGURE 13) Precautions were taken to avoid damage to any minor salivary glands in the submucosa. Complete hemostatis was attained by giving pressure pack. Parallel incised margins were approximated and interrupted sutures (4-0 silk sutures) were carefully placed. (FIGURE 14) Post-operative medications were and chlorhexidine mouthwash 0.12% was given for gentle bathing of the surgical area twice a day for two weeks. Patient was instructed to apply ice packs externally at 20 minutes intervals for 24 hours and was also asked to consume only soft diet during the first postoperative week. Patient was instructed to avoid any manipulation or mechanical trauma to the surgical site and to minimize lip movements when smiling or talking atleast in the first 2 weeks postoperatively. Sutures were removed after 2 weeks. The site healed uneventfully without any post-operative complications and there was signification amount of reduction in the gingival display. The results were stable even after 3 month and 1 year follow up along with competent lips. Patients was highly pleased and satisfied with the final outcome.



FIGURE 13 : 8mm partial thickness tissue removed



FIGURE 14 : Interrupted sutures placed (4-0 silk)



FIGURE 15 : Immediate post-op



FIGURE 16 : 3 months follow-up



FIGURE 17 : (left picture) Baseline smile, (right picture) Final smile makeover and follow up after 1 year

### **VIII. Discussion**

Smile designing is the architectural blueprint on which a dentist should base his/her treatment planning decisions. Increased awareness about beauty and smile makeovers in the adult population has created a drive amongst dentists to improve their esthetic demands. This case report was aimed at showing the integral planning that went into harmonising a beautiful smile and various treatment modalities which can be used to correct the esthetic disharmony in self-conscious patients. In the present case, as there was sufficient width of attached gingiva and due to altered eruption, there was excess gingival tissue covering the crowns of maxillary anterior tooth region which results in a silhouette form that is unattractive as it makes the teeth appear smaller. The esthetic crown lengthening procedure requires gingivectomy to expose the required additional tooth structure followed by osteotomy and osteoplasty to prevent violation of the biological width which can further lead to gingival inflammation, discomfort, gingival recession, bone loss and pocket formation.<sup>5</sup> Since the vertical maxillary excess was not severe requiring orthognathic surgery; hence, the surgical lip repositioning procedure was planned in the present case. The conventional lip repositioning surgery was first described in 1973 by Rubinstein and Kostianovsky.<sup>6</sup> Correction of gummy smile with the help of lip repositioning surgery was also performed detaching the elevator muscle in cases with a short upper lip and it was described by Litton and Fournier.<sup>7</sup> In the present case facial proportions were symmetrical in three horizontal thirds and the gingival display after performing crown lengthening procedure was 4mm indicating mild vertical maxillary excess. Since patient did not wish to go for orthognathic treatment approach, lip repositioning procedure was chosen. Modified lip repositioning leaves the maxillary labial frenum intact which helps in maintaining the midline, prevents changes in symmetry of the lip and also decreases the morbidity associated with the procedure.<sup>8</sup> Ruling out all the systemic conditions and after thorough medical history gingival hyperpigmentation was found to be physiologic in origin. Various treatment modalities are available for cosmetic removal of hyperpigmentation of the gums. Chemical solutions, cryotherapy have been used to destroy pigmented tissue but there is no control over depth of penetration and repigmentation soon develops. Scalpel and bur abrasion surgeries causes bleeding as well as post-operative swelling and discomfort thus making it less favourable for patients. The soft tissue diode laser has advantages such as dry and bloodless surgery, instant sterilization of the surgical site, reduced chances of bacteremia, less mechanical trauma, postoperative pain and do not need periodontal dressings.<sup>9</sup> Patient did not experience any postoperative complications when laser was used for depigmentation. This is in accordance with other studies which state the same advantages for soft tissue diode laser as a treatment modality for depigmentation of gingiva.<sup>9,10</sup> The quality of life and confidence in the society improved as the final outcome of these three procedures met the esthetic demands of the patient.

### **IX. Conclusion**

The aesthetic crown lengthening procedure, modified lip repositioning and the depigmentation by soft tissue diode laser described above offers a practical technique to dramatically improve patient esthetics. The patient was extremely satisfied with the smile makeover and did not complain of any post-operative discomfort. We can say that these periodontal surgical procedures can be used to considerably improve the smile esthetics of a patient. Expectations have raised the bar in the world of dentistry today. Thus, we as cosmetic Dentists must rise up to the challenges and keep up with the latest advances, techniques and materials so as to provide our patients with the highest quality care and satisfaction.

### References

- [1]. Kokich VO Jr, Kiyak HA, Shapiro PA. Comparing the perception of dentists and lay people to altered dental esthetics. *J Esthet Dent* 1999;11:311-24.
- [2]. Liebart ME, Deruelle CF, Santini A, Dillier FL, Corti VM. Smile line and periodontium visibility. *Perio*.2004;1:17–25.
- [3]. Magne P, Gallucci, GO, Belser UC. (2003) Anatomic crown width/length ratios of unworn and worn maxillary teeth in white subjects. *J Prosthet Dent*. 89(5):453-61.
- [4]. Rao AG, Koganti VP, Prabhakar AK, Soni S. Modified lip repositioning: A surgical approach to treat the gummy smile. *Journal of Indian Society of Periodontology*. 2015 May;19(3):356.
- [5]. Tomar N, Bansal T, Bhandari M, Sharma A. The perio-esthetic-restorative approach for anterior rehabilitation. *Journal of Indian Society of Periodontology*. 2013 Jul;17(4):535.
- [6]. Rubinstein AM, Kostianovsky AS. Cirugia astetica de la malformacion de la sonrisa. *Pren Med Argent* 1973;60:952.
- [7]. Litton C, Fournier P. Simple surgical correction of the gummy smile. *Plastic and reconstructive surgery*. 1979 Mar 1;63(3):372-3.
- [8]. Ribeiro-Júnior NV, Campos TV, Rodrigues JG, Martins TM, Silva CO. Treatment of excessive gingival display using a modified lip repositioning technique. *Int J Period Restorative Dent*. 2013;33:309– 3
- [9]. Anoop S, Abraham S, Ambili R, Mathew N. Comparative evaluation of gingival depigmentation using scalpel and diode laser with 1 year follow-up. *Int J Laser Dent*. 2012;2(3):87-91.
- [10]. Suthprasertporn S. , Treatment of Gingival Melanin Hyperpigmentation by Er,Cr:YSGG Laser: Report of 2 Cases, *Thai J Periodont* 2007; 1: 46-55

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