DEPIGMENTATION OF GINGIVIA USING SEMICONDUCTOR DIODE LASER: A CLINICAL CASE REPORT

Nitin Agarwal¹ MDS
Develena Bhowmick² MDS
Abhishek Sinha³ MDS
Anuj Mishra⁴ MDS
Sudhir Shukla⁵ MDS
Devika Singh⁶ MDS

ABSTRACT: Gingival hyperpigmentation has become an important role for major number of young people nowadays. Although medical problems are not seen, but smile with display of black gums makes the appearance very unesthetic and is seen excess in patients with gummy smile. It is caused by excessive melanin pigment deposition secreted by melanocytes situated in suprabasal and basal cell layers of epithelium. The latest treatment modality for gingival hyperpigmentation is use of lasers for depigmentation because of its innumerable advantages over conventional scalpel techniques. Hereby we report a case on the cosmetic correction of gingival depigmentation using a diode laser with excellent results.

KEY WORDS: Diode Laser, 980 nm, Gingiva, Melanin Hyperpigmentation, Depigmentation.


INTRODUCTION

Esthetics has become an important aspect of dental practice & clinicians now accept the challenge to fulfil the esthetic and functional demands of the patients. Achievement of acceptable gingival appearance with biologic and functional stability has gained importance over the years. The gingival color plays a pivotal role in every perception of esthetics and it varies among different individuals which ranges from pale pink color to deep bluish purple hue depending upon on the vascular supply of gingiva, epithelial thickness, degree of keratinization & presence of pigmented cells¹.

Oral pigmentation is the discolouration of mucosa or gingiva. It could be due to physiological or pathological conditions. Gingiva is most common site of pigmentation in oral cavity. Frequent reason of gingival pigmentation is excessive deposition of melanin by melanocyte in the situated in the suprabasal and basal layers of epithelium². It has been seen that the prevalence of melanin pigmentation amongst different populations has been reported to vary between 0% to 89% in relation to the ethnic factors and smoking habits³. After birth, melanin occurs as early as 3 hrs in the oral tissues and in few cases the only sign of pigmentation is on body⁴. Gingival hyperpigmentation, often referred to as racial gingival pigmentation which is seen as a genetic trait in all the ethnicities which is frequently observed in Africans, East Asians and Hispanics⁵-⁷.

Depigmentation of gingiva is a perioplastic surgical treatment where gingival melanin pigmentation is completely removed and reduced by number of techniques. Technique selection is always based on

¹. MDS & Professor in the Department Of Oral Medicine & Radiology, Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow, Uttar Pradesh, India.
². MDS 2nd Year Post Graduate student in the Department Of Oral Medicine & Radiology, Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow, Uttar Pradesh, India.
³. MDS & Reader in the Department of Oral Medicine & Radiology, Sardar Patel Post graduate Institute of Dental & Medical Sciences, Lucknow, Uttar Pradesh, India.
⁴. MDS 3rd Year Post Graduate student in the Department Of Oral Medicine & Radiology,Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow, Uttar Pradesh, India.
⁵. MDS 3rd Year Post Graduate student, Department Of Oral Medicine & Radiology,Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow, Uttar Pradesh, India.
⁶. MDS 2nd Year Post Graduate student, Department Of Oral Medicine & Radiology,Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow, Uttar Pradesh, India.

Corresponding author: “Dr Nitin Agarwal, Professor & Head Of Dept of Oral Medicine & Radiology” < nitinmdds@yahoo.com >
clinical proficiency and choice of individual.

A) Procedures required at removing the pigmented portion:
   a. Surgical Scalpel Technique
   b. Cryosurgery
   c. Electrosurgery
   d. Lasers
      i. Nd: YAG (Neodium: Aluminium-Yttrium-Garnet) Laser
      ii. Er: YAG (Erbium: Aluminium-Yttrium-Garnet) Laser
      iii. CO2 Laser
      iv. Diode Laser
      e. Diamond Burs
      f. Chemicals (90 % Phenol and 95 % Alcohol)

B) Procedures required for covering the pigmented gingiva with grafts from lesser pigmented areas
   a. Free Gingival Grafts
   b. Acellular Dermal Matrix Allograft

Laser depigmentation is increasingly becoming popular as the preferred treatment modality for gingival hyperpigmentation. Laser offers many advantages over conventional surgery including less bleeding and less post operative pain. Diode laser has been introduced in dentistry few years back. It is a semiconductor solid state laser that has a combination of Arsenide, Gallium & other various elements such as Aluminium, Indium to convert electrical energy into form of light energy ranging from 800 nm to 980 nm. The present clinical case represents gingival depigmentation using a semiconductor diode laser.

**CLINICAL CASE**

A female patient aged 23 years old came to Sardar Patel Post Graduate Institute of Dental and Medical Sciences, Lucknow, Uttar Pradesh, India in Department of Oral Medicine and Radiology with the chief complaint of dark Gums (Fig.1) and the treatment for the same. History was carefully recorded and no evidence of tobacco consumption, any systemic condition and drug use was found. Extraoral and Intraoral examination did not suggest any evidence of abnormality. The patient had fair oral hygiene levels with good plaque control. Hyperpigmented gingiva was observed on labial aspect of mandibular and maxillary arches. Based on these findings, a provisional diagnosis of Gingival Hyperpigmentation was established and de-epithelisation extending from canine to canine was planned using a diode laser.

**TREATMENT**

The patient was given oral hygiene instructions and oral prophylaxis was completed. Topical local anaesthetic spray (Lignocaine, 10 %) was used. Laser specific protective eyewares were used by the operator, assistant and the patient. Doctor Smile SIMPLER Diode Laser by Lambda SpA, Vicenza, Italy operating at 980 nm with standard handpiece was used for gingival depigmentation. Laser was set at 2.0 watt in medium pulse mode. (Fig. 2) Laser depigmentation started from mucogingival junction towards interdental papilla and free gingiva in a very light brushing strokes and tip was kept in motion throughout the procedure. (Fig.3) Remnants of tissue were taken out using a gauze which was sterilized and moistened with saline. The entire procedure was repeated until desired epithelial thickness got removed. The maxillary and mandibular arches were covered with grafts harvested from the lesser pigmented areas.
Depigmentation Of Gingiva Using Semiconductor Diode Laser: A Clinical Case Report

Agarwal N / Bhowmick D / Sinha A / Mishra A / Shukla S / Singh D

Depigmentation was carried out in a single visit. The patient was kept under observation at intervals of 7 days, 15 days, 3 months, 6 months and 1 year (Fig.4 to Fig.7). In the first 15 days of follow up no post operative pain, haemorrhage, infection or scarring at any of the site was observed and the healing was uneventful.

Post treatment, the patient was routinely recalled after 3 months, 6 months and 1 year follow up. Satisfactory results were seen amongst the patients with no recurrence of regimentation.

DISCUSSION

There is a great variation in the gingival colour of a healthy individual depending upon gingival vascularisation, thickness, keratinisation and pigmentation along with other factors including genetic factors and racial background. Melanin pigmentation is very common cause for gingival hyperpigmentation which is synthesized by melanin producing cells i.e. melanocytes situated in suprabasal and basal layers of epithelium by hydroxylation of tyrosine to melanin. Melanin hyperpigmentation can also result due to tobacco use, presence of any systemic condition (Endocrine disturbances, Peutz-Jeghers Syndrome, Malignant Melanoma Hemachromatosis, Albright's Syndrome, etc) as well as drug use (Anti Malarial Agents, Tricyclic Antidepressants etc)

Though the presence or absence of melanin in the gingival tissue has no role to play in any disease activity, some researchers however suggest the protective action of melanin by acting as sink for free radicals generated by respiratory burst of phagocytes during bacterial lysis19.
Although medical problems are not seen, but smile with display of black gums makes the appearance very unesthetic. Various techniques have been employed to manage this condition with the sole aim to remove the basal epithelial layer containing melanin pigments and melanocytes. The technique required is based on proficiency of clinician and individual’s choice.

Scalpel technique is the oldest and popular technique of depigmentation but it causes unpleasant bleeding and requires 7-10 days periodontal dressing. Cryosurgery often results in considerable swelling along with more destruction of soft tissue. The penetration depth and optimal duration can’t be controlled if freezing unknown. Electrosurgical depigmentation requires continued electrode application on tissues resulting in greater chances of thermal damage to underlying periosteum and bone. Depithilisation of gingiva by dental bur abrasion is quick and effective technique but causes unpleasant bleeding during the procedure and requires a periodontal dressing for 7-10 days. Chemical agents used to destroy the basal cells are harmful to oral tissues and repigmentation soon develops. Gingivectomy with free gingival graft is more invasive and unnecessarily creates a second surgical site.

Gingival depigmentation by LASER (Light Amplification by Stimulated Emission of Radiation) is a recent addition to this list. Various types of lasers have been tried with encouraging results. The Semiconductor Diode Laser debuted in mid 1990’s and has gained considerable use in the field of dentistry with the latest systems having dimensions comparable to a that of standard dental handpiece.

Diode laser operates at near infrared (NIR) wavelengths (800 nm to 980 nm) are highly absorbed by haemoglobin, melanin and other pigments and are ideally suited for soft tissue procedures. Diode laser like its predecessors interacts with tissue in one of the four ways - Transmission, Reflection, Scatter and Absorption. This absorptive interaction results in conversion of laser energy into thermal energy causing physical changes in the target tissue - Photothermolysis.

Although healing of laser wound is slower than scalpel wound, laser offers many advantages over conventional surgery:

1. Bloodless and dry surgery
2. Instant surgical site sterilization
3. Lesser bacteraemia
4. Lesser mechanical trauma
5. Minimum post operative scaring and swelling
6. Minimal post operative pain

Although initial result of depigmentation procedure is very motivating, but chances of repigmentation is common problem. The large variation in time lag before repigmentation could be related to the technique used and race of the patient. Though the mechanism of repigmentation has been not fully understood, theories suggest migration of melanocytes which are active from adjacent pigmented tissues into the areas treated or activation of melanocytes left during surgery.

**CONCLUSION**

Smile is the mirror of self confidence and joy. The great comedian, Charlie Chaplin stated, “You’ll find that life is still worthwhile, if you just smile”. However, a perfect smile is not just about shape, position and colour of teeth but also the gingiva supporting the teeth. Gingival melanin pigmentation has become an important concern for majority number of patients. Different methods for depigmentation have been documented with comparable results. However, choice of procedure is based on preference of an individual, expertise clinicians and affordability of a patient. Diode laser depigmentation is relatively safe, minimally invasive, convenient and effective treatment modality. The procedure is almost bloodless, painless and sterile with better patient compliance and satisfaction. In present clinical case, evidence of repigmentation was not observed even after one year of follow up.

**REFERENCES**

5. Dummet CO, Barens G. Oromucosal pigmentation: