

Gingival Depigmentation using Microneedling Technique and Hyaluronic Acid Mesotherapy: A Case Report

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ABSTRACT

Gingival depigmentation is a common aesthetic procedure. Gingival pigmentation is primarily physiological due to the production of melanin. Various techniques have been practised to treat gingival depigmentation. Invasive techniques, such as the scalpel method, chemical peeling, and gingivectomy, may cause postoperative discomfort, risk of complications, and potential for gingival recession. To overcome these issues, a novel therapeutic modality called Microneedling (MN), utilised in dermatology, has been investigated for gingival depigmentation. Recently, in the field of dermatology, a technique known as MN, which involves repetitive puncturing, has been widely applied. It is simple, economical, and demonstrates good tolerability in patients. Additionally, this technique provides a dual benefit in both cosmetic and therapeutic realms. Hyaluronic Acid (HA) has anti-oedematous and anti-inflammatory effects and accelerates tissue recovery. In the present case, MN-assisted gingival depigmentation was performed in combination with 0.8% HA gel. It was observed that the Dummett-Gupta Oral Pigmentation Index (DOPI) scores gradually reduced on the 7th, 14th, and 21st day, and the results were found to be clinically predictive.

Keywords: Aesthetics, Dummett-Gupta oral pigmentation index, Micro-conduits, Sterile injections, Visual analogue scale score

CASE REPORT

A 25-year-old female patient presented with the chief complaint of aesthetically displeasing dark pigmented gums in the upper front teeth area and sought treatment. The patient had a history of dark pigmentation of the gingiva for the past 15 years. She had no relevant medical history and was well-built. The patient reported no history of smoking or other deleterious habits.

Intraoperative examination revealed diffuse melanin pigmentation in the attached gingiva in relation to teeth 11, 12, 13, 21, 22, 23, 31, 32, 33, 41, 42, and 43, as shown in [Table/Fig-1], employing the DOPI [1]. The intensity of pigmentation was scored as 2, as illustrated in [Table/Fig-2].



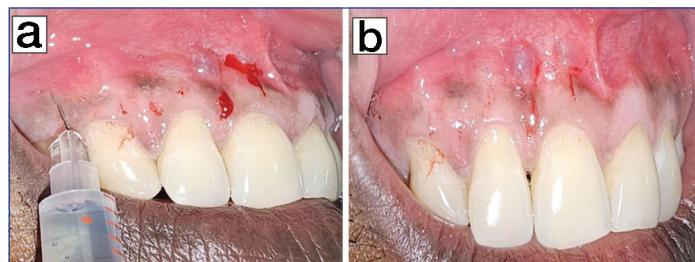
[Table/Fig-1]: Preoperative intraoperative picture.

Score	Inference
0	Gingiva exhibiting a pink colouration
1	Mild light brown hue in the gingiva
2	Medium brown colour or a combination of brown and pink in the gingiva
3	Deep brown/blue-black colour in the gingiva

[Table/Fig-2]: The assessment criteria for Dummett-Gupta Oral Pigmentation Index (DOPI) [1].

The patient underwent non-surgical periodontal treatment consisting of complete scaling and root planing, followed by oral hygiene instructions. The patient was informed about the procedure, and informed consent was obtained.

On the right side of the maxilla and mandible, 0.8% HA was loaded into a disposable insulin syringe with a 30Gx1/2" needle. The needle was inserted at a 45° angle, 2-3 mm apical to the incisal papilla in all surrounding areas. The bevel of the injection needle was positioned sloping upwards. Each involved papilla was injected until blanching or bubbling was visible [2], as shown in [Table/Fig-3a,b].



[Table/Fig-3]: Gingival depigmentation on the right-side of the maxilla: a) Local injection of 0.8% HA; b) Bubbling effects after local injection of Hyaluronic Acid (HA); and Microneedling (MN) are carried out using a Dermapen (Dr. Pen, Las Vegas, NV) device. The needle cartridge features 12 to 24 needles arranged in rows. The depth of penetration is adjusted to 1 mm, with a minimum speed of 412 cycles per minute. The Dermapen is held perpendicular to the gingival surface, and MN is performed horizontally, vertically, and diagonally four times over the entire hyperpigmented gingival area [2].

On the left side of the maxilla and mandible, Microneedling (MN) was performed using a Dermapen, and the procedure was repeated on the opposite side. Following the completion, 0.8% HA gel was applied topically with an applicator stick and left for 2-3 minutes, as shown in [Table/Fig-4,5]. Immediate postoperative images are displayed in [Table/Fig-6].

Follow-up Visit

The patient was scheduled for follow-up appointments on days 7, 14, and 21. [Table/Fig-7] displays follow-up images taken seven days after the intervention. During each recall visit, a clinical evaluation was



[Table/Fig-4]: Gingival depigmentation on the left-side of the maxilla and mandible; Microneedling (MN) with Dermapen.



[Table/Fig-7]: Postoperative after seven days.

which gradually improved to 0 by the 21st day. Overall, both the DOPI score and VAS indicated favourable results, with lower scores reflecting an improvement. The patient expressed high satisfaction, and the results demonstrated clinically predictable outcomes.



[Table/Fig-8]: Postoperative after 21 days.

DISCUSSION

Dark-coloured gums are often considered unaesthetic, although gingival melanin pigmentation is a common occurrence among all races [3]. Pigmented gingival tissue frequently prompts patients to seek cosmetic treatment. In clinical scenarios, it is one of the most commonly encountered complaints by dental surgeons [4].

The deposition of melanin, an endogenous pigment, is the primary cause of gingival hyperpigmentation [5]. Although these are normal physiological pigmentation, they are often viewed as unaesthetic. Various techniques have been employed for gingival depigmentation, each with its own advantages and disadvantages [6]. These procedures are often invasive and include methods ranging from simple scalpel techniques, chemical peeling, gingivectomy, grafting, and cryosurgery to laser-assisted depigmentation [7,8]. Nevertheless, newer techniques are continuously being investigated to understand the values, choices, and demands of each individual. To overcome the limitations of invasive gingival depigmentation techniques—such as postoperative discomfort, risk of complications, and potential for gingival recession—newer non-invasive techniques, such as laser and MN, have been utilised [9].

Although various techniques for gingival depigmentation have evolved over time, the choice of the most suitable method still presents one of the greatest challenges for clinicians. In recent years, a novel therapeutic modality called Microneedling (MN), which has been utilised in dermatology, has been investigated for gingival depigmentation. This method is straightforward, economical, and well-tolerated by patients. Additionally, it offers dual benefits in both cosmetic and therapeutic realms [10]. HA gel, known for its



[Table/Fig-5]: Topical application of Hyaluronic Acid (HA) gel (HAgel).



[Table/Fig-6]: Immediate postoperative.

conducted, and the findings were compared to the preoperative condition. The DOPI scores and Visual Analogue Score (VAS) scores were recorded. Preoperatively, the DOPI score was 2.

A gradual reduction in the DOPI score was observed on the 7th, 14th, and 21st day. By the 21st day, the score had decreased to 0, as shown in the follow-up image on day 21 of the intervention [Table/Fig-8]. The VAS score was 3 in the immediate postoperative period,

biocompatibility and tissue-regenerating properties, has also shown potential to reduce pigmentation and enhance tissue healing [11].

MN also known as collagen induction therapy, falls under the broader therapeutic term 'mesotherapy.' This process involves the repetitive puncturing of the skin with sterilised microneedles [12,13]. This subsequently causes physical trauma by creating small holes known as micro-conduits [14]. These micro-conduits stimulate the production of collagen and elastin and induce a wound healing cascade with the release of growth factors such as Transforming Growth Factor (TGF)-alpha, TGF-beta, and Platelet-Derived Growth Factor (PDGF) [15].

Only a few studies have employed MN for gingival depigmentation. These studies have utilised local injections of vitamin C prior to MN [13,16]. In the present case, we have utilised HA.

HA, also referred to as hyaluronan, is recognised for its beneficial properties. Research indicates that HA possesses both anti-inflammatory and antibacterial effects. Due to its anti-oedematous and anti-inflammatory characteristics, HA acts as a scavenger, helping to eliminate metalloproteinases, prostaglandins, and other substances that trigger inflammation, thereby supporting tissue healing [1,17]. The osmotic properties of HA are believed to contribute to its anti-oedematous effects [18].

A recent study reported that the administration of HA significantly reduced the percentage of skin cells with an increased melanin content by 16% [19]. In a rat animal model, Fan L et al., observed that the effect of MN combined with HA gel injection to promote periodontal soft tissue regeneration was significantly better than HA gel injection alone [20].

No studies in the literature have reported the clinical effectiveness of MN combined with HA gel injection for gingival depigmentation. This non-invasive modality could provide an effective alternative to invasive surgical depigmentation procedures. Therefore, further studies should be conducted to explore the effectiveness of this treatment modality.

CONCLUSION(S)

The present case report opens a new horizon in the treatment of gingival depigmentation. MN, a novel non-invasive therapy combined with local injection or topical application of HA mesotherapy gel, can produce highly predictable results with no side effects. This non-invasive modality can serve as an effective alternative to invasive surgical depigmentation procedures. We need more long-term randomised controlled trials to determine the effectiveness and sustainability of using HA mesotherapy for gingival depigmentation.

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