

The comparison of some depigmentation techniques towards recurrence of gingival hyperpigmentation: a systematic review

Perbandingan beberapa teknik depigmentasi terhadap rekurensi dari hiperpigmentasi gingiva: sebuah kajian sistematis

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ABSTRACT

Objective: To compare the best gingival depigmentation technique toward the recurrence of gingival hyperpigmentation. **Methods:** PubMed and Wiley Online Library were conducted to identify articles from January 2013 to November 2018 about the techniques of depigmentation gingiva in patient with gingiva hyperpigmentation. After the selection of articles, 121 articles were obtained but only 3 articles meet the requirements. Dummert oral pigmentation index (DOPI) and Hedin melanin index (HMI) were used to compare the techniques of gingival depigmentation. **Results:** The clinical parameters have shown reduction of the pigmentation from a patient, in 1, 3 and 6 months. In the second article showed the DOPI only in baseline and 6 months. In third article showed the DOPI only in baseline and 1 month. **Conclusion:** The conventional surgical technique eliminates all the hyperpigmentation and showed the less recurrence.

Keywords: hyperpigmentation, surgical, gingival ablation, recurrence, laser

ABSTRAK

Tujuan: Untuk membandingkan teknik depigmentasi gingiva terhadap rekurensi hiperpigmentasi gingiva. **Metode:** PubMed dan Wiley Online Library digunakan untuk mengidentifikasi artikel dari Januari 2013 hingga November 2018 tentang teknik depigmentasi gingiva pada pasien dengan hiperpigmentasi gingiva. Setelah pemilihan artikel, diperoleh 121 artikel tetapi hanya 3 artikel yang memenuhi syarat. Indeks Pigmentasi Oral Dummert (IPOD) dan Indeks Melanin Hedin (IMH) digunakan untuk membandingkan teknik hiperpigmentasi gingiva. **Hasil:** Parameter klinis menunjukkan pengurangan pigmentasi pasien dalam 1, 3 dan 6 bulan. Pada artikel kedua menunjukkan DOPI hanya pada baseline dan bulan ke-6. Pada artikel ke tiga menunjukkan DOPI hanya pada baseline dan bulan pertama. **Simpulan:** Teknik bedah konvensional menghilangkan semua hiperpigmentasi dan menunjukkan kekambuhan yang lebih sedikit.

Kata kunci: hiperpigmentasi, bedah, ablasi gingiva, rekurensi, laser

Received: 1 May 2019

Accepted: 1 August 2019

Published: 1 August 2020

INTRODUCTION

The first clinical finding on gingiva when looked at the first sight is colour. The colour of gingiva in normal condition usually range from coral pink, pale pink to deep red, or can be performed pale pink to a deep bluish purple. It's determined by some factors, like underlying blood vessels, epithelial thickness, degree of keratinization, and also residing pigments within the gingiva.¹⁻⁷

Gingival hyperpigmentation is the condition on gingiva that especially caused by excessive melanin deposition by melanocytes mainly located in the basal and suprabasal cell layers of the epithelium. This condition can affect people in all different ethnic and make them complain about the colour. According to the amounts of melanin in the epithelium, the colour can be pink coral change to brown, dark brown, to black and blue colours of the gingiva while smiling or talking, and it make so unesthetic.^{2,3,7-9} Depigmentation treatment in gingival hyperpigmentation has several techniques, including using laser techniques, convent-

ional scalpel techniques, abrasion techniques using burs, combination techniques namely conventional and bur scalpel, gingivectomy, cryosurgical, electrosurgery, etc.¹⁰

The principle of a conventional scalpel uses a scalpel no. 11/15. After local anesthesia is performed, the mucosa is irrigated using saline solution, then 1-5 mm epithelial tissue from the lamina propria is removed by gently scrubbing the surface of the thin tissue.⁴⁻⁶ Then, periodontal pack is given to control the bleeding.⁴ The principle of penetration of each laser beam to biological tissue varies. The penetration of the laser beam depends on the degree of absorption of light entering the biological tissue mucosa (absorption rate of free water molecules, proteins, pigments, inorganic components such as apatite and other macromolecules in the tissue), water absorption coefficient, and wave length of each laser. When the laser energy reaches the surface of the tissue, the energy can be reflected, scattered, absorbed, or transmitted to surrounding tissue. Generally, the absorption degree from a laser depends

on the wavelength of each laser. In particular, absorption is strongly influenced by the coefficient of absorption of water into the tissue. The deeper the penetration of light into the soft tissue the lower water absorption coefficient, while the shallower light penetration into the soft tissue the higher water absorption coefficient.¹³

Recurrence of hyperpigmentation is the return of melanin pigment in the mucosa of the oral cavity after the depigmentation process as a result of several factors, namely chemical, thermal, surgical, pharmacological, and or idiopathic.¹

Gingival recurrence can occur if melanin is not removed evenly in all areas during depigmentation so that melanocytes can return.^{4,11} The mechanism of recurrence is still unknown certainty, but according to migration theory, active melanin in adjacent pigmented tissue can migrate to the treated tissue.¹² Recurrence was observed using the Dummett Oral Pigmentation Index (DOPI) and the Melanin Hedin Index (HMI). DOPI and HMI are indices used to see inclusion criteria and evaluate recurrence rates.

This article only compares 2 techniques for recurrence, namely laser technique and conventional scalpel technique. The technique used is divided as follow: Er:YAG Laser {Erbium-Doped: Yttrium, Aluminum, and Garnet}, Er,Cr:YSGG laser {Erbium, Chromium-Doped Yttrium, Scandium, Gallium and Garnet}, carbon dioxide laser {CO₂ Laser}, surgery with scalpel no. 11 or 15 {scalpel/surgical stripping}.²⁻⁷ The objective in this review is to compare the techniques of gingival depigmentation using Er:YAG laser, CO₂ laser and scalpel in patient with gingiva hyperpigmentation.

METHODS

Protocols

This systematic review used the Preferred Reporting Items for Systematic Review and Meta-analyses (PRISMA) criteria. The questions of this review were adapted using the Population, Intervention, Comparison, Outcomes) PICO criteria. The P is patients with the gingiva hyperpigmentation; I is gingival depigmentation, C is the techniques of depigmentation, scalpel/surgical stripping, Er YAG Laser, Er,Cr:YSGG, and CO₂ laser, while O is comparison of the recurrence from all techniques in the different articles.

Search strategy

Search protocols were recorded from an electronic base performed on PubMed and Wiley from January 2013 to November 2018. The keyword was human research, and full-text was available. The Mesh keywords were "pigmentation" AND "gingiva" AND

"wound healing", resulted in 121 titles on initial search. Manual search subsequently performed, 10 journals obtained based on titles and abstract, and only 3 journals that met the inclusion criteria.

Eligibility criteria

This review have two criteria; first inclusion. All of them are English language article, limited to the articles that published from January 2013 to November 2018, human studies, patients with gingiva hyperpigmentation, and clinical parameters were evaluated after 1, 3, 6 month of treatment. The second, exclusion criterium is patients with normal colour or pink coral, or no hyperpigmentation in gingiva.

Study selection

In this study use a data base from Pubmed and Wiley Online Library and got the 121 titles. Afterwards, authors selected the studies by title and abstracts, result in 112 titles. After been selected by title and abstract, read the full text, 3 articles were found appropriate with inclusion criteria.

Data Collection Process

The articles have been selected by abstract and title, were selected in inclusion criteria, after that the abstract and the selected full-text are downloaded.

RESULTS

Total of 121 articles were obtained, identified from PubMed and Wiley Online Library's. The articles based on human were 112, and after searching by title and abstract were found 10 articles. Finally, article that met right inclusion were 3 articles.

All of the three articles are clinical study and using different technique; they are laser and conventional technique. There are three different laser techniques in all of articles, they are Er YAG laser; Er,Cr:YSGG Laser; CO₂ laser and another techniques using the same techniques are scalpel techniques.

The article's show depigmentation change in 1, 3 and 6 month using DOPI and HMI. In second review showed the DOPI only in baseline and 6 months.

DISCUSSION

Gingival hyperpigmentation is the condition in gingiva that enhancing pigmentation from normal, especially caused by excessive melanin deposition by melanocytes mainly located in the basal and suprabasal cell layers of the epithelium.

The first article stated that DOPI and HMI from baseline to 6 months using laser and scalpel technique have no significant different for treatment hyperpigmentation. Therefore, scalpel technique is a gold standar

Table 1 Comparison of clinical parameters from DOPI and HMI at baseline and 1,3, 6 months.

Author/ Year	Subject (n)	Age	Index/ treatment	DOPI				HMI			
				Baseline	1 month	3 month	6 month	Baseline	1 month	3 month	6 month
Alhabash- neh/2018	20	24 ± 5.88	Scalpel	2.40 ± 0.50	0.00 ± 0.00	0.15± 0.37	0.20 ± 0.41	3.40 ± 0.50	0.00 ± 0.00	0.15 ± 0.37	0.20 ± 0.41
			Er YAG Laser	2.45 ± 0.51	0.00 ± 0.00	0.20± 0.41	0.30 0.47	3.40 ± 0.50	0.00± 0.00	0.20 ± 0.41	0.35 ± 0.59
			Surgical Stripping n=70	2.6 ± 1.0	-	-	0.65 ± 0.65	3.9	1.02	1.02	1.04
Hedge/ 2013	140	-	Er YAG Laser n=35	2.5 ± 1.5	-	-	1.0 ± 1.0	3.9	1	1.02	1.08
			CO2 Laser n=35	2.15 ± 1.15	-	-	1.0 ± 1.0	3.9	1.05	1.02	1.08
			Er,Cr:YSGG Laser	2.57 ± 0.85	0.045± 0.145	-	-	3.82 ± 0.4	0.045± 0.145	-	-
Gholami/ 2018	22	-	Surgical Stripping	3.82 ± 0.4	0.00 ± 0.00	-	-	3.82 ± 0.4	0.00 ± 0.00	-	-

too for treatment gingival depigmentation. The second article stated that DOPI and HMI from baseline to 6 months using laser (Er Yag 84% and CO₂ 82.7% lasers) have high cost but effective for esthetic gingival depigmentation, but recurrency in CO₂ laser is high. Scalpel technique were 90.0% and become gold standar for treatment depigmentation. Using laser and scalpel have a statistically highly significant. The third article have stated that only two laser setting-2 showed DOPI and HMI with low indices, and the mean HMI less than 2 and mean DOPI less than 1 in all treatments. The results explained that Er,Cr:YSGG laser is the most better method than surgical blade, because after 12 months patient with surgical blade treatment have a high recurrency than using laser technique. Article-3 have a same techniques in treatment gingiva hyperpigmentation, among laser and scalpel. Article-2 stated that the best choice for gingiva depigmentation is using scalpel, scalpel is still gold standard for gingiva depigmentation. Using scalpel have a minimal injury.

Basically each technique has advantages and disadvantages. Laser techniques provide patient comfort, greater patient safety, more aesthetic, relatively easier ablation of soft tissue than mechanical instruments and good hemostatic and bacteriocidal effects. Lasers can more easily cut, evaporate and reshape the soft tissues of the mouth in the oral cavity, without or less bleeding, and without or less suturing.¹³ However, they require expensive costs.^{11,13} In most surgical lasers, high power, produces photothermal effects on the tissue and thus soft tissue evaporation occurs by the thermal

effects. In particular, CO₂ and erbium lasers directly and easily evaporate soft tissue from the photothermal effect. Regarding both types of erbium lasers, the effect of soft tissue ablation seems to be greater after treating with Er:YAG laser compared to Er,Cr:YSGG laser.¹³

The technique of using a conventional scalpel does not require expensive costs, and is also classified as an easy technique.^{9,14} However, as we know in intra-oral tissue, especially gingiva, it is often inaccessible with conventional scalpel because gingiva has complex topography.¹³ On the other hand, related to the problem of wound healing, several other studies say the speed of wound healing after the use of lasers is not yet known with certainty and is fundamentally difficult to compare the results of conventional laser and scalpel surgery. Wound healing can occur relative to both therapies.^{4,6,13}

In some cases, using of lasers often causes recurrence. According to Hegde et al, 6-18 months observation of laser techniques using produce recurrences compared with conventional surgical techniques that can recurrence 7 years after treatment. Esen et al, said that recurrence can arise from the use of CO₂ lasers.⁴

Although it hurts and requires more suturing than laser therapy, 13 treatments using conventional scalpel technique for gingival depigmentation because they rare cause gingival recurrence. Using a conventional scalpel also only causes minimal injury.^{4,6}

It was concluded that using scalpel have a good result in gingiva. Scalpel is still a gold standard to treat gingiva hyperpigmentation.

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