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Laser vs Scalpel for Gingival Melanosis Depigmentation: A Review of Comparative Efficacy

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Abstract

Gingival melanosis is a benign condition characterized by excessive melanin deposition in the gums, often caused by genetic factors, smoking, or systemic health issues. Although asymptomatic, the dark pigmentation can be a cosmetic concern for individuals. Various depigmentation techniques have been developed, with scalpel surgery and laser therapy being the two most common. This review compares the efficacy, healing processes, patient comfort, and histopathological impacts of both techniques. The scalpel method is cost-effective and immediately removes pigmentation but is associated with post-operative discomfort, longer healing times, and a higher risk of scarring. In contrast, laser therapy offers a minimally invasive approach with faster healing, reduced discomfort, and a lower risk of scarring, though it is more expensive and may require multiple sessions. Laser therapy also shows lower recurrence rates due to its precision in targeting melanin-producing cells. Ultimately, the choice between the two techniques depends on patient preferences, the extent of pigmentation, and cost considerations.

Keywords: Gingival Melanosis, Laser Depigmentation, Scalpel Surgery, Melanin Hyperpigmentation, Histopathology, Patient Outcomes, Comparative Efficacy

Introduction

Gingival melanosis is a condition where excessive melanin, a natural pigment responsible for skin, hair, and eye color, accumulates within the gum tissues. This condition is often caused by genetic factors, smoking, or certain systemic health conditions. While it is medically benign and does not present any symptoms such as pain or discomfort, the dark pigmentation on the gums can be aesthetically displeasing, especially for individuals concerned about the appearance of their smile. This concern has led to the development of various techniques aimed at depigmenting the gums, or reducing the visibility of melanin. Over the years, two primary methods have emerged for treating gingival hyperpigmentation: scalpel surgery and laser therapy.

Scalpel surgery, the more traditional of the two, physically removes the pigmented tissue, while laser therapy, a more modern approach, targets melanin-producing cells without requiring tissue excision. Both techniques are effective in eliminating gingival pigmentation, but they differ in terms of their invasiveness, healing times, patient comfort, and long-term outcomes. These differences have led to ongoing debates among dental professionals about which method offers the best results. This review aims to explore the scalpel and laser techniques in-depth, comparing their efficacy, patient experiences, healing processes, and histopathological effects on the gingival tissues. (1-4)

Discussion

Scalpel Technique (5-8)

The scalpel technique is one of the oldest and most established methods for treating gingival melanosis. It involves the mechanical removal of the pigmented gum tissue using a surgical blade. The procedure is straightforward: the dentist or surgeon carefully excises the discolored gingival tissue, effectively removing the layer of melanin. One of the main advantages of this method is its simplicity. The scalpel technique is often seen as a highly effective and reliable way to immediately remove pigmentation, especially when large areas of the gum are affected. Furthermore, the procedure is generally less expensive than more modern alternatives, such as laser therapy, making it accessible to a broader range of patients.

However, despite its effectiveness, the scalpel technique has several notable disadvantages. Because it involves physically cutting the gum tissue, the procedure is quite invasive. As a result, patients often experience significant post-operative bleeding, as the excised area can be quite large. This bleeding can extend into the days following surgery, making the recovery process more uncomfortable. Additionally, the invasive nature of the procedure means that patients are likely to experience more pain and discomfort during and after the surgery compared to less invasive methods. Healing times are also longer for scalpel procedures, as the gum tissue needs to regenerate and heal from the open wound created by the excision. In some cases, the healing process may result in visible scarring, which can compromise the aesthetic outcome that the patient sought to improve.

Although the scalpel method is a cost-effective and immediate solution for gingival melanosis, the longer recovery times, post-operative discomfort, and risk of scarring present significant challenges for patients. These factors can deter individuals from choosing this option, especially when less invasive alternatives are available.

Laser Technique (9-14)

In recent years, laser therapy has gained popularity as a minimally invasive alternative to scalpel surgery for treating gingival melanosis. Unlike the scalpel technique, which removes the tissue, laser therapy works by targeting and destroying melanin-producing cells within the gum tissue without physically cutting it. Different types of lasers, such as diode, Nd

, and CO2 lasers, are used in these procedures. The laser's energy is absorbed by the melanin in the cells, causing the cells to break down and be naturally resorbed by the body over time. This method allows for highly precise targeting of the pigmented areas, minimizing damage to the surrounding healthy tissue.

One of the primary advantages of laser therapy is its minimally invasive nature. Since the procedure does not involve cutting or excising tissue, there is little to no bleeding during the surgery. This is because the laser coagulates blood vessels as it works, effectively sealing them and preventing significant blood loss. The reduced invasiveness also results in less post-operative discomfort for the patient. Most individuals report experiencing only mild discomfort or sensitivity following the procedure, and they can usually return to their regular activities much sooner than those who undergo scalpel surgery. Additionally, the healing process is significantly faster with laser treatment. Since the laser minimizes tissue damage, the gums can heal more rapidly, reducing the overall recovery time. Furthermore, because the laser does not leave an open wound, the risk of infection and complications is much lower than with scalpel surgery.

Another advantage of laser therapy is the reduced risk of post-operative scarring. The precision of the laser allows for targeted removal of pigmentation without affecting the surrounding tissues, which leads to a more aesthetically pleasing outcome. This is particularly important for patients who are concerned about the appearance of their smile, as scarring can sometimes negate the cosmetic improvements gained from depigmentation.

However, despite these advantages, laser therapy does have some limitations. It is typically more expensive than scalpel surgery, largely due to the cost of the specialized equipment and the training required to use it effectively. Moreover, in some cases, patients may require multiple laser sessions to achieve the desired level of depigmentation, particularly if the pigmentation is extensive or deeply embedded in the tissue. While these additional sessions can add to the overall cost and time commitment, many patients find the benefits of less discomfort, faster healing, and minimal scarring to outweigh the drawbacks.

Patient Comfort and Healing (15-17)

When comparing patient comfort between the scalpel and laser techniques, laser therapy is consistently reported to provide a superior experience. The minimally invasive nature of laser therapy results in significantly less pain and discomfort both during and after the procedure. Patients undergoing laser treatment often experience minimal swelling or soreness, and any discomfort they do experience typically subsides within a few days. This is a stark contrast to the scalpel method, which involves a more invasive procedure that creates a larger wound. Patients who undergo scalpel surgery frequently report more significant post-operative pain, swelling, and discomfort. Additionally, because the scalpel method results in an open wound, there is a higher risk of infection, which can further complicate the healing process and prolong discomfort.

Healing times also differ significantly between the two techniques. Laser therapy, due to its less invasive nature,

allows the gums to heal much faster. The laser seals blood vessels and minimizes tissue trauma, which accelerates the body's natural healing response. Most patients recover from laser treatment within a week, and they can return to their normal oral hygiene routines relatively quickly. In contrast, healing from scalpel surgery takes longer because the excised tissue must regenerate. The larger wound area also increases the likelihood of post-operative complications, such as infection or delayed healing, further extending the recovery period.

Recurrence Rates (18,19)

One of the concerns with any depigmentation treatment is the possibility of pigmentation recurrence. Gingival melanosis can return over time because melanocytes, the cells responsible for producing melanin, can repopulate the gum tissues. Both scalpel and laser treatments carry a risk of recurrence, although the likelihood varies between the two methods. Research suggests that laser therapy may offer a lower recurrence rate compared to scalpel surgery. This is due to the precision with which lasers can target melanin-producing cells. By effectively destroying these cells, lasers may reduce the chances of pigmentation returning. Scalpel surgery, while initially effective at removing pigmentation, may leave residual melanocytes behind, increasing the potential for recurrence over time.

Histopathology (20-22)

The histopathological effects of scalpel and laser treatments differ significantly because of the distinct mechanisms by which each method interacts with the tissue. Scalpel surgery involves the physical removal of pigmented tissue, which creates an open wound. The healing process for scalpel-treated tissue involves secondary healing, characterized by an inflammatory response, granulation tissue formation, and eventual re-epithelialization. This process is slower and can result in scarring, particularly if the excision is large or if healing is complicated by infection or other factors.

In contrast, laser therapy works by thermally disrupting melanin-producing cells without cutting into the tissue. The heat from the laser causes coagulation necrosis of the pigmented cells, which are then resorbed by the body. Histopathological studies of laser-treated tissues show minimal inflammation and faster re-epithelialization compared to scalpel-treated tissues. The reduced tissue trauma associated with laser therapy correlates with faster healing and a lower risk of scarring. Overall, the histopathological evidence suggests that laser therapy may offer a more favorable healing response, with less tissue damage and fewer complications than scalpel surgery.

Conclusion

In conclusion, both scalpel surgery and laser therapy are viable options for treating gingival melanosis, but each has its own strengths and limitations. The scalpel technique, while effective and cost-efficient, is associated with more post-operative discomfort, longer healing times, and a higher risk of scarring. Laser therapy, on the other hand, offers a minimally invasive solution with faster healing, less discomfort, and a reduced risk of post-operative complications. However, the higher cost of laser therapy and the potential need for multiple sessions may deter some patients. Ultimately, the choice between these two techniques should be based on individual patient needs, the extent of pigmentation, and personal preferences. Laser therapy may be the better option for patients seeking a more comfortable and cosmetically superior outcome, while the scalpel technique remains a reliable choice for those looking for a more affordable treatment.

References

1. Müller S. Melanin-associated pigmented lesions of the oral mucosa: Presentation, differential diagnosis, and treatment. Dermatol. Ther. 2010;23:220–229. doi: 10.1111/j.1529-8019.2010.01319.x. [PubMed] [CrossRef] [Google Scholar]
2. Hassona Y., Sawair F., Al-Karadsheh O., Scully C. Prevalence and clinical features of pigmented oral lesions. Int. J. Dermatol. 2015;55:1005–1013. doi: 10.1111/ijd.13133. [PubMed] [CrossRef] [Google Scholar]
3. Gaeta G.M., Satriano R., Baroni A. Oral pigmented lesions. Clin. Dermatol. 2002;20:286–288. doi: 10.1016/S0738-081X(02)00225-0. [PubMed] [CrossRef] [Google Scholar]
4. Eisen D. Disorders of pigmentation in the oral cavity. Clin. Dermatol. 2000;18:579–587. doi: 10.1016/S0738-081X(00)00148-6. [PubMed] [CrossRef] [Google Scholar]
5. Dummett CO. Oral pigmentation. First symposium of oral pigmentation. J Periodontol. 1960;31:356–60. [Google Scholar]
6. Dummet CO, Barens G. Oromucosal pigmentation: An updated literary review. J Periodontol. 1971;42:726–36. [PubMed] [Google Scholar]
7. Cicek Y, Ertas U. The normal and pathological pigmentation of oral mucous membrane: A review. J Contemp Dent Pract. 2003;4:76–86. [PubMed] [Google Scholar]
8. Shafer WG, Hine MK, Levy BM. Philadelphia: WB Saunders Co; 1984. Text Book of Oral Pathology; pp. 89–136. [Google Scholar]
9. Fry L., Almeyda J.R. The Incidence of Buccal Pigmentation in Caucasoids and Negkoids in Bkitain. Br. J. Dermatol. 1968;80:244–247. doi: 10.1111/j.1365-2133.1968.tb11966.x. [PubMed] [CrossRef] [Google Scholar]
10. Hedin C.A. Smoker's melanosis. Occurrence and localization in the attached gingiva. Arch. Dermatol. 1977;113:1533–1538. doi: 10.1001/archderm.1977.01640110053007. [Pub Med] [CrossRef] [Google Scholar]
11. Tamizí M., Taheri M. Treatment of severe physiologic gingival pigmentation with free gingival autograft. Quintessence Int. 1996;27:555–558. [PubMed] [Google Scholar]
12. Ponnaiyan D., Gomathy L., Anusha J.A. The correlation of skin color and gingival pigmentation patterns in a group of South Indians in Tamil Nadu, India. SRM J. Res. Dent. Sci. 2013;4:54–58. doi: 10.4103/0976-433X.120178. [CrossRef] [Google Scholar]
13. Ali S.M., Kumar N.P., Reddy A., Vasudevan S. Comparative Evaluation Between Scalpel and Laser Technique in Gingival Depigmentation: A Case report. Int. J. Contemp. Med. Res. 2015;2:126–130. [Google Scholar]
14. Çerman A., Altuna I. Oral Pigmentation. J. Pigment. Disord. 2016;3:2376–2427. doi: 10.4172/2376-0427.1000234. [CrossRef] [Google Scholar]
15. He WL, Li CJ, Liu ZP, et al. Efficacy of low-level laser therapy in the management of orthodontic pain: a systematic review and meta-analysis. Lasers Med Sci. 2013;28(6):1581–1589. doi: 10.1007/s10103-012-1196-y. [PubMed] [CrossRef] [Google Scholar]
16. Carroll JD, Milward MR, Cooper PR, Hadis M, Palin WM. Developments in low level light therapy (Lllt) for dentistry. Dent Mater. 2014;30(5):465–475. doi: 10.1016/j.dental.2014.02.006. [PubMed] [CrossRef] [Google Scholar]

17. Mester E, Ludany G, Selyei M, Szende B, Total GJ. The stimulating effect of low power laser rays on biological systems. Laser Rev. 1968;1:3. [Google Scholar]
18. Deepak P, Sunil S, Mishra R, Sheshadri Treatment of gingival pigmentation: A case series. Indian J Dent Res. 2005;16:171–6. [PubMed] [Google Scholar]
19. Thangavelu A, Elavarasu S, Jayapalan P. Pink esthetics in periodontics-gingival depigmentation: A case series. J Pharm Bioallied Sci. 2012;4(Suppl 2):186–90. [PMC free article] [PubMed] [Google Scholar]
20. Storrer CL, de Oliveira ND, Deliberador TM, Ori LT, Guerrero SM, Santos FR, et al. Treatment of gingival smile: A case report. J Int Acad Periodontol. 2017;19:51–56. [PubMed] [Google Scholar]
21. Kumar P, Rattan V, Rai S. Comparative evaluation of healing after gingivectomy with electrocautery and laser. J Oral Biol Craniofac Res. 2015;5:69–74. doi: 10.1016/j.jobcr.2015.04.005. [PMC free article] [PubMed] [CrossRef] [Google Scholar]
22. Mostafa D. A successful management of sever gummy smile using gingivectomy and botulinum toxin injection: A case report. Int J Surg Case Rep. 2018;42:169–174.