MJoSHT
Malaysian Journal of Science, Health & Technology
[mjosht.usim.edu.my]

Case Report

Surgical Intervention on Drug-Influenced Gingival Enlargement using Diode Laser Therapy

Muhammad Annurdin Sabarudin[1,3], Yew Hin Beh[2,3], Akram Hassan[3], Zuryati Abd Ghani[3] and Haslina Taib[3]

[1]*Faculty of Dentistry, Universiti Sains Islam Malaysia, Kuala Lumpur, 55100 Malaysia.*
[2]*Faculty of Dentistry, Universiti Kebangsaan Malaysia, Kuala Lumpur, 50300, Malaysia.*
[3]*School of Dental Sciences, Universiti Sains Malaysia Health Campus, 16150 Kubang Kerian, Kelantan, Malaysia.*

Correspondence should be addressed to:
Muhammad Annurdin Sabarudin; annurdin@usim.edu.my

Article Info
Article history:
Received:30 April 2022
Accepted:6 July 2022
Published:1 September 2022

Academic Editor:
Azlina Mokhtar

Malaysian Journal of Science, Health & Technology

MJoSHT2022, Volume 8, Special Issue
eISSN: 2601-0003

https://doi.org/10.33102/2022285

***Abstract* — This is a clinical case describing a hypertensive female patient with a drug-influenced gingival enlargement (DIGE) on the labial and lingual gingivae of the lower anterior dentition. DIGE is attributed to the prolonged use of medications in a susceptible individual. She had undergone non-surgical periodontal therapy prior to surgical intervention for the removal of gingival enlargement (GE) using diode laser therapy. A diode laser is a type of laser widely used in dentistry. This laser therapy is a less invasive technique for the removal of GE. After 6 months of follow-up, no recurrence of GE was observed, and regular supportive periodontal therapy was adopted to sustain the gingival health. The utilization of the diode laser showed excellent predictability and clinical outcomes.**

***Keywords* — Baricitinib Drug-influenced gingival enlargement, gingivectomy, gingival enlargement, calcium channel blockers, diode laser therapy**

I. INTRODUCTION

Gingival enlargement (GE), previously known as gingival overgrowth, is an enlargement of the gingival tissues, either localized or generalized. This term has taken the place of gingival hyperplasia (increase in cell number) and gingival hypertrophy (increase in cell size) as these are histological diagnoses and do not fully characterize the pathological processes found within the tissues [1]. This gingival condition may affect the aesthetic, mastication, speech, and oral hygiene measures [2, 3]. In addition, GE has been associated with various factors such as adverse drug effects, inflammation, neoplastic processes, and hereditary gingival fibromatosis [4].

Drug-influenced gingival enlargement (DIGE) is an unwanted effect commonly associated with medications [2, 3]. A recent study reported that DIGE was prevalent in 77.3% of patients taking calcium channel blockers (CCBs) medication for more than 5 years [5]. Additionally, there are twenty prescriptions known to cause DIGE [6]. The commonest drugs which have been reported to cause GE includes antiepileptic drugs. For example, phenytoin for treatment and management of seizure disorders in epileptic patients, antihypertensive agents, including CCBs such as nifedipine and amlodipine, and immunosuppressants such as cyclosporin A to prevent rejection in patients who received organ transplants. DIGE

may develop in a susceptible individual during the first 3 months of taking the medications [7].

Non-surgical periodontal therapy is the first line of treatment, including appropriate plaque control and discontinuing or changing the inducing drug [8]. Surgical excision or removal of DIGE is usually recommended when non-surgical periodontal therapy and/or substitution or withdrawal of medication is unsuccessful by which the growth is affecting oral hygiene procedures or function as well as aesthetics [9]. Contemporarily, surgical excision of DIGE using laser therapy is available using a diode or carbon dioxide (CO2) laser. It effectively reduces bleeding, improves comfort intra and post-operatively, and improves surgical site healing [10]. In addition, a diode laser is highly absorbable by hemoglobin and melanin, making it simple to manipulate soft tissue, thus promoting wound healing [11]. This case report was intended to report on the surgical management of DIGE using diode laser therapy.

II. CASE REPORT

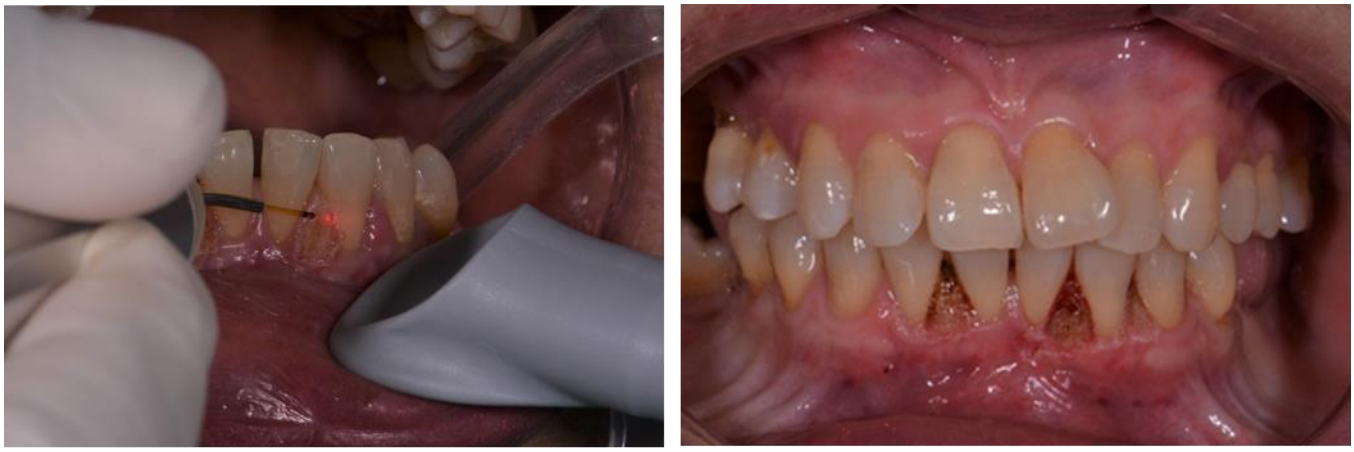
A 45-year-old Malay female visited the Undergraduate Dental Clinic, School of Dental Sciences, Universiti Sains Malaysia (USM), for denture construction. However, the patient presented with gum swelling in the lower anterior region. The patient has hypertension and hyperlipidemia on regular medical check-ups at Klinik Rawatan Keluarga, Hospital USM. Apart from that, the patient has been prescribed oral tablets Felodipine 10mg and Simvastatin 20mg in the past 5 years. She was a regular dental attendee and brushed her teeth 3 times daily with a soft-bristled toothbrush and fluoridated toothpaste. She did not smoke and had no parafunctional habits. Note that the patient was motivated and keen on dental treatment to improve her oral health. Clinically, the gingiva at the lower anterior teeth appeared reddish, swollen and lobulated at both the labial and lingual area of the interdental papilla. The gingival was inflamed mainly at the lower anterior region, absence of stippling and slightly edematous. The gingival enlargement (GE) was classified as grade 3 based on Clinical Index GE, which indicates marked GE, represented by the encroachment of the gingival onto the clinical crown and has a buccolingual dimension of approximately 3mm or more, measured from the tip of the papilla outward [12]. There were pseudopockets due to GE of about 5mm at the mesial and distal surface of the affected teeth. Oral hygiene was good, with a plaque score of 10.2% and a bleeding score of 15.0%.

She had previously completed initial periodontal therapy, which is full mouth scaling, during her visit to the dental clinic. However, the GE has not been resolved. Thus, she was then referred to Periodontic Clinic for the surgical management of drug-influenced gingival enlargement (DIGE). Gingivectomy was done using GEMINI™ (Ultradent, USA) diode laser surgery prior to denture construction.

Prior to the surgical procedures, a pre-operative vital signs assessment was done, including blood pressure (125/80 mmHg) and random blood glucose (4.0 mmol/L). Oral hygiene was good, with a plaque score of 19% and a bleeding score of 5%. After obtaining written consent, local infiltration was performed with 1 capsule of local anesthesia (2% mepivacaine with adrenalin 1:100,000). Pre-procedural surgical site rinsing was done with 0.12% chlorhexidine for 1 minute. The patient was draped and swabbed, creating a sterile surgical environment. Gingivectomy was performed using GEMINI™ (Ultradent, USA) diode laser with dual-wavelength 810nm and 980nm, 1.2 watts (Figures 2a- 2b). Gingivectomy was only carried out on the affected site without neither raising the flap or bone recontouring. Post-operative instructions were given, which include avoiding toothbrushing at the surgical site and rinsing with 0.12% chlorhexidine mouthwash twice daily for 1 week. She was advised to take a soft cold diet intake for 2 days post-operatively. In addition, the patient has also been prescribed an oral tablet of paracetamol 1g to be taken three times daily for 3 days or when necessary.

Following the surgery, the patient was recalled every week for the first month, every 2 weeks the following months and monthly review for 3 to 6 months. During the review, the patient maintained excellent oral hygiene with an average of less than 10% of plaque score. The healing was uneventful throughout the reviews. The patient's oral hygiene was satisfactory, and no recurrence of gingival growth was observed after 6 months post-operatively (Figure 3).

Figure 1. Pre-treatment clinical pictures prior to the surgical management on drug-influenced gingival enlargement (DIGE) using diode laser therapy (a) Buccal view (b) Right buccal view (c) Lower lingual view.



(a) (b)

Figure 2. (a) Gingivectomy was performed using diode laser therapy 810nm+980nm 1.2 watts (b) Immediate effect after gingivectomy was done.

Figure 3. A post-operative clinical picture was taken during the supportive periodontal therapy at 6 months.

III. DISCUSSION

Drug-influenced gingival enlargement (DIGE) commonly affects the interdental gingiva of the anterior teeth and is confined to the attached gingiva compared to the marginal gingiva. The interdental papilla area has a greater predisposition to develop gingival enlargement (GE) than the marginal gingiva due to several specific molecular compounds involved in the wound healing process. For example, surface receptors, procollagen type I, fibronectin, glycosaminoglycans and growth factors [13, 14]. It may extend coronally as the tissue enlarges and become thickened and lobulated in appearance [15]. The GE tends to be more pronounced in areas where plaque accumulates, such as at the edges of restorations, retained roots, and around the orthodontic appliances. Nevertheless, it is seldom observed in the edentulous area [16]. The lesion may be inflamed if associated with periodontal inflammation, which appears red or purplish and bleeds profusely upon probing [17]. The mechanism of DIGE is still uncertain, and the treatment is largely limited to the maintenance of improved oral hygiene, withdrawal, or substitution of medication and surgical intervention [18, 19].

Surgical excision or removal of DIGE is usually recommended in conditions where the growth affects oral hygiene procedures or function as well as aesthetics. For this approach, the gingivectomy and/or gingivoplasty by internal/external bevel incision could be performed [20]. However, few techniques for surgical interventions can be applied, such as scalpel gingivectomy, electrosurgery and laser approaches [21, 22]. Removal of DIGE was reported to be easier, less technique sensitive, and fewer complications in laser than in conventional gingivectomy [23]. On the other hand, scalpel gingivectomy may lead to complications such as surgical trauma, post-operative pain, unpleasant bleeding, and swelling and show more dissatisfaction among patients [24]. Diode laser therapy also has significantly improved wound healing on the 7th and 30th days post-operatively [25].

The diode laser is a solid-state semiconductor laser emitted in continuous wave and gated-pulsed mode [26]. It is characterized by wavelengths of 800-980nm, which target especially soft tissues, hence ideal for gingivectomy procedure [27]. The use of lasers has been shown to enhance the prognostic outcome, less discomfort, minimal or no bleeding due to sealing of capillaries by protein denaturation and stimulation of clotting factor VII production. It also shortens healing time, reducing post-operative bleeding and edema [20, 28].

In this present case, DIGE was satisfactorily treated via initial periodontal therapy, including oral hygiene instruction and motivation, followed by surgical gingivectomy using diode laser therapy. Based on this case, diode laser therapy appears to cause no recurrence of GE in the laser-treated surfaces after 6 months of supportive periodontal maintenance. This indicated that laser surgery has favourable outcomes and increased therapeutic efficacy [29]. However, there is a possibility for the GE to recur as long as the associated medication is continued and persistent with other risk factors [30]. Therefore, the patient must be informed of this tendency and the importance of maintenance of effective oral hygiene as key factors in preventing and managing GE associated with these drugs. Supportive periodontal therapy is crucial to sustaining gingival/ periodontal health, thus preventing the recurrence of GE in the long run [31].

IV. CONCLUSIONS

Diode laser therapy for surgical intervention of drug-influenced gingival enlargement (DIGE) can improve patient acceptance and prognosis by reducing hemorrhage and bacteremia and boosting patient cooperation and quality of life.

CONSENT TO PARTICIPATE

Written informed consent was obtained from the patient for the anonymized information to be published in this article.

CONFLICT OF INTERESTS

The authors declared no conflict of interest and did not receive any funding for this article.

ACKNOWLEDGEMENT

We would like to thank School of Dental Sciences, Health Campus, Universiti Sains Malaysia and Faculty of Dentistry, Universiti Sains Islam Malaysia for the support. This case report received no grant or funding from any agency.

REFERENCES

[1] Corrêa, J. D., Queiroz-Junior, C. M., Costa, J. E., Teixeira, A. L., & Silva, T. A. (2011). Phenytoin-induced gingival overgrowth: a review of the molecular, immune, and inflammatory features. International Scholarly Research Notices, 2011. doi:10.5402/2011/497850

[2] Amit, B., & Shalu, B. V. (2012). Gingival enlargement induced by anticonvulsants, calcium channel blockers and immunosuppressants: A review. IRJP, 3(7), 116-9.

[3] Andrew, W., Evelyn, W., Francis, M., Mark, J., & Mark, C. (2014). Pattern of gingival overgrowth among patients on antihypertensive pharmacotherapy at a Nairobi hospital in Kenya. Open Journal of Stomatology, 2014. doi:10.4236/ojst.2014.44025

[4] Ramírez-Rámiz, A., Brunet-LLobet, L., Lahor-Soler, E., & Miranda-Rius, J. (2017). On the cellular and molecular mechanisms of drug-induced gingival overgrowth. The open dentistry journal, 11, 420. doi: 10.2174/1874210601711010420

[5] Taib, H., Mohd Radzwan, M. H., Sabaruddin, M. A., Wan Mohamad, W. M., & Mohamad, N. (2021). Prevalence and risk factors of drug-induced gingival overgrowth in hypertensive patients. Journal of Dentistry Indonesia, 28(1), 8-14. doi.org/10.14693/jdi.v28i1.1166

[6] Gupta, N., Goyal, L., & Gupta, N. D. (2017). Periodontal management of phenytoin induced gingival enlargement: a case report. J Dent Health Oral Disord Ther, 8(1), 00271. doi: 10.15406/jdhodt.2017.08.00271

[7] Bharti, V., & Bansal, C. (2013). Drug-induced gingival overgrowth: The nemesis of gingiva unravelled. Journal of Indian Society of Periodontology, 17(2), 182. doi: 10.4103/0972-124X.113066

[8] Drisko, C. H. (2001). Nonsurgical periodontal therapy. Periodontology 2000, 25(1), 77-88. doi.org/10.1034/j.16000757.2001.22250106.x

[9] Tungare, S., & Paranjpe, A. G. (2021). Drug induced gingival overgrowth. In StatPearls [Internet]. StatPearls Publishing. www.ncbi.nlm.nih.gov/books/NBK538518/

[10] Maddi, A., Alluri, L. S., & Ciancio, S. G. (2015). Management of gingival overgrowth in a cardiac transplant patient using laser-assisted gingivectomy/gingivoplasty. J Int Acad Periodontol, 17, 77-81.

[11] Azma, E., & Safavi, N. (2013). Diode laser application in soft tissue oral surgery. Journal of lasers in medical sciences, 4(4), 206. PMID: 25606331; PMCID: PMC4282004.

[12] Ingles, E., Rossmann, J. A., & Caffesse, R. G. (1999). New clinical index for drug-induced gingival overgrowth. Quintessence international, 30(7).

[13] Csiszar, A., Wiebe, C., Larjava, H., & Häkkinen, L. (2007). Distinctive molecular composition of human gingival interdental papilla. Journal of periodontology, 78(2), 304-314.

[14] Sabarudin, M. A., & Taib, H. (2019). Drug-influenced gingival enlargement: Overview of the clinical features and assessment methods. The Journal of Dentists, 7(1), 1-7. doi.org/10.12974/2311-8695.2019.07.1

[15] V.R. Smitha Rani Thada, Keerthilatha M Pai. (2012). Unusual Clinical Presentation of Generalized Gingival enlargement. International Journal of Collaborative Research on Internal Medicine and Public Health Vo.4 No.4.

[16] Taylor, B. A. (2003). Management of drug-induced gingival enlargement. doi.org/10.18773/austprescr.2003.007

[17] Hallmon, W. W., & Rossmann, J. A. (1999). The role of drugs in the pathogenesis of gingival overgrowth. A collective review of current concepts. Periodontology 2000, 21(1), 176-196. doi.org/10.1111/j.1600-0757.1999.tb00175.x

[18] Pundir, A. J., Pundir, S., Yeltiwar, R. K., Farista, S., Gopinath, V., & Srinivas, T. S. (2014). Treatment of drug-induced gingival overgrowth by full-mouth disinfection: A non-surgical approach. Journal of Indian Society of Periodontology, 18(3), 311. doi.org/10.4103/0972-124X.134567

[19] Sabarudin, M. A., Taib, H., Wan Mohamad, W. M., Zainuddin, S. L. A., Wan Ghazali, W. S., & Misran, A. A. (2022). Salivary IgA Depression in Drug-Influenced Gingival Enlargement among Hypertensive Patients. Journal of Dentistry Indonesia, 29(1), 30-35. doi.org/10.14693/jdi.v29i1.1295

[20] Mawardi, H., Alsubhi, A., Salem, N., Alhadlaq, E., Dakhil, S., Zahran, M., & Elbadawi, L. (2021). Management of medication-induced gingival hyperplasia: a systematic review. Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology, 131(1), 62-72. doi.org/10.1016/j.oooo.2020.10.020

[21] Mavrogiannis, M., Ellis, J. S., Thomason, J. M., & Seymour, R. A. (2006). The management of drug‐induced gingival overgrowth. Journal of clinical periodontology, 33(6), 434-439. doi.org/10.1111/j.1600-051X.2006.00930.x

[22] Sabarudin, M. A., Taib, H., & Mohamad, W. M. W. (2022). Refining the Mechanism of Drug-Influenced Gingival Enlargement and Its Management. Cureus, 14(5). doi.org/10.7759/cureus.25009

[23] Pourzarandian, A., Watanabe, H., Ruwanpura, S. M., Aoki, A., & Ishikawa, I. (2005). Effect of low‐level Er: YAG laser irradiation on cultured human gingival fibroblasts. Journal of periodontology, 76(2), 187-193. doi.org/10.1902/jop.2005.76.2.187

[24] Kravitz, N. D., & Kusnoto, B. (2008). Soft-tissue lasers in orthodontics: an overview. American journal of orthodontics and dentofacial orthopedics, 133(4), S110-S114. oi.org/10.1016/j.ajodo.2007.01.026

[25] Kohale, B. R., Agrawal, A. A., & Raut, C. P. (2018). Effect of low-level laser therapy on wound healing and patients' response after scalpel gingivectomy: A randomized clinical split-mouth study. Journal of Indian Society of Periodontology, 22(5), 419. doi.org/10.4103/jisp.jisp_239_18

[26] Gupta, G. (2011). Management of gingival hyperpigmentation by semiconductor diode laser. Journal of Cutaneous and Aesthetic Surgery, 4(3), 208. doi.org/10.4103/0974-2077.91256

[27] Kaya, G. Ş., Yavuz, G. Y., Sümbüllü, M. A., & Dayı, E. (2012). A comparison of diode laser and Er: YAG lasers in the treatment of gingival melanin pigmentation. Oral surgery, oral

medicine, oral pathology and oral radiology, 113(3), 293-299. doi.org/10.1016/j.tripleo.2011.03.005

[28] El Shenawy, H. M., Nasry, S. A., Zaky, A. A., & Quriba, M. A. (2015). Treatment of gingival hyperpigmentation by diode laser for esthetical purposes. Open access Macedonian journal of medical sciences, 3(3), 447. doi.org/10.3889/oamjms.2015.071

[29] Vescovi, P., Corcione, L., Meleti, M., Merigo, E., Fornaini, C., Manfredi, M., Bonanini, M., Govoni, P., Rocca, J.P. and Nammour, S., 2010. Nd: YAG laser versus traditional scalpel. A preliminary histological analysis of specimens from the human oral mucosa. Lasers in Medical Science, 25(5), pp.685-691. doi.org/10.1007/s10103-010-0770-4

[30] Campos, L., Gallottini, M., Pallos, D., Simões, A., & Martins, F. (2018). High-power diode laser on management of drug-induced gingival overgrowth: Report of two cases and long-term follow-up. Journal of Cosmetic and Laser Therapy, 20(4), 215-219. doi.org/10.1080/14764172.2017.1400165

[31] Rakesh, B. M., Sharma, S., & Chandana, K. H. (2021). A rare case of accelerated gingival overgrowth with high dose amlodipine therapy. Journal of Pharmacovigilance and Drug Research, 2(1), 39-41. doi.org/10.53411/jpadr.2021.2.1.8