

Laser treatment of drug-induced gingival enlargement: overview of research of the last 50 years

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ABSTRACT

Drug-induced gingival enlargement (overgrowth) occurs as a result of the use of systemic medication such as immunosuppressants, anticonvulsants, and calcium channel blockers. These medication classes treat important general conditions, which makes their use essential. Often, the hyperplasia that occurs as an adverse effect of the medication has a remarkable clinical aspect. An intricate, multidisciplinary approach is required, beginning with the replacement of causing medication and ending with the upkeep of strict hygiene. The need for research and the study of solutions that provide comfort to patients affected by the adverse effects of the administered medication is thus imposed. Our research summarizes the literature from the past 50 years on laser therapy for medication-induced gingival enlargement. The aim is to highlight the novel nature of using lasers as a treatment method as well as their beneficial therapeutic effects.

Keywords: laser treatment, drug-induced, gingiva, gingival enlargement

INTRODUCTION

One common side effect of using systemic medications, such as immunosuppressants, anticonvulsants, and calcium channel blockers, is drug-induced gingival enlargement [1]. The terms overgrowth or enlargement of the gingiva have replaced the previous phrases hyperplasia or hypertrophy, which are nowadays considered histopathological diagnoses [2]. To improve the quality of life for these patients, research on the treatment of drug-induced gingival hyperplasia is necessary, especially considering the systemic illnesses for which these medications are used. Even though they are separate categories, the three classes implicated in drug-induced gingival enlargement exhibit comparable biological pathways that result in gingival proliferation. Seymour et al. presented in 1996 the multifactorial

character of drug-induced gingival enlargement, represented by the current medication, associated bacterial plaque and genetic predisposition [1]. These comprehensive concepts build an inventory of knowledge that allows oral healthcare providers to see and use cutting-edge, specific therapy methods. The foundation of personalized medicine is established by the patient's unique traits also genetic predisposition [3]. Due to this, it is necessary to highlight the progress of laser therapy along with how it may be used to treat patients with drug-induced gingival hyperplasia.

MATERIALS AND METHODS

A search for articles on the PubMed platform was carried out using keywords in different text combinations: "drug induced gingival overgrowth

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laser”, “laser therapy gingival overgrowth”, “medical induced gingival hyperplasia laser”, “medical induced gingival hyperplasia”, having as a period defined the years August 1976- March 2024. The results obtained from the search were analyzed. The set of criteria used to select the articles connected with the theme of the present study is presented in Table 1.

TABLE 1. The inclusion and exclusion criteria for the selected articles

Inclusion criteria	Exclusion criteria
1. Presentation of the use of laser as a treatment method	1. Presentation of gingival enlargements that are not due to medication or are of unknown cause
2. Study of gingival enlargement resulting from the administration of medication such as: immunosuppressants, calcium channel blockers, cyclosporine	2. Not using the laser in the treatment
3. Articles written in English, abstract and free full text in the period 1976-2024	3. Articles that study drug-induced gingival enlargement, but not its treatment

RESULTS

390 articles with the specified keywords were found in the PubMed database search. 127 of these publications were relevant to the subject of the study. After a thorough review, only 18 articles were selected as eligible for the present research. The study workflow is presented in Figure 1.

The use of laser as a treatment method for drug-induced gingival overgrowth is carried out after the patient is well instructed and able to maintain proper hygiene practices and after the initial professional cleaning performed by the dentist [4,5].

Laser treatment has a hemostatic effect, produces good coagulation, and reduces the risk of recurrence of the lesions [6,7]. This method also reduces the healing period even in patients with an affected general condition, postoperative edema and pain are alleviated, and intraoperatively the doctor has good control of the procedure through the visibility of the operative field [7]. The use of laser treatment is a safe method even in difficult cases, with multiple relapses after classical treatment[8].

Following laser therapy, the clinical cases can be treated prosthetically allowing the patient to regain lost functions [9]. Laser treatment of hyperplasia combined with classical surgery is a useful method for proper healing. The uncomfortable need for acrylic suckdown splints is eliminated. Intraoperative hemostasis improves up the surgical procedure and reduces operating time[10].

DISCUSSION

In the first phase of treatment of drug-induced gingival overgrowth, the dentist needs to perform and educate the patient to accomplish proper oral hygiene. A multidisciplinary approach by general practitioners, dentists, periodontologists, and cardiologists is also useful. Replacing cyclosporine with other classes of drugs such as tacrolimus, correct identification of the medication and its link with the gingival enlargement and their recurrences, are just a few examples that can often achieve a successful treatment. The initial therapy can significantly reduce the lesions until they disappear. Frequently cases with significant lesions are encountered, so surgical treatment is necessary [3].

The capacity to reduce intra- and postoperative bleeding indicates the beneficial use of laser thera-

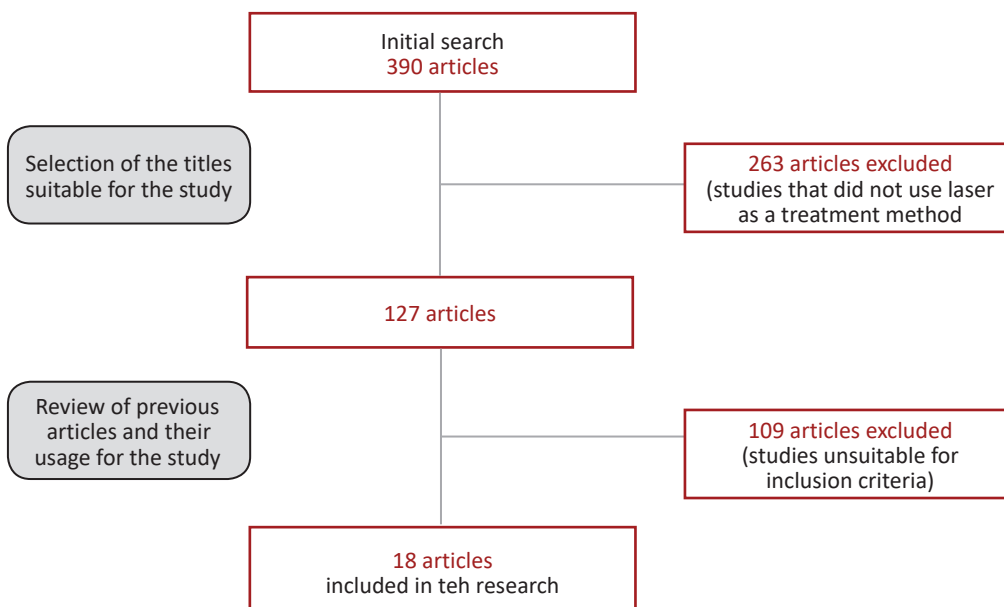


FIGURE 1. The workflow of the studies selection

py in treating drug-induced gingival overgrowth in a patient receiving concurrent treatment of cyclosporine (500 mg/day) for a kidney transplant performed four years prior, and nifedipine (30 mg/day) for hypertension [4]. Given the lesion's strong vascularization, its favorable application in cases of gingival overgrowth after cyclosporine administration is crucial in this particular scenario. Continued laser therapy was successful even in cases where the lesion reappeared after the patient had properly mastered hygienic practices. The risk of gingival overgrowth in cases of nifedipine administration is increased, therefore dental controls are essential. The application of the treatment option is individualized, in most cases the use of laser treatment, the replacement of the medication by the specialist, the clinical follow-up of the patients, and proper oral hygiene lead to remission of the gingival enlargement [4].

Laser treatment was also used in the case of two patients treated with Tacrolimus and Fenodipine. It has been noted that laser therapy considerably reduces intraoperative bleeding, discomfort, postoperative edema, and infection risk in addition to surgical time. Unlike the traditional method, laser therapy results in a more visually satisfying aspect of the gums, and the chance of a recurrence is thus reduced. When a re-intervention is necessary, patients are encouraged to use the laser instead of the more traditional procedure because it is a more comfortable means of treatment [5]. Improvements in the periodontal parameters associated with chronic marginal periodontitis are also noted after the laser treatment [6].

In one trial, CO₂ laser therapy was used combined with standard gingivectomy for four patients with kidney transplants exhibiting drug-induced gingival hyperplasia. When the clinical status was reassessed after a year, one of the four patients showed signs of a minor relapse; surgical complications did not persist within this period [7].

Surgical intervention may be required for curative therapy, even if good oral hygiene and professional prophylaxis are often essential parts of an efficient treatment plan. The success of the selected laser treatment was demonstrated by the two-year evaluation of a patient reported in one of the investigated publications [8].

Since 1998, when a study described the treatment of a patient with drug-induced gingival overgrowth, the effectiveness of argon laser therapy has been confirmed. After undergoing a kidney transplant and being diagnosed with insulin-dependent diabetes, the patient was prescribed cyclosporine, phenytoin, and a calcium channel blocker. Reports of fungal superinfection have additionally been reported. The prosthetic functionality was compro-

mised as a result of the progressive damage. After laser therapy, the gingival growth that obstructed the application of prostheses in the prosthetic field was removed, allowing for the restoration of function [9].

In 1996, the mouthguard's usage for hemostasis following surgery caused discomfort and impaired proper function. To reduce bleeding and operating time, the CO₂ laser was utilized in a case of drug-induced gingival overgrowth after cyclosporin A and nifedipine were used [10]. Low intraoperative bleeding and excellent cleaning were also found in a case report of a patient treated with nifedipine after gingival enlargement was removed using a CO₂ laser [11]. A patient diagnosed with gingival overgrowth caused by phenytoin was treated via conventional scaling and an Erbium: YAG laser that was only applied to the false periodontal pockets, avoiding the need for surgical removal of the lesion [12].

When occlusion, mastication, or phonation are impacted by gum disease, patients generally visit the dentist in the later stages of the disease [13]. Certain cases require the application of surgical methods by the degree of complexity determined by clinical observation. The development of laser technology has led to advancements in the field of conventional surgical methods.

According to a 2020 systematic review of 22 studies on drug-induced gingival overgrowth, there is a reduced risk of gingival lesion recurrence when laser therapy is applied in the surgical stage [14]. A case report from 2013 describes laser treatment performed under general anesthesia to remove a drug-induced gingival enlargement. Considering the severity of the injuries and the patient's psychological state, the benefits were substantial [15].

A patient with diminished mental capacity showed comparable outcomes with laser ablation of anticonvulsant-induced hyperplasias, as reported in a study with a 2-year follow-up [8]. The value of utilizing the laser in these challenging cases of overgrowth is demonstrated by a second study with fifteen patients who had mental impairment. The characteristics of the laser avoid incidents like intended dressing removal and postoperative bleeding, resulting in optimal healing and hemostasis intra- and postoperative surgery [16].

Up to a year after laser therapy, follow-up studies demonstrate positive outcomes with little variation in gingival volume evaluation, improving the patient's quality of life and motivation to cooperate [17]. A 1985 study provides a realistic summary of the development of laser treatment, stating that if its application in dentistry was limited at that time, it would inevitably advance favorably and to the detriment of traditional methods [18].

A patient receiving nifedipine treatment for heart disease had gingival hypertrophy, according to a new research report published in February 2024. Risk factors for the patient were improperly fixed prosthodontics and inconsistent oral hygiene. The first step of the laser treatment involved mechanically removing the bacterial plaque using a specialized method called the Guided Biofilm Therapy (GBT) protocol, decontaminating the area with a laser, and replacing the calcium channel blocker medication with a different class of antihypertensive drugs. This section underlines how critical it is to treat bacterial plaque, the main cause of the problem. A 450-nm laser was selected for the second stage of the treatment - the surgical phase. Considering the features of gingival overgrowth favored by calcium channel blockers, the laser method makes more sense than the traditional surgical method. Following the laser therapy, the patient experienced less pain, a more comfortable healing process, and a decreased rate of recurrence following excision. After a year, consistent outcomes were noted [19].

A case report from 2022 describes how a patient who had a single oral dose of amlodipine (5 mg/day) acquired gingival enlargement. Following the surgical procedure and cardiologist-approved medication modification, a diode laser with a wavelength of 445 nm was utilized to remove the bacterial plaque. It is shown that the particular wavelengths selected in these circumstances have a more effective cutting depth. After a year of monitoring, similar outcomes were noted, including good healing, a more comfortable operation for the patient, and a low recurrence. Consequently, extensive research on laser therapy shows how important this kind of care is for a condition as complicated as gingival expansion [20].

The constraints of the present study are related to one database selection, full text available, abstracts in English, and the period limitation. All studies demonstrate the main benefits of laser therapy; however, they do not specify its specific practice limitations. A comprehensive understanding would require the inclusion of research studies of a larger number of scholarly sources, as well as a series of questionnaire objectives responded to by as many dentists as possible who use laser therapy as a treatment method for gingival overgrowth.

CONCLUSION

When treating drug-induced gingival hyperplasia, the most important things to focus on are ensuring a proper diagnosis and educated oral hygiene. Therapeutic success is then facilitated by the particular type of treatment selected. Laser treatments are currently the gold standard for treatment and offer more benefits than traditional procedures. Many benefits, including a reduced recovery period after surgery, a lower risk of bleeding and infection, and less discomfort and edema following surgery, support its usage. By minimizing the overheating of traditional lasers and refining the treatment of soft tissues, the water laser technology has lately become more customized. Modern lasers (Er,Cr: YSGG laser) make it possible to remove impacted tissues without endangering healthy ones. Simultaneously, it decreases nerve conduction, promoting analgesia and lowering pain during and after surgery. The patient's comfort and the effectiveness of the therapeutic act depend on this function. When a patient is not in pain throughout a medical procedure, it encourages compliance and willingness to participate in all phases of the therapy. The expensive costs of using the laser and the requirement for medical staff to get adequate training should be mentioned as drawbacks. As a result, the benefit of using sales in treating gingival overgrowth is a proven method that is applied with positive outcomes for the patient.

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Data curation: CL.

Writing—original draft preparation: CL.

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