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LASER in Treatment of Warts

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Abstract:

Wart is a benign proliferation of epidermal cells that develops secondary to infection of keratinocytes by human papilloma virus (HPV). To date, more than 200 types of HPV are recognized and ~40 types can involve genital areas. Treating warts remains a challenge, as no single method is universally effective. Treatment approaches depend on factors such as the patient's age, the wart's location, and prior treatments. Options include topical applications, intralesional injections, physical destruction methods, and systemic therapies. Common techniques like cryotherapy, surgical removal, immunotherapy, and electrocautery often result in incomplete clearance and frequent recurrence. This underscores the need for innovative and more effective therapies to achieve durable and satisfactory results for patients. Different laser types have been used for the treatment of wart.

Keywords: LASER, Warts,HPV.

Introduction:

Laser treatment in dermatology operates on the utilizing photothermal or photomechanical mechanisms to destroy targeted tissue. By delivering monochromatic coherent light at a specific wavelength and fluence, the laser is absorbed by specific structures within the target area. This light energy is then converted into thermal energy, leading to the desired effect on the targeted structures. Depending on the pulse duration and energy density, this process can either result in the coagulation of the structures through a photothermal effect or the blasting of the structures through a photomechanical effect **(1).**

Warts are skin lesions characterized by the excessive growth and dilation of blood vessels. In the pursuit of effective wart treatment, numerous studies have employed 585-nm pulsed dye lasers (PDLs), specifically targeting the blood vessels within the warts. This wavelength range is chosen due to the strong absorption peaks of haemoglobin, the main component of blood, which occurs between 585 to 595 nm **(2).**

The 585 nm wavelength is highly absorbed by haemoglobin and oxyhaemoglobin, making it an ideal choice for treating vascular lesions. The laser emits short, powerful pulses that are efficiently absorbed by red structures, such as small blood vessels. The rapid absorption of laser energy leads to the heating and subsequent bursting of capillaries and telangiectasias, as these structures are unable to withstand the sudden temperature increase **(1).**

Following treatment with PDL, purpura, a discoloration of the skin, develops within minutes and gradually resolves over a period of 10-14 days as macrophages digest the damaged material and blood residues. With each treatment session, vascular lesions can be expected to lighten, demonstrating the effectiveness of the dye laser in treating these conditions **(1).**

In the pursuit of treating stubborn warts, the use of different lasers, including CO2 laser. Studies have reported cure rates ranging from 52% to 64% when using the CO2 laser for wart treatment. However, it is essential to note that this method is often associated with potential complications, such as infection, delayed healing, scarring, and other adverse effects **(3).**

A comprehensive analysis of 35 studies conducted between 1989 and 2015, involving a total of 2149 patients, shed light on the efficacy of lasers in treating both simple and stubborn non-genital warts. The response rates varied across different laser types, with the CO2 laser demonstrating rates between 50% and 100%, the Erbium YAG (Er:YAG) laser ranging from 72% to 100%, the PDL showing rates from 47% to 100%, and the Nd:YAG laser exhibiting rates from 46% to 100%. Recent randomized controlled trials (RCTs) have indicated that PDL treatment yields comparable results to conventional therapies like cryotherapy and cantharidin**(4).**

Al-Sabak and Jaafar. (5) treated 22 patients with a total of 478 lesions with ND:YAG laser 532. Participants ranged from 6 to 45 years old, including 13 females and 9 males. Results showed excellent responses in 19 patients (86.36%), with 15 achieving complete response (78.94%). At three months, outcomes included 1 good (4.545%), 1 fair (4.545%), and 1 poor response (4.545%). The findings were statistically significant (P = 0.002). Cumulative clearance rates after each treatment session were 58.4%, 77.7%, and 89.9%. Only one patient experienced recurrence, and mild side effects did not disrupt daily activities.

Smith et al. (6) implemented Nd:YAG laser to tackle stubborn verruca plantaris. The treatment showed remarkable efficacy, curing 69.8% of cases completely, with 9.4% experiencing improvement. Importantly, no adverse side effects such as hyperpigmentation, scarring, or infections were reported. This highlights the effectiveness and safety of Nd:YAG laser therapy in managing challenging verruca plantaris, with rare instances of recurrence observed.

Smith et al. (6) highly endorse the utilization of Nd:YAG laser ablation as an effective treatment option for stubborn verruca plantaris. However, it is crucial to exercise caution and avoid directly injecting subcutaneous local anaesthesia beneath the verruca prior to this treatment.

Pharaon et al. (7) documented two cases of persistent hand warts that were effectively treated with the long-pulsed 755 nm alexandrite laser. The treatment achieved successful results in both instances. These findings highlight the laser's effectiveness against stubborn warts on the hands.

Park et al. (8) investigated the efficacy and safety of using the Nd:YAG laser alone versus in combination with a 755-nm alexandrite laser for palmoplantar warts. Patients were split into two groups, with one receiving Nd:YAG only and the other in combination with a 755-nm alexandrite laser. Treatment responses were analysed based on clearance rates, vascular/hyperkeratosis grades, patient satisfaction, and pain ratings. No significant differences were found in effectiveness (p = .348), satisfaction (p = .560), or pain ratings (p = .728) between groups. Both treatment methods proved equally effective for resistant palmoplantar warts.

Lasers are a potential treatment for both simple and stubborn warts. The most commonly studied lasers for this purpose include CO2, Er:YAG, PDL, Alexandrite and Nd:YAG. Among these, PDL is associated with the fewest side effects. However, the use of lasers for treating warts remains limited due to the absence of standardized treatment guidelines. Additional researches is necessary to evaluate the effectiveness of different laser types. Comparisons between laser treatments and non-laser options are also needed. Furthermore, studies should focus on determining the best treatment protocols. Establishing these guidelines could enhance the use of lasers in wart management **(4).**

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