

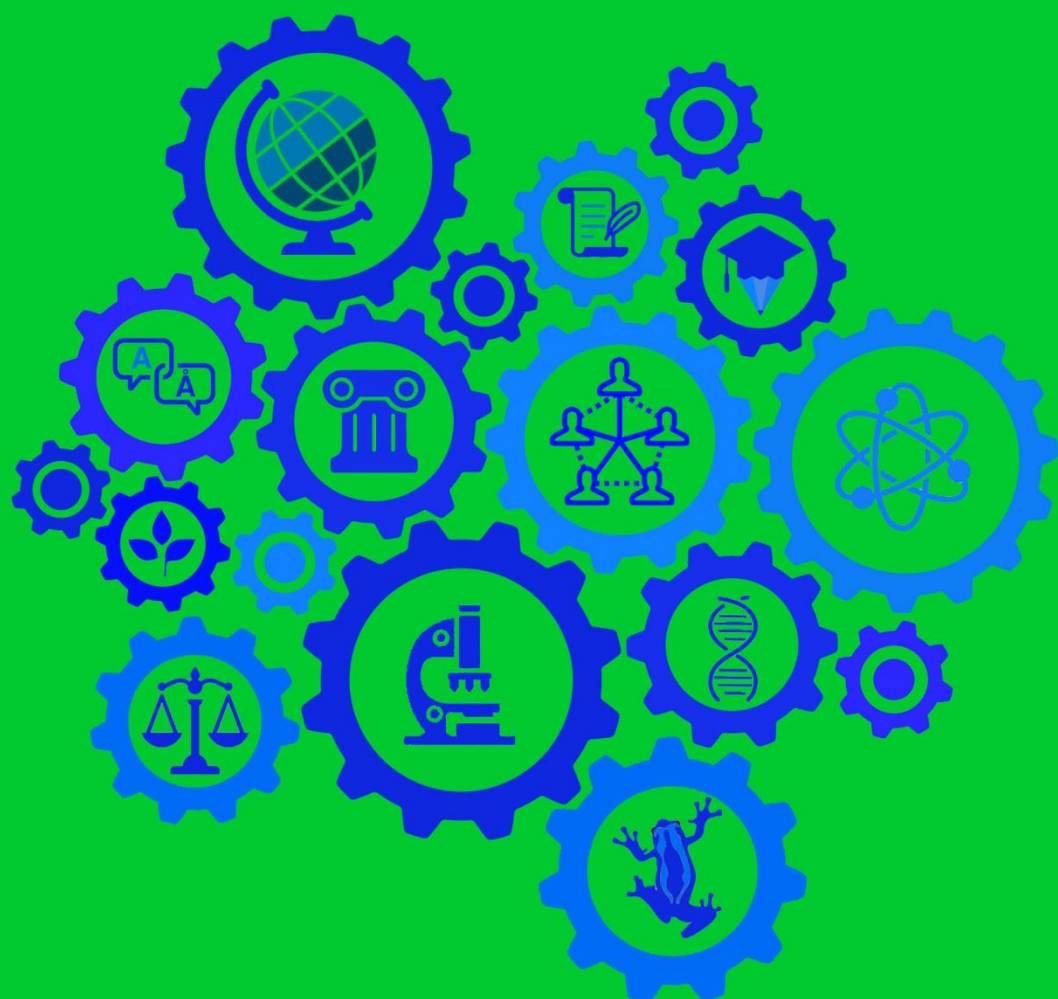
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EVALUATION OF THE EFFECTIVENESS OF LASER REMOVAL OF VIRAL WARTS

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Abstract: One of the serious problems of modern medicine is the treatment of warts. Due to their prevalence, patient discomfort and extensive prospects for complications. In recent years, laser therapy has become an effective method with benefits such as safety, convenience, painlessness, reduced side effects and rapid recovery. In this study, we evaluated the effectiveness of the VBeam Perfecta laser (manufactured by Candela) in the treatment of warts. The results show that this laser method is promising for patients with warts and can be recommended as a treatment method.

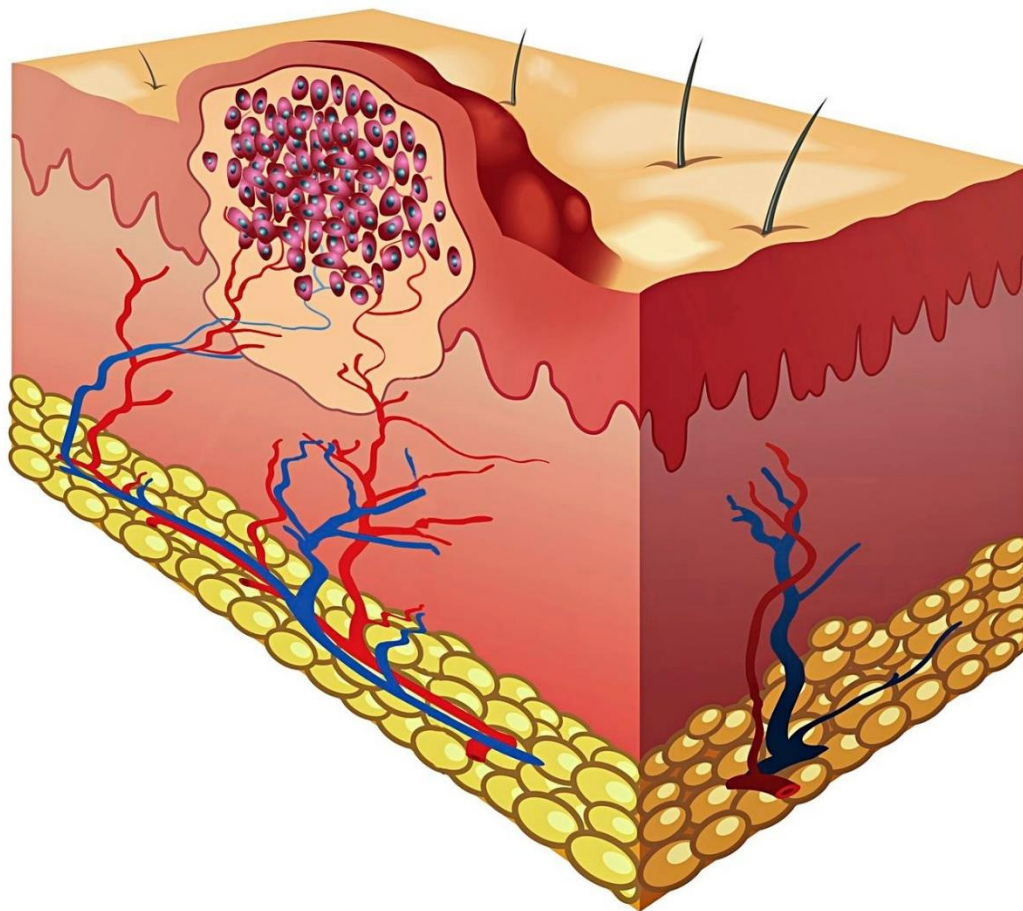
Keywords: viral warts, papillomavirus (HPV), laser destruction, VBeam Perfecta laser (Candela)

Introduction

In recent years, research by dermatologists has focused on the treatment of infection caused by the human papillomavirus (HPV). The geography of the prevalence of this infection, the proven role in the development of tumor diseases and the diverse nature of the emerging pathology [1]. HPV is the causative agent of infection, a small virus without a shell with a double-stranded DNA genome that contains about 8000 base pairs. More than 200 different types of HPV have been identified, each with a unique set of clinical manifestations depending on the location and immune status of the

infected person. Some types of HPV are oncogenic, which means that they can cause malignant cell transformation [4].

Warts are small, benign tumor-like skin formations that can occur in different locations [7]. There are several types of warts, including verruca vulgaris, which is caused by HPV types 2, 4, 7, 27, and 29, verruca plana, caused by types 3, 10, 28, and 41, and verruca plantaris, caused by types 1, 2, and 4 HPV [2]. These types of human papillomavirus (HPV) are generally not considered to be pathogenic, but patients with immunodeficiency, most commonly those with kidney transplants, do have an increased risk of skin cancer associated with certain "harmless" strains of HPV [3] (Fugur 1).



Figur-1. The structure of the wart

The virus enters the skin through damaged areas, and the target cells are basal keratinocytes. After infection, these cells undergo increased proliferation, which leads to hyperkeratosis. Currently, there is no therapy that would fully satisfy both doctors and patients. All available treatments (acid moxibustion, curettage, cryosurgery, electrosurgery and surgical excision) can effectively treat "epidermal growths", but they do not guarantee the eradication of the virus.

There are no enzymes in the DNA of the virus that could be affected by existing antiviral drugs used against herpes viruses, so there is currently no specific treatment for HPV. In addition, treatment results do not always meet patients' expectations due to the possibility of complications such as bleeding, blistering, scarring and pigmentation disorders.

Laser ablation is one of the most widely used and effective techniques that optimally combines surgical action with thermal damage to healthy skin, while allowing radiation to penetrate deep enough into tissues. A laser, or optical quantum oscillator, is a technical device that generates electromagnetic radiation in the form of a focused, highly coherent, monochromatic beam.

Modern lasers differ from other types of electromagnetic radiation in their properties. When the laser beam interacts with the skin, the radiation can be absorbed, transmitted, reflected or scattered depending on the wavelength of the laser and the optical properties of the target material. The balance between these interactions determines the overall effect of the laser on tissues. The absorption of laser energy can have a significant effect on tissues, leading to various effects such as tissue heating, evaporation and ablation. When carrying out destructive methods of treatment, the destruction of a viral wart with damage to epithelial tissues is carried out, which requires compliance with antiseptic conditions before healing. Failure to comply with medical prescriptions during wound healing after destructive therapy and not regular use of prescribed drugs can lead to infection of the wound with the

development of the inflammatory process, an increase in the duration of the healing process and scarring of tissues.

The advantages of laser technology should include safety, convenience, reduced risk of side effects and rapid recovery of the patient.

According to the type of active medium used, lasers can be classified into:

- Solid-state lasers (e.g. ruby, neodymium)
- Gas lasers (for example, helium-neon, carbon dioxide)
- Semiconductor lasers (diode lasers)
- Liquid lasers (based on inorganic and organic dyes)
- Metal vapor lasers (e.g. copper, gold)

Lasers can also be classified by the type of radiation emitted into ultraviolet, visible and infrared. Both semiconductor and metal vapor lasers can operate at low intensity for therapeutic purposes and at high intensity for surgical procedures. Laser radiation can be further divided into low-intensity (LI) and high-intensity (HI). LI lasers are used to treat various skin diseases through various mechanisms such as anti-inflammatory, antioxidant, analgesic and immunomodulatory effects. HI-lasers are mainly used to destroy tumor tissues.

When considering the possibility of laser therapy, it is important to take into account absolute contraindications, such as a history or current diagnosis of melanoma, squamous cell carcinoma, dysplastic nevus, malignant lentigo or Bowen's disease. Individual intolerance to laser radiation

Depending on the wavelength of the radiation, lasers can be divided into ultraviolet (UV), visible and infrared. Both semiconductor lasers and metal vapor lasers can generate low-intensity radiation for therapeutic purposes and high-intensity radiation for surgical applications. Laser radiation can be classified as low-intensity laser irradiation (LLI) or high-intensity laser interaction (HLI). NILI is used in the treatment of various skin diseases, and its main effects include anti-inflammatory,

antioxidant, analgesic and immunomodulatory effects. On the other hand, VLI is mainly used to destroy tumor tissue [1].

When considering the issue of laser therapy, it is necessary to take into account the absolute contraindications.

- A history or current history of melanoma;
- A history of squamous cell skin cancer;
- Dysplastic nevi, malignant lentigo, Bowen's disease;
- Individual intolerance to laser radiation.

Materials and methods

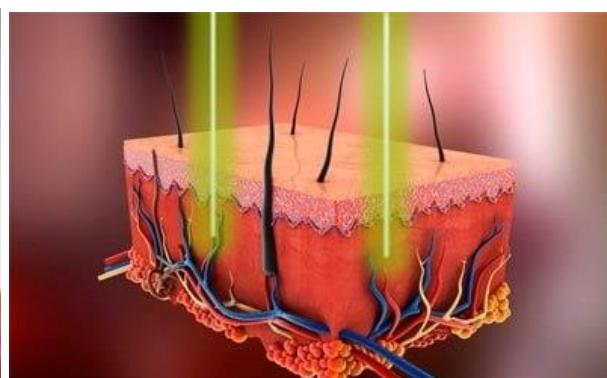
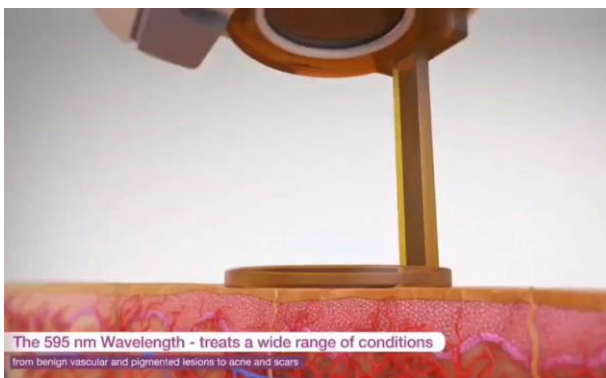
We observed 92 patients with viral skin lesions, including:

- 35 patients had common warts (group 1)
- 42 patients had plantar warts (group 2)
- 15 patients had flat warts (including those located on the red border of the lips) (group 3)

The age of patients ranged from 18 to 66 years, and the duration of the disease — from 1 month to 4 years old.

To remove viral lesions, we used the VBeam Perfecta laser device (manufactured by Candela). This device emits radiation at two different wavelengths simultaneously - 595 nm (green light). Using filters, the doctor can choose any of the wavelengths (Fig. 2).

Parameters used:PDF(spot size 7 mm; pulse duration 0.45-1.5 ms; fluence 10-14 j/cm²)



Figur-2. The effect of the laser VBeam Perfecta on the wart vessel

The destruction process is carried out contactless, with continuous operation of the device by means of scanning fiber movements at a wavelength of 595 nanometers (pulsed on a dye),

A pulsed dye laser appears to be an effective method of treating plantar warts. The safety is excellent and is one of the main advantages of this method. Considering that papillomavirus infections are prone to chronic recurrent course and occur against the background of a secondary immunodeficiency situation, which suppresses cellular immunity and reduces nonspecific protection, immunomodulators such as Keravort were recommended for the prevention of relapses. It is not a direct antiviral agent, it enhances the body's own immunity to HPV infection.

Results and discussions

The results of treatment were evaluated by the degree of tumor removal, the timing of epithelialization and the frequency of side effects.

In the first group, pronounced hyperemia was observed in all patients 15 minutes after laser treatment. After 24 hours, hyperemia persisted in 3 patients (8.5%). All 35 patients had increased edema 72 hours after treatment. Five days after treatment, edema persisted in 5 patients (14.3%), and serous crusts formed in all patients (100%). The final assessment was carried out 21 days after the procedure: all patients had complete recovery, and two patients (5.7%) retained mild cyanosis

In the second group, after 5 minutes, all subjects had pronounced hyperemia and a dark cyanotic color. The final result of the second group was evaluated after 30 days. Epithelialization was completed in all patients.

The effect of treatment on viral lesions was assessed after six months. Laser therapy using VBeam Perfecta (Candela) made it possible to completely remove tumors in 84 people (91%). No long-term side effects (scarring or pigmentation) were observed in the first group.

Conclusion

Therefore, our study demonstrated the high efficacy of the VBeam Perfecta laser (Candela). The benefits of this technique include the minimal risk of scarring and damage to adjacent tissues. The procedure is quick, bloodless, and can be performed on an outpatient basis. Considering the good tolerability of the treatment and the absence of age-related contraindications, laser ablation is a preferred option for the treatment of warts.

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