

Ablation of Cutaneous Lesions using an Erbium: YAG Laser

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INTRODUCTION:

Erbium:YAG laser has been used for laser skin resurfacing for many years. It is an effective device for resurfacing and has a faster recovery time and fewer side effects when compared to the CO₂ laser resurfacing¹. There are several published studies demonstrating its effectiveness in laser resurfacing.

Er:YAG laser has a wavelength of 2.94 μ m, which is absorbed by water 16 times more than the CO₂ laser². This property makes it an ideal tool for tissue ablation. Each pass of Er:YAG laser removes a thin layer of skin and the depth of ablation can be controlled by altering the effective fluence. Er:YAG laser has been used for indications other than resurfacing for wrinkle and acne scars^{3,4,5,6,7}. Epidermal lesion can be removed without damaging the dermis, minimizing the risk of scarring. Er:YAG laser can be used to ablate/remove many benign, pre-malignant and malignant cutaneous lesions. It can be used to remove/treat Seborrheic Keratosis, Actinic Keratosis, Lentigines, Epidermal Nevus, Benign Nevi, Xanthelasma, Syringomas, Sebaceous Hyperplasia, Warts, Melasma, Milia, Acrochordons, Dermatoses Papilosa Nigra, Hypertrophic Scars, Rhinophyma, Superficial Basal Cell Carcinoma, Squamous Cell Carcinoma in Situ (Bowen's Disease), etc. The data presented in this poster was collected to evaluate the safety and effectiveness of erbium:YAG laser in removing cutaneous lesions.

METHODS:

Fourteen female and nineteen male patients with skin types I to IV with various cutaneous lesions were treated with Erbium:YAG laser. The youngest patient was 22 and the oldest was 67. The first patient was treated in September 1999 and the last one in March 2002. An Er:YAG laser with a wavelength of 2.94 μ m was used with a fixed pulse width of ~250 μ s. Patient's eyes were covered with wet gauze and all personnel in the operating room used protective goggles. A smoke evacuator was used. A fluence of 5 to 60 J/cm², spot size 1.5, 3.0 and 5.0 mm was used to ablate benign, pre-malignant and superficial malignant skin lesions. The lesions were

exposed to the laser pulses until they were visibly removed. Photographs were taken before and after treatment at all follow up visits. The follow up visits ranged from one week after treatment to more than a year after initial treatment. A total of 416 lesions were treated. The data about specific lesions is shown in Table 1. A surgical excision was performed and microscopic evaluation was done after the ablation of Squamous Cell Carcinoma in Situ to demonstrate complete ablation with the laser treatment.

Table 1:

LESION	Number	LESION	NUMBER
Solar Lentigo	47	Xanthelasma	03
Seborrheic Keratosis	93	Verruca Vulgaris	01
Nevus	23	Milia	80
Achrocordon	116	Syringoma	25
Sebaceous Hyperplasia	26	SCC in Situ	01
Actinic Keratosis	02		

RESULTS:

All lesions were removed successfully at the time of treatment. There were two patients who had recurrence and needed further treatment. Total number of recurrent lesions was 8 out of 416 with a rate of 1.92. Five of these lesions were Sebaceous Hyperplasia and three were Solar Lentigines. A microscopic evaluation confirmed the complete ablation of SCC in Situ. There was usual erythema, swelling and pinpoint bleeding associated with the use of Erbium:YAG laser. None of the patients had any side effects including infection, scarring or permanent pigmentary alteration.

CONCLUSION:

Erbium:YAG laser is another safe and effective device that can be used to remove benign, pre-malignant and superficial malignant cutaneous lesions. The recurrence rate is low and the risk of complications is minimal. Further studies need to be done to compare this modality of treatment with traditional dermatologic procedures in removing similar lesions.

DISCUSSION:

The faculty of dermatology has changed in many ways in recent past. Younger dermatologists are performing many surgical and cosmetic procedures that were not part of dermatology until recently. The use of lasers has revolutionized the field of dermatology since we started using the pulsed dye laser based on the theory of selective photo-thermolysis⁸. Every dermatologist deals with patients who are bothered by various skin growths. Some of these growths are symptomatic and others are removed for cosmetic reasons. Most of these lesions can be treated with a variety of surgical methods, including excision, shave removal, cryosurgery, cauterization, etc.

There is significant awareness about the use of lasers in general population through media and marketing by the laser industry and laser surgeons. This has created a general perception that “lasers” are better surgical tools. In this “high tech” world, most patients prefer “laser” treatment over traditional surgical methods. The advantage of Er:YAG laser over other methods of treatment is that it gives the surgeon a precise control over tissue removal with a minimal risk of scarring. We collected this data from our patient population to evaluate the safety and effectiveness of Er:YAG laser. The data shows that Er:YAG laser can be used safely and effectively to remove cutaneous lesions. One has to be careful when removing malignant or pre-malignant lesions. It is safe to remove superficial skin cancers, i.e., superficial BCC and SCC in Situ. Extreme caution is needed when removing nevi. Nevi should not be removed by any method that would not yield microscopic diagnosis in anyone with personal and/or family history of Melanoma or Dysplastic Nevi. Any nevus that appears atypical should be biopsied before laser ablation.

It is unclear if the use of Er:YAG laser ablation is better than any other traditional methods of removing cutaneous lesions. Further comparative studies should be performed to answer this question.

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