Original Article

595nm Pulsed Dye Laser: An Alternative to Treat Basal Cell Carcinomas

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Abstract:

Background: Basal cell carcinoma (BCC) is the most common cutaneous malignancy. Proffered treatment for these lesions is surgery. Based on patient's age, drug allergies, and place of lesions, surgery may not be the best option, and alternative treatments should be considered. Pulsed dye laser (PDL) may be a good alternative therapy. The aim of the present study was to determine the effectiveness and safety of this laser in the treatment of BCCs in Iranian patients.

Methods: Patients with definite diagnosis of BCC enrolled in the study. For each patient, one lesion proved to be superficial, or nodular BCC via histopathology was treated with PDL for four sessions and after the last session, re-biopsy was done to determine any remnant of tumor. All patients were followed for 6 to 13 months to capture any recurrence of as soon as possible.

Results: A total of 12 patients including eight male and four female were selected. All patients completed the study in accordance to the treatment protocol. All patients cleared clinically resulting flat hypo pigmented scar, but in pathology, two patients showed remnants of tumor and were referred for surgery. No side effects, but mild erythema and irritation were noted in all patients. No recurrences were found during the follow up period.

Conclusion: It seems that PDL may be an effective alternative therapy for some subtypes of BCCs with acceptable safety profile. Further studies with larger sample sizes are required to support this opinion.

Keywords: BCC; pulsed dye laser (PDL); surgery; lasers, dye

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Introduction

Basal cell carcinoma (BCC) is the most common cutaneous malignancy with a relatively benign course with minimal invasion, and it rarely metastasizes (1, 2). Ultraviolet exposure increases the incidence of this tumor and lesions are mainly found on sun-exposed skin (3-5). Different clinical forms including morphoeic, nodular, superficial and basi-squamous have been described (6). Proper treatment of BCCs depends on variations such as clinical form, invasion in histopathology, age and patient's basic health, location of lesions, history of recurrence, or previous radiotherapy. Many options including surgery, immiquimod, radiofrequency, cryo-surgery, electro cautery, etc. are available

with different cure rates and recurrence probability (7-15). According to a patient's general health, history of drug reactions, age, place of tumor and personal desires, some options such as surgery may not be applicable in all situations; hence, alternative treatment options including pulsed dye laser (PDL) should be considered. Recently, some authors have indicated potential benefits of 595nm pulsed dye laser (PDL) in treating some clinical variants of BCCs including nodular and superficial forms (16-18). A comprehensive literature search failed to find any successive study about application of PDL in Iranian patients with BCCs. According to different cure rates reported in these studies, and difference in skin color of Iranian patients, the present study was designed to determine the cure rate of this therapy in Iranian patients with nodular and superficial BCCs.

Methods

Patients with superficial and nodular BCCs, confirmed through histopathology, were selected if they preferred non-surgical treatment or surgery was inapplicable, because of tumor site or patient's basic health status. Patients were ruled out if they did not have enough compliance to fit in the laser treatment protocol, or preferred other treatment options such as radiotherapy and other physical treatments. All patients provided an informed consent form and were included if they had agreed with the treatment protocol. The study was conducted in accordance with Declaration of Helsinki and was approved by the local ethics committees. All patients were treated with 595nm pulsed dye laser with these parameters: fluence: 12j, pulse duration: 1.5 ms, spot size: 7mm with disabled Dynamic cooling device (DCD) produced by Candella V-Beam PDL laser with 10% overlap. All patients were treated for four successive sessions with three weeks intervals, and four weeks after the final treatment session, all lesions were re-biopsied in four quadrants for each lesion to reveal any remnant of the tumor. All histopathology reports were documented. Patients were followed after treatment from 6 to 13 months to detect any recurrence in the first stages. All lesions were photographed with an 8 Mega pixel Nikon digital camera. The recorded data were analyzed using SPSS ver. 16, and p values < 0.05 were considered as significant. Student t-test and chi-square test were used when necessary.

Results

A total of 12 patients including eight male and four female were enrolled. Two patients had more than one tumor. Mean diameter of tumors was 8 ± 3.5 mm, and all were of superficial or nodular type without ulceration. Table 1 shows the summary of the tumors in patients.

All patients completed the treatment course in accordance to the treatment protocol. Clinically, tumors healed in all cases and a flat atrophic hypo-pigmented scar substituted it (Figure 1, 2).

Ten patients had cleared lesions in the second histopathology report. Two patients failed to respond to laser treatment, and their second pathology report was positive for remnant BCC tumor, and they were referred to for other treatment modalities. There was no relationship between the tumor diameter and healing rate ($p>0.05$). Again,

Table 1. Tumor size, site and response to PDL treatment.

Lesion	Site of tumor	Histopathologic subtype	Diameter of tumor	Pathologic outcome
1	Nose pole	superficial	5×7mm	Cleared
2	Frontal area	nodular	10×8mm	Cleared
3	Left Cheek	nodular	6×7mm	cleared
4	Frontal Area	superficial	5×9mm	Cleared
5	Left cheek	superficial	10×10mm	Cleared
6	Right Cheek	nodular	7×9mm	Tumor persists
7	Nose	nodular	12×8mm	Cleared
8	Temporal area	suparficial	10×12mm	cleared
9	Frontal area	superficial	6×9mm	cleared
10	Right cheek	nodular	10×7mm	cleared
11	Nose	nodular	5×6mm	Tumor persists
12	scalp	superficial	7×8mm	Cleared

Figure 1. (A) Before laser therapy. **(B)** After Laser Therapy.

statistical analysis failed to show any relationship between the size and pathologic subtype of tumors and healing rate ($p>0.05$). We found no severe side effects in patients receiving PDL, but mild local irritation, inflammation and some ulceration about two weeks after treatment with PDL were seen. In the follow up period, no recurrence was detected in patients with negative control pathology.

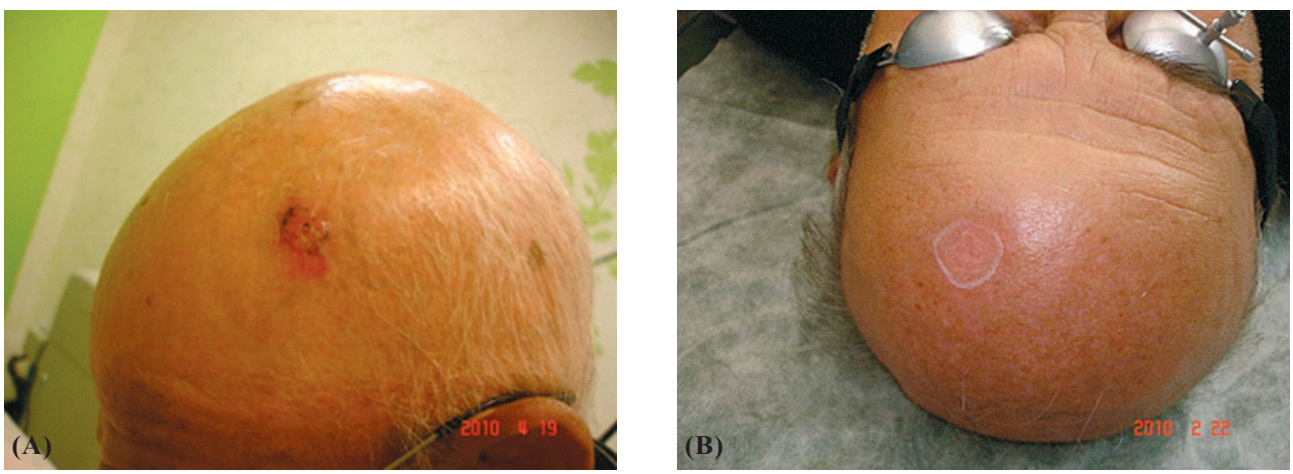

Figure 2. (A) Before laser therapy. **(B)** After laser therapy.

Discussion

To date, at least two studies have confirmed usability of PDL as a non-surgical option in treating BCC (18, 19). According to our results, the present study is in agreement with these two works. We found that PDL is an effective alternative for non-surgical treatment of BCC, with a clearing rate of about 80% in four treatment sessions proved by histopathology examination. Clinically, hypo-pigmented flat scar produced by laser treatment was the final outcome in pathologically cleared patients. Our cure rate is to some extent within the range of other studies. Many authors have recommend surgery as the first line of therapy for these lesions when applicable. But surgery in is not applicable in some cases, except in price of unacceptable complications of anesthesia, cardiac failure, and impaired hemostasis, and in some cases allergies to drugs used for anesthesia. According to the results of the present study, we suggest PDL as an alternative treatment for superficial BBCs, when surgery is not recommended. One of the previous studies reported that lesion diameter was effective on the final outcome, and smaller lesions responded better (18). We didn't find such effects in our patients. The histopathology response rate in our study was 80%, which is comparable with other studies. It seems that the histopathology response rate may be related to the fact that vascular mass of a tumor is an effective predictor of response (18, 19). In tumors with low vascular mass, only non-specific destructive effect of the laser beam can eliminate tumor cells, which increases failure rate independent of histopathology subtypes. According to the high rate of tumor recurrence in micro-nodular and infiltrative subtypes, such types of BCC were excluded from. Also, in pigmented tumors, the pigment itself may interfere with absorption of laser beam by vascular supply of tumor and we excluded these subtypes too. Clinically, all of our patients responded well to this treatment and the result was the appearance of thin hypo pigmented flat scar. But the histopathology exam revealed two non-responder cases who were referred for other treatment options. No major adverse reaction was found after therapy, only mild to moderate erythema and burning sensation during laser therapy and fine crust formation that resolved spontaneously living thin hypo-pigmented flat scar. We followed all patients in Razi Medical Center Tumor Clinic every three months, and no recurrence among patients with histopathology resolution has been found. Although optimum laser parameters to achieve best results are yet to be determined, and controlling of the histopathology exam is necessary to confirm tumor ablation. In addition, the few numbers of patients, and the short follow up period had added to the limitations of the present study. In conclusion, 595nm pulsed dye laser seems to be an effective alternative in treating BCC's with mild adverse effects.

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