



Photodynamic therapy for conventional treatment resistant actinic keratosis

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Abstract

Introduction: Actinic keratosis (AK) is a common skin disease, presumably caused by long term sun exposure, and capable to undergo malignant transformation. Here, we present a case of AK successfully treated with PDT. A 75-years old male patient presented with AK on the head. The patient had received conventional treatments for the last 3 years, with no satisfactory outcome. The patient was treated with methyl aminolaevulinate based PDT in three sessions. After 3 months of the treatment, the patient illustrated complete response to the treatment. The patient has been followed up for 2 years and no recurrence has been observed. PDT has a rapid response and significantly effective for improving Actinic Keratoses lesions.

Keywords: histologically, keratinocytes, squamous cell carcinoma, photodynamic therapy, photosensitizer, methyl aminolaevulinate (MAL)

Introduction

Actinic keratosis (AK) is a common skin disease, presumably caused by long term sun exposure. AK frequently affect the face, neck, balding scalp, chest, back of arms and shoulder [1, 2, 3, 4]. Clinically AK is presented as a rough or scaly plaque with superficial scales on a red base. AK lesions are often multiple, appearing either as raised papules or flat macules with a brown or yellow-colored crust overlying an erythematous base. Histologically AK is characterized by proliferation of typical keratinocytes limited to the epidermis. AK may undergo malignant transformation and progress to invasive squamous cell carcinoma (SCC), thereby biopsy is recommended in case of any suspicion of invasive malignancy [5, 6, 7, 8].

Albeit AK has been managed with several treatment modalities, the standard treatment remains elusive. Specifically, the treatment options for AK include cryosurgery, curettage, excision surgery, topical treatments (5-fluorouracil [5-FU] cream, diclofenac gel, imiquimod cream, and ingenol mebutate gel), etc [9, 10, 11]

Photodynamic therapy (PDT) is an emerging and promising approach to treat various skin diseases. PDT treatment protocol consists of two main steps; first, a photosensitive substrate is applied to the lesion, and second, the absorption of the photosensitive substrate in the lesion is followed by light exposure of specific wavelength, which triggers a cascade of photochemical reactions in lesion, ultimately resulting in cell killing [12, 13]. A patient may receive multiple sessions of PDT, depending upon the nature and size of the lesion.

Herein, we present a case of AK successfully treated with PDT. Specifically, a 75 years old male patient presented with an AK lesion on the scalp, which did not responded to the conventional treatments. The patient showed complete response with excellent

cosmetic outcomes to PDT (3 sessions).

Case Report

A 75 years old male patient presented with the complaints of multiple lesions on the scalp, as shown in [Figure 1]. The lesion had been diagnosed as AK. The patient received conventional treatments without any satisfactory results. The patient was planned for PDT. The treatment/ study protocol was approved by the local institutional based ethics committee of the Swat Institute of Nuclear Medicine, Oncology and Radiotherapy (SINOR), Pakistan. The treatment procedure was thoroughly explained and written signed consent was obtained. The patient's lesions photographs taken on his first visit was set as baseline for the treatment.

To carry on the treatment, the lesions and the adjacent skin were cleaned and deeply scrubbed to remove the necrotic layer. Photosensitizer (i.e., methyl aminolevulinate; MAL), in the form of cream, was prepared and applied to the AK-affected areas under adhesive covering for an incubation time of (3 hrs). After the incubation period, the cream was removed and the areas were washed with normal saline. The lesion was given light energy dose of 75 J/cm² by red laser light (wavelength = 635nm). The patient received three sessions of PDT; the first two sessions were two weeks apart, while the third session was given at one-month interval. The clinical features of the patient, lesion characteristics and PDT protocol used have been summarized in [Table 1]. The patient was clinically assessed on each visit, and showed complete response after three sessions of PDT.

The patient complained mild burning sensation and pain during the first PDT treatment which was easily managed by cold-water spray; however, the patient had no such complaints during the second and third PDT sessions.

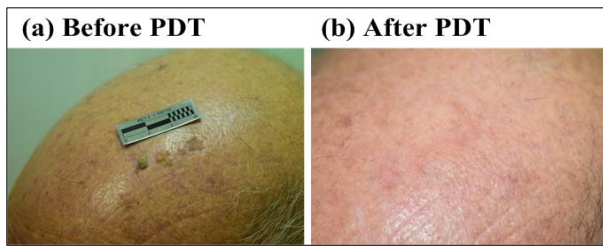


Fig 1: Sample white light photos summarizing the progress of PDT treatment of the Actinic Keratosis lesion. Single chronic disfiguring ulcerated lesion on the scalp (a), after three sessions of PDT complete response with excellent cosmetic results was observed (b).

Table 1: Summary of clinical features of the patient with Actinic Keratosis lesion characteristics and PDT

Clinical Features		Lesion Characteristics		PDT Treatment	
Age	75 years	Site	Scalp	Photosensitizer	MAL*
Gender	male	Size	3cm	Laser wavelength	635 nm
Previous Treatment	Conventional treatment	Ulceration	Present	Light dose	75 J/cm ²
Treatment outcome	No response	Disfigurement	Present	No. of sessions	03

*MAL: Methylaminolevulinat

Discussion

Actinic keratosis (AK) is a chronic and prevalent skin disease. Typically, the AK may comprise of visible, non-visible and subclinical lesions in the sun-exposed areas of the skin, which, if remain untreated, are prone to malignant transformation [3].

Although various treatment modalities are available for the management of AK, the increasing resistance of AK, however, limits the efficacy. Moreover, the potential systemic toxicities, limited success of complete response and prolong treatment durations of conventional treatments also hinders their clinical applications [6]. In this perspective, there is an urgent need for new treatment modalities of AK, particularly in low socio-economic countries, like Pakistan. PDT offers a promising and effective treatment option for AK, as efficacy rates of as high as 70–90% has been reported. Systemic toxicity, one of the major health issues related to conventional treatments of AK, has also been eliminated in PDT. Specifically, PDT is a local, selective, non-invasive and short duration treatment. Nevertheless, PDT has its own set of shortcomings, such as the burning sensation and pain during the treatment and post-treatment hypersensitivity to daylight, which usually subsides within a couple of days [14, 15].

Consequent upon the encouraging results from the treatment of the first AK case in Pakistan, we have planned to conduct a comparative study of AK patients treated with Photodynamic therapy and conventional treatments at SINOR, Pakistan.

Conclusion

PDT offers low cost treatment option for the treatment of AK and produce excellent cosmetic outcomes. The overall treatment time and duration of each session are significantly short compared to the conventional treatments. PDT treatment has no risk of systemic toxicity and offers better therapeutic option to heal rapidly disseminated lesions of AK without affecting the healthy tissues.

Conflicts of Interest

The authors have no conflicts of interest.

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