

Macular cutaneous amyloidosis treated with methyl aminolevulinate and daylight photodynamic therapy: A case report

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Christina M Huang^{1,2}, Lauren Lam² and Robert Gniadecki²

Abstract

Primary cutaneous amyloidosis is characterized by polymerization of extracellular amyloid precursors in β -pleated sheet conformation into larger fibrillar aggregates. Observation in models of Alzheimer's disease have noted that amyloid polymerization in the brain is blocked by reactive oxygen species. Singlet oxygen is formed in the skin during methyl aminolevulinate photodynamic therapy. Therefore, we speculate that type II photochemical reaction is responsible for the observed therapeutic activity of methyl aminolevulinate photodynamic therapy in our patient with primary cutaneous amyloidosis. Our case is the first report demonstrating the efficacy of daylight photodynamic therapy in primary cutaneous amyloidosis. Daylight photodynamic therapy may provide a convenient and cost-effective therapeutic option in primary cutaneous amyloidosis, and its efficacy should be further confirmed in prospective trials.

Keywords

Photodynamic therapy, amyloidosis, depositional disease

Introduction

Primary cutaneous amyloidosis (PCA) is characterized by polymerization of extracellular amyloid precursors in β -pleated sheet conformation into larger fibrillar aggregates. Although various treatments have been reported in the literature to treat PCA, there are only a few high-quality randomized trials reported to date. The lack of data leaves the best approach to management unclear and contributes to the absence of treatment standards for PCA. We present a case demonstrating the efficacy of methyl aminolevulinate daylight photodynamic therapy (MAL-DPDT) in PCA.

Case

A 60-year-old female presented with a 14-year history of pruritic, well-demarcated, yellow-brown, waxy macules distributed to her cheeks. A biopsy of a lesion demonstrated deposits of pink amorphous material in the upper dermis, staining positively with Congo red and exhibiting green birefringence under polarized light, consistent with amyloid. A thorough workup including serum protein electrophoresis, urine protein electrophoresis, complete blood cell count with differential, liver-associated enzymes, creatinine, urinalysis, electrocardiogram, and chest radiography showed no systemic disease involvement. Based on these findings and the

histologic characteristics, a diagnosis of macular PCA was made.

The patient had no prior therapy of the lesions. A trial of liquid nitrogen cryotherapy (2 cycles) for 3 s on a left pre-auricular papule was unsuccessful. The patient declined systemic therapy, and photodynamic therapy (PDT) with ultraviolet B or psoralen ultraviolet A was not feasible due to the geographic location of the patient. We therefore decided to treat with daylight photodynamic therapy (DPDT). The patient was advised to apply a thin amount (160 mg/g) of methyl aminolevulinate (MAL) cream to PCA lesions, followed by 2 h of daylight exposure. The treatment was undertaken during the month of August, on sunny days only. She activated treatment both outdoors and indoors, by sitting near a window. Significant improvement in pigmentation, pruritus, and size of the lesions was observed after 1 month of treatment (Figure 1). Side effects experienced by the patient included mild erythema and a tolerable headache.

¹School of Medicine, Queen's University, Kingston, ON, Canada

²Division of Dermatology, University of Alberta, Edmonton, AB, Canada

Corresponding Author:

Christina M Huang, School of Medicine, Queen's University, 15 Arch Street, Kingston, ON K7L 3L4, Canada.
Email: Chuang@qmed.ca





Figure 1. Significant improvement in pigmentation, pruritus, and size of the lesions was observed after 1 month of treatment. Before (left), 2 weeks (middle), and 1 month (right) on treatment with MAL and natural visible light therapy.

Both of these resolved within days after treatment. The only other patient concern was the cost of the medication.

Discussion

PCA is subdivided into the lichenoid, macular, and nodular types. In macular PCA, amyloid is deposited in the upper dermis and is composed of keratins, which may be released from apoptotic keratinocytes.¹ Mutation in oncostatin M receptor beta decreases apoptotic threshold in keratinocytes and is linked to PCA.²

To our knowledge, our case is the first report showing efficacy of MAL-DPDT in PCA. The idea to use PDT in our case stems from the observation in models of Alzheimer's disease where amyloid polymerization in the brain is blocked by reactive oxygen species. It was found that singlet oxygen and hydroxyl radicals oxidize amyloid and amyloid precursors and prevent protein assembly into supramolecular structures.³ Singlet oxygen is formed in the skin during methyl aminolevulinate photodynamic therapy (MAL-PDT).³ Therefore, we speculate that a type II photochemical reaction is responsible for the observed therapeutic activity of MAL-DPDT in PCA. Of interest, other treatments, which increase free radical formation in the skin such as narrow band ultraviolet B^{4,5} or psoralen ultraviolet A,⁶ have demonstrated moderate efficacy in PCA as well.⁷⁻⁹

Treatment of PCA with MAL-DPDT has several advantages as a treatment modality. First, as a topical treatment, it decreases potential side effects associated with systemic therapy. Second, not all treatment centers carry a PDT machine. In addition to increased accessibility, MAL with natural light allows more flexibility for timing of treatment. This enhances convenience for patients and may result in higher treatment compliance. Furthermore, the

ease of therapy without reliance on a PDT machine can lower healthcare costs.

In conclusion, MAL-DPDT may provide a convenient and cost-effective therapeutic option in PCA, and its efficacy should be further evaluated in prospective trials.

Declaration of conflicting interests

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Informed consent

The patient has given verbal and written consent for her picture to be used and published.

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