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REVIEW

Efficacy of photodynamic therapy in the management of oral premalignant lesions. A systematic review

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Oral premalignant lesion;
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Erythroplakia;
Erythro-leukoplakia;
Verrucous hyperplasia

Summary
Objective: The aim was to systematically review the efficacy of photodynamic therapy (PDT) in the management of oral premalignant lesions.
Methods: The addressed focused question was ''Is PDT effective in the management of oral premalignant lesions?'' PubMed/Medline, Google-Scholar, EMBASE and ISI Web of Knowledge databases were searched from 1984 till June 2014 using different combinations of the following keywords: photodynamic therapy; oral premalignant lesions; leukoplakia; erythroplakia; erythro-leukoplakia; verrucous hyperplasia; and submucous fibrosis. Review articles, experimental studies, case-reports, commentaries, letters to the Editor, unpublished articles and articles published in languages other than English were not sought. The pattern of the present study was customized to mainly summarize the relevant information.

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Results: Thirteen studies were included. In these studies, the number of patients ranged between 5 patients and 147 individuals with mean ages ranging between 51 years and 62.2 years. Oral premalignant lesions, which were investigated were leukoplakia, erythroplakia, erythroleukoplakia and verrucous hyperplasia. Reported number of premalignant lesions ranged between 5 and 225. Laser wavelength, duration of irradiation and power density were 585—660 nm, 60 s to 16.6 min and 100—150 mW/cm^2, respectively. Aminolevulinic acid, chlorine-e6, meta-tetrahydroxyphenylchlorin and photofrin were used as photosensitizer. The frequency of PDT application ranged between once and 12 times. Complete, partial and no response to PDT was shown by 27—100%, 5—50% and 0—25% of pre-malignant lesions, respectively. The recurrence rate of pre-malignant lesions was up to 36%.
Conclusion: PDT is effective in the overall management of oral premalignant lesions.

Contents

Introduction

A variety of therapeutic strategies have been proposed for the management of oral per-malignant lesions (such as leukoplakia [OL], oral erythroplakia [OE], oral erythroleukoplakia [OEL], oral verrucous hyperplasia [OVH] and sub-mucous fibrosis). These treatment modalities include topical application of drugs (for example, vitamin A, antibiotics and steroids) [1—4], laser ablation, cryotherapy and surgical excision [5,6]. Non-surgical management strategies (such as topical application of drugs) for the management of pre-malignant lesions may be successful in the short-term as high recurrence rates have been reported with this form of treatment [7,8]. Moreover, it has also been reported that surgical treatment of oral precancerous lesions increases morbidity and formation of scar tissue [9].

Photodynamic therapy (PDT) is a contemporary treatment modality for the management of oral inflammatory conditions. PDT involves interaction between a light source and chemical dye or photosensitizer (PS) in the presence of oxygen [10,11]. This interaction produces reactive oxygen species [11,12] that cause oxidative damage to microbial cell walls and pre-malignant and malignant cells [13—15]. In the study by Yu et al. [16], 35 patients with oral verrucous hyperplasia (OVH) were treated using PDT. The results showed complete elimination of OVH with no recurrence up to 35 months of follow up. Similar results were reported by Chen et al. [15]. Results from these studies [15,16] suggest that PDT is a potential therapeutic strategy for the management of oral premalignant lesions. However, studies [17,18] have also reported recurrence rates of up to 36% following treatment of oral premalignant lesions using PDT. In this regard, it seems that there is a controversy over the effectiveness of PDT in the management of oral premalignant lesions. To our knowledge from indexed literature, efficacy of PDT in the management of oral premalignant lesions has not been systematically reviewed.

The aim of the present study was to systematically review the efficacy of PDT in the management of oral premalignant lesions.

Materials and methods

Focused question

Based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, a focused question was constructed. The addressed focused question was ''Is PDT effective in the management of oral premalignant lesions?''

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