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Review

A treatment algorithm for the management of intraoral burns: A narrative review

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ABSTRACT

Oral mucosa follows a distinctly different trajectory of wound healing than skin. Although there are contemporary guidelines regarding treatment of burns to the skin, there is no standard of care specific to intraoral burns. This narrative review proposes an evidence-based treatment algorithm for the management of intraoral burns. Data was collated through a comprehensive review of the literature and only included studies that have reported particular success with favorable short- and long-term prognoses. In order to critically appraise the strength of the treatment recommendations, the GRADE criteria was applied to each arm of the algorithm. The algorithm was initially subdivided into the four primary etiologies of intraoral burns — thermogenic, cryogenic, chemical, electrical. Our findings emphasize the importance of conservative modalities of intra-oral burn treatment.

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Contents

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1. Introduction

Oral burns arise from injury to the mucosa from thermal, chemical, or electrical insults. Most burns are superficial and uncomplicated, with little other than supportive treatment to promote proper healing of the burn wound. Severe full-thickness burns are fortunately rare, but are often associated with potentially devastating sequelae and may even prove fatal [1]. Regardless of the burn severity, the appropriate management should address factors such as pain relief, infection control, and acceleration of wound repair, in order to restore the orofacial complex in a functionally and aesthetically sound manner. To accomplish these goals, management must be compatible with the patient's medical history and with the nature of the burn injury, including its etiology, duration, and distribution [2]. A systematic, evidence-based algorithm can greatly facilitate this decision-making process.

Oral burn wounds of all etiologies result in mucosal lesions with histopathologic and clinical consequences that are different from burn wounds of the skin. Both oral mucosa and skin are stratified with a superficial layer of epithelium or epidermis, an intermediate layer of basal lamina, and a deep layer of lamina propria, submucosa, or dermis [3]. Functionally, however, oral mucosa bears little resemblance to skin, especially in their respective responses to burn injuries. Wound healing of the oral mucosa is superior to wound healing in the skin. The oral mucosa is noted among clinicians for its scarless healing and thus often considered the closest surrogate of the near-ideal healing model observed in fetal wounds [4]. A natural corollary is the presence of saliva in the oral cavity, which is believed to contribute to the reduced scar formation of oral mucosa. However, the presence of saliva is not the only mechanism of ideal healing of mucosa. Reilly et al. reported the development of a keloid on a skin graft previously transposed into the oral cavity to reconstruct an intraoral defect [5]. This finding implies that scarless healing is intrinsic to the oral mucosa itself and is not solely dependent on saliva or other extrinsic influences [5,6]. Chen et al. expanded on this idea and hypothesized that the transcriptomes of wound repair differed between oral mucosa and skin. They confirmed that oral mucosa expressed lower levels of proinflammatory mediators leading to rapid and scarless healing of intraoral wounds [7]. Moreover, Szpaderska et al. found that oral mucosa recruited less inflammatory cells to wound sites, especially neutrophils whose local infiltration has long been associated with delayed wound healing and scar formation [8,9].

Currently, there is a paucity of controlled clinical trials investigating the best treatment regimens that are specifically applicable to oral burns, the contemporary management has largely been extrapolated from the same treatment principles applied to the management of skin burns. The unique biology of the oral mucosa necessitates an altogether separate treatment methodology. To the authors' knowledge, no data currently exists outlining the standard of care for the management of oral burns. Several case reports and case series have described treatment regimens for oral burns that are primarily based on the expert opinion of clinicians, and not on evidence-based recommendations. The treatment algorithm we propose attempts to eliminate this inconsistency and provides a cohesive treatment methodology with recommendations that are specific to each of the three major types of oral burns.

2. Method

A comprehensive search was conducted through the online PubMed database for English-language articles with no publication date restrictions. In order to critically evaluate the strength and quality of recommendations, the treatments outlined in each branch of the algorithm have been rated according to the GRADE system [10]. This mechanistic and reproducible approach to grading the strength of recommendations has proved useful to systematic reviewers and has suitably been adopted by numerous health organizations since its inception in 2004, including the Cochrane Collaboration and the World Health Organization among others [11]. This system adds a level of transparency to the algorithm that allows clinicians to make informed, albeit subjective, decisions when considering treatment recommendations.

For all studies considered in oral burn management, only the critical outcomes will be addressed as they contributed the most to constructing the algorithm [12]. The critical outcomes include the short- and long-term prognosis of the intervention of interest as well as the morbidity and mortality [13] associated with the alternative of no treatment [12,14]. In the GRADE system, the strengths of recommendation will ultimately depend on how these critical outcomes are affected by the following four parameters that are specific to the intervention of interest: (1) net benefit of the intervention, (2) quality of available evidence, (3) variability in patient's values and preferences, and (4) cost of the intervention [15,16]. Based on these four parameters, we used the GRADE guidelines to classify the proposed treatments into strong or weak categories, effectively quantifying the confidence with which we can empirically recommend any given treatment within the algorithm (Table 1) [15].

The final grade assigned to the individual treatments are binary designations, comprised of a number and a letter (Fig. 1). By convention, the strength of recommendation is represented by the numbers 1 or 2, representing strong or weak recommendations, respectively [15,17]. The quality of evidence is instead represented by a letter ranging from A to D