



Atypical Reaction to Topical Lidocaine Application in Endodontics – A Report

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Abstract

Effective moisture control in endodontics relies on rubber dam isolation, often requiring topical anesthetics to reduce clamp-related discomfort. Lidocaine is widely used due to its quick action and low allergy risk, but also has dose-dependent antifungal properties. Subtherapeutic doses is said to aggravate dormant fungal infections. This report presents a possible case of fungal exacerbation linked to topical lidocaine use.

Keywords: Lidocaine, Rubber Dam, Anesthesia, Antifungal agents, Hypersensitivity.

Introduction

Moisture control remains an integral aspect of all endodontic procedures, with rubber dam isolation being the standard of care in restorative and endodontic dentistry. Besides providing an aseptic and moisture-free environment, the rubber dam prevents accidental ingestion or aspiration of instruments and irrigants.

Placement of rubber dam clamps, however, can cause minor discomfort or pain due to pressure on the gingival tissues. To mitigate this, topical anesthetics—available as gels, sprays, or solutions—are

frequently used to anesthetize the soft tissue before clamp placement [1]. Some studies have shown that the topical anesthetic is capable of reducing the risk and intensity of pain during the adaptation of the clamp of rubber dam [2,3].

Topical anesthetic sprays have greater concentration of local anesthetic and are absorbed rapidly across the mucous membrane, thus providing effective anesthesia [4]. Lidocaine is the only amide based local anesthetic that can be used both as oral and injectable form. It can be used orally as a gel, solution, ointment or spray. The

action of lidocaine onsets approximately 1-2 minutes from application and remains for a time period of 15 minutes and at approximately 5 minutes its maximum efficacy is seen. When compared to Benzocaine, Lidocaine has lower risk of allergic reaction, aiding it as an ideal option as topical anesthetic.

The anti-fungal activity of lidocaine has been previously reported as a dose-dependent effect [5]. Lidocaine fungicidal effect was confirmed for concentrations corresponding to at least double MIC, varying from 15mg/mL to 30mg/ml, showing a dose-dependent effect [6]. Concentrations exceeding the minimum inhibitory concentration (MIC) exhibit fungicidal effects, while subtherapeutic dosing may paradoxically stimulate latent fungal organisms, leading to an exacerbation of dormant infections [7,8]. This case report describes a rare instance of possible fungal reactivation following the use of topical lidocaine spray for rubber dam placement in a medically compromised patient.

Case Report

A 46-year-old female presented to the Department of Conservative Dentistry and Endodontics seeking treatment for pain in the upper left posterior region. Her medical history included hyperthyroidism, dyslipidemia, hypertension, and type 2 diabetes mellitus, all managed with regular medication over the past two years.

Clinical examination revealed deep proximal caries involving tooth #24 (upper left first premolar). The tooth was non-tender to percussion and palpation, with negative responses to thermal and electric pulp tests. Radiographic assessment showed caries extending into the pulp with a periapical radiolucency suggestive of asymptomatic apical periodontitis. A diagnosis of pulpal necrosis with asymptomatic apical periodontitis was made, and nonsurgical root canal treatment was planned. Procedure was initiated after obtaining the consent form the patient.

Given the non-vital status, no injectable anesthesia was administered. The tooth was isolated using a rubber dam after application of topical lidocaine spray to minimize gingival discomfort during clamp placement. Access cavity preparation and canal instrumentation commenced uneventfully. However, the patient

began to experience discomfort mid-procedure. Treatment was paused, a calcium hydroxide medicament was placed, and the cavity was temporized.

The next day, the patient returned with multiple erythematous, well-defined plaques covered with silvery white scaling on the forehead, glabella, and upper nasal bridge, ranging from 1 × 1 cm to 2 × 4 cm (Figure 1). Similar mucosal changes were noted on the palate. The lesions were non-tender, non-ulcerated, and accompanied by mild surrounding hyperpigmentation. No lesions were observed on the extremities or neck.

The patient was referred to the Department of Dermatology. Differential diagnoses included plaque psoriasis, delayed hypersensitivity reaction, and discoid lupus erythematosus. Patient was advised for complete blood count, ESR, ANA profile and Patch test as part of the examination.

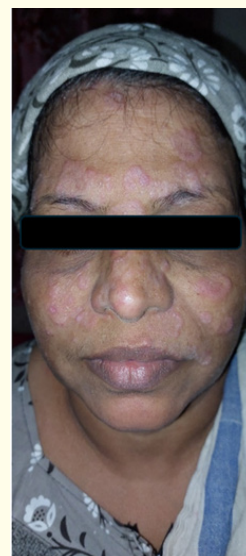


Figure 1: Multiple erythematous plaque over the face measuring in different dimensions.

With the all the advised test (Patch test and ANA profile) being negative, a tentative diagnosis of fungal infection was made. Accordingly, patient was prescribed with Oral Itraconazole, Lilituf cream (antifungal) and Tab Teczine (antihistamine) and was kept under observation.

After 1 week, patient reported with noticeable reduction in the scaling, erythema and discomfort suggesting a good response towards the prescribed systemic antifungal medication. Endodontic treatment was completed and patient was recalled after 1 month (Figure 2).



Figure 2: One week post medication with antifungal agents.

After 1 month, complete resolution of the facial plaques, with no residual scaling or erythema noted. The skin appeared healthy and uniform in texture and color. No new lesions were reported and patient remained symptom free (Figure 3).

Discussion

Introduced by Dr Sanford C Barnum in 1864, rubber dam has evolved from a system that was originally designed for isolation during gold foil placement to one that has become mandatory dur-



Figure 3: One month follow up.

ing routine endodontic treatment, facilitating ultimate protection for both patient and the clinician. However, the application of a rubber dam clamp may cause some degree of pain and discomfort to the patient, even though minimal pressure is exerted on the gingival tissue. As a result, topical anesthesia, in the form of either gel or spray, is typically applied to the soft tissue before placing the clamp.

Lidocaine is the most commonly used topical anesthetic, which is an amide-based agent with onset approximately 1-2 minutes from application and remains for a time period of 15 minutes and at approximately 5 minutes its maximum efficacy is seen. These topical agents have greater concentration of anesthetic agent and are rapidly absorbed across the mucous membrane, thereby providing effective anesthesia [4].

Various local anesthetics have shown to possess antifungal property against cutaneous fungal infections [9,10,11]. However, the exact mechanism is yet to be evaluated, but said to be due to direct damage to the fungal cytoplasmic membrane [10]. A study by Pina-Vaz C et al reported that more than 90% of the intracel-

lular cation damage occurs when the fungal cells are exposed to 0.3, 50 and 30 mg/mL of benzydamine, lidocaine and bupivacaine respectively [12]. Lidocaine fungicidal effect was confirmed for concentrations corresponding to at least double MIC, varying from 15mg/mL to 30mg/ml, showing a dose-dependent effect [6]. However, the concentration of lidocaine used in topical anesthetics is 15% with each actuation delivering 7.5mg of lidocaine. This dose is below the MIC required for its antifungal effect.

Studies have reported that when an antifungal agent is applied at a dose lower than its MIC, it could lead to more aggressive and sudden exacerbation of the fungal infection in an otherwise asymptomatic individual [7,8].

In the present case, topical anesthetic (lidocaine topical spray) was applied prior to the placement of the rubber dam clamp during the endodontic treatment. Since the topical agent contains lidocaine at a sub-therapeutic dose required for antifungal effect, this led to sudden exacerbation of the latent fungal infection.

The patient has multiple health issues including high blood pressure, diabetes, and abnormal cholesterol levels, and is currently receiving treatment for these conditions. But patient did not have any history of fungal infection or was under any antifungal medications.

Various studies have reported a two-way positive association between dyslipidemia and fungal infections [13]. Thereby indicating a possible latent fungal infection which the patient wasn't aware about.

Rubber dam sheet being a rubber latex-based material, can induce allergic reaction in certain individuals, which is usually immediate and is characterized by erythema over and around the area of rubber dam contact, facial swelling, tachycardia and also dyspnea [14]. However, such reactions were not observed in the present study and thus excluding the possible latex based allergic reaction. And also, smear test performed by the dermatologist also excluded the possibility of the reaction being latex allergy.

Furthermore, patients' symptoms reduced by 1 week after being prescribed antifungal medications which further validates that it was an exacerbation of fungal infection.

This case is among the initial reports suggesting a potential link between topical anesthetic use and fungal infection. Therefore, further research is required to verify this possible association.

Conclusion

This case suggests that topical lidocaine spray may trigger latent fungal infections in medically compromised patients when used at subtherapeutic doses. Although lidocaine is safe and effective, its dose-dependent antifungal action and possible paradoxical effects need further study. Clinicians should consider this risk in patients with systemic conditions, and more research is needed to clarify this potential link.

Conflict of Interest

No conflict of interest associated to this manuscript.

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