

Cryotherapy: Case report and a short review

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Abstract

Cryotherapy is the clinician use of cold, applied locally or generally through various methods, to lower the temperature of the skin and subcutaneous tissues. Clinicians often emphasize that patients apply ice for therapeutic purposes after physical injuries and various surgical procedures. This case report describes a case of Oral Lichen Planus being treated with cryosurgery in 52 years old female.

Keywords: Cryosurgery, Cryoprobe, Re-epithelization.

Introduction

Hippocrates (460-377 BC) described the use of ice and snow packs as a local therapy for limiting edema and pain, which he employed prior to surgery. Similarly, Napoleon's personal surgeon, the military surgeon Dominique Jean Larre, highlighted history of amputated case in cold temperatures during their retreat from Moscow. In 1851, Amott stated that tissue destruction happened by freezing which controls inflammatory reactions, pain which in turn reduces muscle spasm and facilitates free movement with repeated acute and chronic body aches and swelling. In this view there is a need for proper documentation for a proper treatment protocol for the benefit of cryotherapy procedures for the patients.^{1,2}

Physiological Effects of Cryotherapy

It has been reported in literature that after post-opt surgery reduces inflammation, besides there are temporary physiological and functional disparities.

Case Report

A 52 years old female reported in the department of Periodontology and Oral Implantology with chief complaint of burning sensation in buccal mucosa and palate since 2 years. Clinical examination showed whitish discoloration measuring (2cm X 2cm) of buccal mucosa and palate, which on performing biopsy was diagnosed to be Oral Lichen Planus.

Due to the age of the patient and general systemic health, cryosurgery was proffered over conventional surgery. The patient was anesthetized by 14% topical anesthesia (lignocaine hydrochloride spray). The lesion area on the buccal mucosa and palate were isolated and steps for cryotherapy using nitrous oxide were done. The whole process undertook 2 min with a 30 second overlap. Patient was recalled at an interval of 24 hours for 3 days where in the parameter like pain on the scale of 10 reported to be 3. Post operatively complete epithelization was recorded at the end of 10th day.



Fig. 1: Pre-operative, post-operative

Discussion

Changes after 24 hours

Changes after 1st day depicted an elevated area of 4mm, fluid filled elevated area with an extend superiorly to the line of occlusion, inferiorly in vestibule opposite 1st, 2nd and 3rd molar, distally opposite ascending ramus. Similarly, Green stein reported thawing had occurred in the centre of the lesion where the tissues were frozen simulating an ice ball. Post-opt 2nd day whitish sloughing was noticeable with reddish periphery. 3rd post-opt reddish line was seen with area showing rough and irregular borders. On 7th day the margin of the lesion were no longer fluid filled, rough and appeared to be merged with the peripheral mucosa showing repair.

In 1970 Mayer *et al.* conducted a histological study on healthy gingival on freezing. Frozen section depicted multinucleated giant cells in the periphery of lesion after 12 hours. In accordance with our study which also reported repair in 24-48 hours. In 1987, Tal *et al.*⁷ used gas expansion cryoprobe for duration of 3 seconds. In a 5 years study, it was observed that the low dosage of cryotherapy delineating the gingival epithelium without penetrating the lamina propria. In another 5 years study he stated that treatment of moderate to heavy pigmented gingival in seven nonsmoking patients was beneficial. The sites were exposed to a gas expansion cryoprobe cooled to -81°C for 10 s. Patients did not report side effects, nor did they require additional treatment during the 5 years period after surgery.³⁻⁷

Stages of Cryotherapy

In 1982, Hocutt et al,⁸ gave 4 stages of cryotherapy.

I stage - 1-3 minutes – After applying ice there was a feeling of no sensation.

IIstage - 2-7 minutes – A feeling of burning

IIIstage - 5-12 minutes – Local numbness was observed

IVstage- >12 minutes – Deep dilatation was observed.

Indications of Cryotherapy

More often in the treatment of inflammatory growths, mucoceles on the lips, papilloma, polyps, keratotic patches leading to smooth healing without scarring.

Contraindications for Cold Therapy

In diseases such as rheumatoid arthritis, cryoglobulinemia, hypertensive disorders, ischemic areas were cryosurgery may lead to vasoconstriction.

Mode of Cold Application

“Cryotherapy” is a wider term that includes numerous techniques to induce heat absorption (e.g., ice pack, ice massage, gel pack, ice chips in a plastic bag, ice in a washcloth, ice wrapped in a paper towel, and melted ice water through wet towels). Merrick et al. (2002)⁹ assessed temperature reduction of the thigh after bags of crushed ice, commercially available ice packs, and frozen gel packs were applied for 30 minutes. The resultant skin temperatures were 6.47°C (crushed ice), 6.24°C (ice pack), and 9.86°C (gel pack).

Knight (1995)¹⁰ indicated that ice packs could be used directly on the skin for 30 to 60 minutes without causing skin damage. However, data indicate that long term (24 to 72 hours) continuous application of ice packs can cause frostbite.

Length of Intervals and Durations of Time for Cold Therapy

5 decades back cryotherapy has been applied for an interval of 20 minutes. It was seen by Lavelle & Synder¹¹ and Malone et al. that 10 minutes interval was sufficient to increase the permeability of localized area.

Treatment of Oral Lesions

The basic technique of cryotherapy stresses rapid cooling, slow thawing and repetition of the freezing process to maximize tissue destruction. Two methods with closed and open system increase tissue destruction. The most accepted methods for cryotherapy has been either:

1. Probe application with nitrous oxide.
2. Localized application with applicator tip or nitrous oxide spray.⁴

Never the less the application of cryoprobe for duration of 1-2 minutes has been proven effective. In case of smaller lesion, 30 second cycle was sufficient where as 3 minutes of application is used in chronic pre-malignant lesions has shown their efficiency. However large hyperplastic, benign and malignant lesions require more freezing cycles and

surgical removed followed by cryotherapy on the base of the lesion.

Conclusion

Based on available literature, cryotherapy if used effectively could help the patients as an adjunct to surgery or where surgery is contradicted. It can be concluded cryotherapy is less interventional and is safe in its therapeutic and cosmetic effects.

Conflict of Interest: None.

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