Cryotherapy of Intra-Oral Lesions Using Dipsticks

Dr. Alok Sagtani,[1] Dr. Deborah Sybil D,[2] Dr. Premlatha K Shetty,[3] Dr. Mohan Baliga[4]

[1,2]Department of Oral and Maxillofacial Surgery, College of Dental Surgery,
BP Koirala Institute of Health Sciences, Dharan, Nepal;
[3,4]Dept of Oral and Maxillofacial Surgery, Manipal College of Dental Sciences, Mangalore, India

Correspondence:
Dr. Alok Sagtani. Email: drsagtani@hotmail.com

ABSTRACT

Introduction: The fear of the knife and needle by the patients made doctors look for new ways to treat lesions that would generally require excision. Cryosurgery is a method of lesion destruction by rapid freezing.

Objective: The aim of this study was to evaluate the efficacy of open system of cryosurgery using liquid nitrogen and dipsticks in the management of benign and certain malignant oral lesions and to study post-operative morbidity, if any.

Materials and Method: Twenty five patients of both sexes, ages between 8-70 years with clinically diagnosed benign and certain malignant oral lesions were included in the study. A cotton swab dipped in liquid nitrogen was applied with pressure on the lesion for 30 to 45 seconds. This was followed by a period of thawing which was double the freezing time. The freeze-thaw cycle was repeated twice. Secondary treatment was performed after two weeks in any residual lesion.

Result: Out of 25 patients, 24 were treated successfully with one or two applications without any complications. One patient dropped out of the study as he was cancerophobic and wanted the lesion excised at the earliest. Amongst the lesions, mucocoeles were the easiest to treat whereas verrucous carcinoma was the most resilient.

Conclusion: Cryotherapy with liquid nitrogen using dipsticks gives satisfactory results with no intra or post operative bleeding, no surgical defects, minimal or no scarring, and no infection following treatment.

Keywords: Cryotherapy; liquid nitrogen; dipstick.

INTRODUCTION

The fear of the knife and needle by the patients made doctors look for new ways to treat lesions that would generally require excision. Cryosurgery is a method of lesion destruction by rapid freezing in situ which has been in use since the time of Hippocrates.[1] The lesion is frozen and the resultant necrotic tissue allowed sloughing spontaneously. Surgical management of maxillofacial lesions leads to significant functional and aesthetic deformities in the form of scarring, interference with speech, etc. Cryotherapy offers advantages as in a bloodless field to work in, with minimal discomfort to the patient and lack of significant scarring or any other debilitating complications. Cryotherapy can be used for management of soft tissue lesions like leukoplakia, mucocoele, fibroma, angiomas and also bony lesions like cysts.

Dipsticks are simple cotton swabs which are nothing but cotton tipped wooden sticks and are easily available and at a low cost. These dipsticks dipped in cryogen can be used for the treatment of various oral lesions and are particularly useful for regular and multiple lesions, as well as those presenting on a curved surface.

MATERIALS AND METHOD

This study was conducted in the Department of Oral and Maxillofacial Surgery, Manipal College of Dental Sciences, Mangalore from November 2003 to March 2005. Twenty five patients with clinically diagnosed lesions were included in the study. The types of lesions included in the study are listed in Table 1. Armamentarium used were liquid Nitrogen, carried in a flask, Dipsticks (cotton swabs), Plastic cup, 2% Lignocaine jelly.

Technique: After obtaining consent from the patient, topical jelly was applied on the lesion to act not only as an anesthetic but also as a lubricant. Then a cotton swab dipped in liquid nitrogen was applied with pressure on the lesion for 30 to 45 seconds. This was followed by a period of thawing which was double the freezing time. The freeze-thaw cycle was repeated twice. Secondary treatment was performed after two weeks in any residual lesion.

RESULT

Twenty four patients completed the study. The patient with leukoplakia discontinued the study as he was cancerophobic and wanted excision of the lesion even though there was significant improvement after the first application of cryogen.

Nine cases of mucocoeles resolved with one application of liquid nitrogen with dipstick and 2 cases needed a subsequent application. Two cases had significant edema in the immediate post-operative period but subsided with no intervention. One of the patients was HIV positive and no problems were encountered in healing of this case either. Fibromas were slightly resistant. Three patients needed two applications over two weeks. One patient with a fibroma on the tongue needed three applications. Only one case resolved with one application as it was very superficial. Haemangiomas in two patients resolved with one application. One patient required 2 applications. Verrucous carcinomas were the most resistant of all. Except for one patient with superficial lesion, all required subsequent applications with one needing four applications. None of the patients required local anesthesia injection or post-operative medication. Bleeding was not encountered in the intra or post operative period. No complication or recurrence was seen during the study (Figure 1, 2).

Table 1: Type of lesions treated.

Lesion	No. of cases
Mucocoele	11
Fibroma	06
Haemangioma	03
Leukoplakia	01
Verrucous carcinoma	04

Figure 1: Haemangioma on the dorsum of tongue.

Figure 2: Healed with minimal scarring.

DISCUSSION

The fear of surgery led many people to avoid treatment for conditions considered benign which later turn malignant increasing the magnitude of the problem. Thus it was imperative to introduce some operative technique to overcome this fear amongst patients. The application of cold to control pain has been in use for a very long time and over the years it was found to be useful in controlled tissue destruction and has been applied in various fields including oral surgery. Most tissues freeze at -2.2 °C, and tissue death occurs at a temperature of -20 °C.[2] The effectiveness of cryosurgical treatment stems from the formation of extracellular and intracellular ice crystals. A rapid build-up of toxic electrolyte concentrations, alteration in pH, protein denaturation and disruption of cell membranes subsequently occur. The vascular status of the cryolesion is also regarded as the factor responsible for the completion of cell destruction in the frozen area. Poswillo[3] reported that healing after freezing takes place mainly by regeneration. The amount of mature collagen found in a cryoscar is appreciably less than in scars produced by knife or electrosurgery. Cryosurgery has the potential advantage of being easily applicable by repeated interventions with minimal or no anesthesia and over long intervals without unpleasant side-effects. It controls dissemination of tumor cells by immobilizing them within the frozen lesion until killed, it leaves no unpleasant odor and it is followed by relatively painless healing without the hazard of haemorrhage. It has the disadvantage that it is not as effective on dry keratinized tissues as on warm moist tissues, and the depth of penetration is limited and also difficult to estimate.

The early complications[4] include pain and vesicle formation. Exposure of bone occurs where freezing has been applied to thin mucoperiosteal surfaces such as the attached gingivae, the mucosa over the lingual aspect of the mandible, and the hard palate, where freezing has been too harsh. Although healing may be delayed for many weeks in such cases, the devitalized exposed bone remains uninfected and pain-free, until sequestration and/or resorption have occurred, and the area is recovered by mucosa. In such sites, therefore, if the nature of the lesion permits, the tendency is to freeze for less than one minute, and to repeat treatment later if necessary. Scarring and fibrosis are minimal following cryosurgery, compared with either excision and suture or diathermy excision.[5] On the facial skin, freezing for longer than 20-30 seconds produces superficial necrosis in the usual way, and healing is attended by a slightly depressed, thin epidermis with reduction in pigmentation and absence of skin appendages.[6]

Cryotherapy gives satisfactory results with no intra or post operative bleeding, no surgical defects, minimal scarring and no infection following treatment.[7]

Cryosurgical systems have been classified as 'closed' and 'open'. The closed system offers a greater degree of control, but involves the use of a complex and delicate apparatus, with the depth of freezing being less profound than with the open system. Freezing is performed by tissue contact with a probe through which a cryogen is circulated, and controlled temperatures need to be maintained. The three main types of closed system are: a) Thermo-electric; b) Evaporative; and c) Joule-Thomson.[8]

The open system involves the direct application of cryogen to the lesion using a cotton swab. Due to direct contact of the cryogen to the lesion, the open system can produce a more profound depth of freezing. Cotton swabs are particularly useful for regular and multiple lesions, as well as those presenting on a curved surface. Liquid Nitrogen (-191 °C)[7] is the most often used cryogen, as it is the coldest and most versatile and so is more effective in eradicating tissue lesions. Liquid nitrogen and cotton swabs are low cost, and readily obtainable in most hospitals.

The general indications are benign, precancerous, and malignant lesions, patients that use pacemakers, patients with high surgical risks, and patients with anesthesia allergy. It can be used as a palliative procedure for inoperable patients, for metastasis, and for obstructive lesions.[9]

There are some contraindications especially with the closed system, e.g., cold intolerance, cold urticaria, cryoglobulinemia, agammaglobulinemia,

dysfibrinogenemia, Raynaud's and collagen diseases, pyoderma gangrenosum, patients undergoing hemodialysis or immunosuppressive therapy, and patients with platelet alterations or with multiple myeloma.[10,11]

HIV patients present minimal risk of disease transmission with no eventful post-operative sequelae even though it would be too premature to say this based on one patient. However, as the equipment used (dipsticks and plastic cup) is disposable, it presents no risk of cross infection from such patients.

Based on our experience, we agree with the pioneers of cryotherapy on its use in the treatment of benign, premalignant and non-invasive malignant lesions of oral and facial region.[4,7,12-14] Surgical option for oral lesions when contraindicated due to various factors, cryotherapy with dipsticks is an effective modality of treatment.

CONCLUSION

Thus we conclude that cryotherapy with dipsticks using liquid nitrogen can be used effectively for treatment of superficial benign lesions with one application. Larger and deep seated lesions require multiple applications. Malignant lesions can also be treated but require regular and prolonged observation to look for any progression or recurrence. Liquid nitrogen cryotherapy using dipsticks is a very safe, inexpensive and easy to perform technique for use on an out patient basis for treatment of various oral lesions and forms a good alternative therapy in patients with fear of knife and needle.

REFERENCES

1. Ishida EC, Ramos-e-Silva M. Cryosurgery in oral lesions. Int J Dermatol. 1998;37:283-5.
2. Fraser J, Gill W. Observations on ultra-frozen tissue. Br J Surgery. 1967;54:770-6.
3. Poswillo DE. Cryosurgery of benign and orofacial lesions. In: Bradley PF, ed.: Cryosurgery of the Maxillofacial region. Vol. 1. Boca Raton. FL: CRC Press, 1986:153-75.
4. Leopard PJ. Cryosurgery and its application to oral surgery. Br J Oral Surg. 1975;13:128-52.
5. Poswillo DE. A comparative study of the effects of electrosurgery and cryosurgery in the management of benign oral lesions. Br J Oral Surg. 1971; 9:1.
6. Goldwyn RM, Rossoff CB. Cryosurgery for large hemangiomas in adults. Plast Reconstr Surg. 1969;43: 605.
7. Yeh CJ. Simple cryosurgical treatment for oral lesions. Int J Oral Maxillofac Surg. 2000;29:212-6.
8. Thomas EH. Cryosurgery: 2. Engineering aspects. Cryogenics. 1972;12(1):6-8.
9. Kuflik EG, Gage AA. Cryosurgical treatment of skin cancer. New York: Igaku-Shoin, 1990:237-42.
10. Graham GF. Cryosurgery for benign, premalignant and malignant lesions. In: Wheeland RG, ed. Cutaneous Surgery. Philadelphia: WB Saunders, 1994:835-69.
11. Kuflik EG, Gage AA. The five-year cure rate achieved by cryosurgery for skin cancer. J Am Acad Dermatol. 1991 Jun;24(6 Pt 1):1002-4.
12. Leopard PJ, Poswillo DE. Practical cryosurgery for oral lesions. Br Dent J. 1974;136:185-96.
13. Tal H. Cryosurgical treatment of hemangiomas of the lip. Oral Surg Oral Med Oral Path. 1992;73:650-4.
14. Toida M, Ishimaru J, Hobo N. A Simple cryosurgical method for treatment of oral mucous cysts. Int J Oral Maxillofac Surg. 1993;22:353-5.