

# Cryotherapy for Treatment of Mouth Mucocele

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## ABSTRACT

A mucocele is a common salivary gland disorder that most commonly affects young adults. A 35-year-old female patient reported to the Department of Oral and Maxillofacial Surgery, with the chief complaint of swelling on the left side of floor of mouth. The aim of this case report is to present the management of mucocele present in floor of the mouth in a young female patient using liquid nitrogen cryosurgery. The present case report has also discussed mechanism of action, current protocol of cryosurgery with emphasis on clinical pros and cons along with the clinical outcomes.

**KEYWORDS:** Cryotherapy, liquid nitrogen, mucocele, ranula

## INTRODUCTION

Mucocele is a common salivary gland disorder which is defined as a mucus filling cyst that usually appears in the oral cavity, paranasal sinuses, or lacrimal sac.<sup>[1,2]</sup> The term mucocele is derived from a Latin word, *mucus* and *cocele* meaning cavity.<sup>[3]</sup> It is the 17<sup>th</sup> most common salivary gland lesion seen in the oral cavity.<sup>[4]</sup> Clinically, mucoceles are of two types (a) extravasation and (b) retention type. Extravasation cyst is usually seen in minor salivary glands and forms due to leakage of fluids from the salivary gland ducts and acini into the surrounding soft tissue, whereas retention type cyst results from obstruction of salivary gland duct and hence is commonly found in ducts of major salivary glands.<sup>[5]</sup> However, clinically, there is no difference in the two cyst types.

Size of the retention type variant varies from few mm to few cm. Furthermore, it occurs singly and is rarely present bilaterally.<sup>[6]</sup> It is an asymptomatic, soft, and fluctuant swelling with rapid onset which frequently resolves on its own.<sup>[7,8]</sup> It is common in the first three decades of life. Diagnosis of mucocele is pathognomonic so the data about the lesion, location, history of trauma, rapid appearance, variation in size, bluish color, and consistency help in diagnosis of such lesion.<sup>[9-11]</sup>

There are several treatment modalities, both surgical and nonsurgical for the treatment of mucocele, of which conventional surgical excision is commonly followed. An alternative treatment

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for many lesions of the skin and oral cavity including mucoceles is cryosurgery. Cryosurgery is an effective, well-aimed, controlled destruction of diseased tissue by application of cold.<sup>[12,13]</sup> It is a well-tolerated procedure which produces excellent results and can be easily performed in the office setting. Considering the fact that biopsy before mucocele surgery may compromise the final results for diagnoses, cryotherapy should be done in such cases.<sup>[14]</sup>

## CASE REPORT

A 35-year-old female patient reported to the Department of Oral and Maxillofacial Surgery, with the chief complaint of swelling on the left side of the floor of mouth adjacent to tooth number 36. The swelling was present for the past 3 months. Past medical, dental, and family history were not contributory. On clinical examination, the lesion appeared as a single, well-circumscribed swelling of half an inch in size [Figure 1]. It was painful on palpation, flaccid in consistency with clearly defined limits and a smooth surface.

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**Figure 1:** Preoperative photograph



**Figure 2:** Application of cryoprobe



**Figure 3:** Photograph immediately after treatment



**Figure 4:** One-week follow-up



**Figure 5:** Three months follow-up

A signed informed consent was taken from the patient for the surgical intervention. Considering her apprehension and treatment benefits, cryosurgery was performed. Local anesthesia (2% xylocaine, 1:80,000 adrenaline) was given

to anesthetize the surrounding structures. A closed system consisting of a cryoprobe and nitrous oxide gas was used. Nitrous oxide was released from a high pressure inside the cryotip which was placed directly on the lesion [Figure 2]. The lesion was exposed directly to three consecutive “freeze-thaw cycles” and each cycle lasted for 5–10 s. The cryoprobe was moved from the center of the lesion to the borders until the lesion appeared white and frozen, resembling an ice ball. Figures 3-5 show the appearance of the lesion immediately after treatment, at 1 week follow-up, and at 3 months follow-up, respectively.

## DISCUSSION

Mucocele is a salivary gland disorder and also the second most commonly occurring soft-tissue tumor of the oral cavity. Although frequently found in lower lip, it may occur in other locations also. Mechanical and physical trauma such as aggressive tooth brushing and lip biting habits are the main causes for occurrence of such lesions.<sup>[15]</sup> These lesions are devoid of epithelial lining and are also termed as superficial mucocele and/or classical mucocele. Surgical excision, marsupialization, micro-marsupialization,

electrocautery, intralesional corticosteroid injection, and CO<sub>2</sub> laser ablation are some of the conventional methods that have been used and are still used for treatment of mucoceles.<sup>[3,16-18]</sup> For superficial mucoceles, no any surgical treatment is required unless the lesion frequently recurs and is problematic to the patient. If treatment is desired, the options include surgical excision, cryotherapy, and laser vaporization. With most oral ranulas, surgical management is preferred.<sup>[16-18]</sup> Of these, cryosurgery is a treatment option which aims at minimal injury/complications to structures lying in proximity to the floor of mouth such as submandibular duct, lingual nerve, and artery.<sup>[19]</sup>

Cryotherapy is one of the most recent ablation techniques that have been used in the management of esophageal cancer.<sup>[20]</sup> Patients who are not a candidate for traditional curative resection due to underlying comorbidities of advanced cancer may benefit from this endoscopic treatment modality. While the use of cryotherapy for esophageal cancer is relatively recent, it has been used for some time in the treatment of glottic and subglottic stenosis, radiation proctitis, and for skin conditions such as warts also.<sup>[21,22]</sup>

Different studies have suggested that endoscopic spray cryotherapy is effective in treating patients with Barrett's high-grade dysplasia (HGD) and early esophageal cancer, including those who have failed other forms of treatment, at least in the short term. Specifically, cryotherapy treatment was associated with a complete eradication of Barrett's HGD in 72–100% of patients whereas early stage esophageal cancer patients, a complete response to cryotherapy treatment was observed in 61–100% of patients.<sup>[20-22]</sup>

Cryotherapy destroys tissues by application of extreme cold via different cryogen agents such as nitrous oxide gas, liquid nitrogen spray. As nitrous oxide gas is released from a high pressure to a low pressure into the cryotip, the drop in temperature results in freezing of tissues which is in accordance with the fact that for cell death to occur, temperature must fall below  $-20^{\circ}\text{C}$ .<sup>[20,21]</sup> During the freeze cycle, the drop in temperature results in (a) crystallization of extracellular water and (b) reduction of cell resistance to shrinkage due to membrane lipid hardening. Besides, the electrolyte concentration increases with depleting stores of extracellular water. To counteract this concentration gradient, intracellular water starts moving out of the cell. Furthermore, this water starts crystallizing but remains trapped within the cellular membrane resulting in toxic concentration of intracellular electrolytes. In addition, during the thaw cycle, cells at the lesion's periphery start taking up excess electrolytes and to equalize this gradient difference, water enters the cell thereby leading to swelling and cell lysis.<sup>[23,24]</sup>

The benefits of cryotherapy include absence of postoperative discomfort, bloodless surgical site, minimal to zero scarring, and excellent cosmetic results. Moreover, cryotherapy carries the advantage of usefulness in candidates in whom surgery is contraindicated owing to any reason. Furthermore, this therapy

is localized in action and can be repeated without any permanent side effects.<sup>[25,26]</sup> On the other hand, cryosurgery has certain disadvantages such as unpredictable degree of swelling, lack of precision of depth in area of freezing, slight degree of necrosis, and sloughing which results in delayed healing which can be a bit problematic.<sup>[25]</sup>

## CONCLUSION

Mucoceles are common, self-limiting benign lesions resulting from extrinsic and/or self-inflicted trauma. Since these lesions are usually painless, hence they go unnoticed by the person himself/herself. Majority of such cases are identified by the dentists when the patient comes for either routine dental checkups or other unrelated dental problems. There are various treatment options available, but cryosurgery is a valuable treatment of choice pertaining to reduced pain and less recurrence rate.

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## Conflicts of interest

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