Cryosurgery in the Management of Potentially Malignant Lesions: A Report of Two Cases

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Cryosurgery is a therapeutical approach that uses freezing to obtain a tissue inflammatory or destructive response. It has been successfully used for both cutaneous and oral conditions. The characteristics of oral mucosa like humidity and smoothness makes it an ideal site for this approach. Oral submucous fibrosis is a potentially malignant disorder of the oral mucosa, with areca nut chewing being the primary causative agent. Leukoplakia is a potentially malignant lesion associated with excessive consumption of alcohol and tobacco. Although there are no specific treatment modalities to prevent recurrence, abandoning habits can decrease the chance of recurrence, as well as the transfiguration into malignant tumors of these disorders. However, with the advent of cryosurgery, oral surgeons are provided with a new modality for treating oral potentially malignant disorders. This case report highlights the pioneering effect of nitrous oxide cryosurgery in treating two cases of oral submucous fibrosis with leukoplakia and oral leukoplakia respectively showing promising results during follow-up.

Keywords: Cryosurgery, Leukoplakia, Oral submucous fibrosis

INTRODUCTION

A potentially malignant lesion is a disorder or finding that, if left untreated, may lead to oral cancer. Oral potentially malignant lesions are relatively common, occurring in about 2.5% of the general population and are an important target for oral cancer prevention. Oral premalignant lesions include leukoplakia, erythroplakia, oral submucous fibrosis, and oral lichen planus.1

Oral submucous fibrosis is a potentially malignant disorder and debilitating condition of the oral mucosa. It can occur at any age but is most commonly seen between 16 and 35 years of age. It may be associated with oral leukoplakia and other potentially malignant disorder or oral malignancy.2

Pindborg in the year 1988 had divided oral submucous fibrosis into three stages as follows:3

Stage I: It mainly includes stomatitis with erythematous mucosa, vesicles, mucosal ulcers, melanotic mucosal pigmentation and mucosal petechiae.

Stage II: Fibrosis is observed in the healing vesicles and ulcers, which is the endorsement of this stage. Initially, lesions show blanching of the oral mucosa. Older lesions include vertical and circular palpable fibrous bands in the buccal mucosa and in the vicinity of mouth opening. This results in a mottled marble-like appearance of the mucosa. Distinctive findings include limited mouth opening, stiff and small tongue, blanched and leathery floor of the mouth, fibrotic gingiva, decreased mobility of soft palate, atrophic tonsils, shrunken bud like uvula and sunken cheeks, not proportionate with age or nutritional status.

Stage III: Sequelae of oral submucous fibrosis (OSMF) are as follows: Leukoplakia is seen in more than 25% of individuals with OSMF. Speech and hearing defect may occur because of the tongue and eustachian tube involvement.

Oral leukoplakia is a most common potentially malignant lesion affecting the oral cavity. It is defined as “a white plaque of questionable risk having excluded other known diseases or disorders that carry no increased risk for cancer” given by world Health Organization in the year 2005. The
CASE REPORTS

Case 1
The first case is about a 27-year-old male patient reported to the Department of Oral Medicine and Radiology complaining of decayed tooth in the left upper back tooth region since 4 months. Social history revealed smoking 10 cigarettes/day past 13 years and also Gutkha chewing for 10 years, which he had discontinued 6 months back. On intra-oral examination, diffuse fibrous bands in right buccal mucosa were noticed extending 2 cm away from the commissure of the mouth up to 1 cm in front of pterygomandibular raphe (Figure 1). Left buccal mucosa, soft palate, tongue and floor of the mouth were normal with no restricted mouth opening. An irregular white patch, non-scrapable and with ill-defined margins measuring approximately 1.0 cm × 2.5 cm was also noticed on the right buccal mucosa. On palpation, the white lesion was non-scrapable and non-tender. Right side buccal mucosa showed loss of resiliency with palpable fibrous bands. With these findings, a provisional diagnosis of oral submucous fibrosis with leukoplakia was given.

Patient was advised for routine blood investigations, and the report was normal. Incisional biopsy was done, and the specimen was subjected for histopathological examination. H and E stained soft tissue sections showed oral submucous fibrosis with focal areas of moderate dysplasia. The clinical and histopathological features were correlated; a final diagnosis of oral submucous fibrosis with leukoplakia over right buccal mucosa was given.

Case 2
A 83-year-old male patient reported to the Department of Oral Medicine and Radiology complaining of missing upper and lower front teeth for the last 6 months and want typical site of occurrence of leukoplakia is commissure with a prevalence of about 42% followed by the buccal mucosa of about 22% in the case of males. In the case of females it is about 40% with respect to buccal mucosa and commissures 19.2% as propounded by Banoczy. The most common predisposing factors are smoking and alcohol consumption.

The treatment options for these potentially malignant lesions mainly include surgical and non-surgical methods. The invasive nature of these potentially malignant lesions together with its long and innocuous extent leverages the treatment. The standard modalities of treatment for these lesions includes conventional surgery using a scalpel, laser surgery, cryosurgery, and electro coagulation.

Cryosurgery is an efficient method for tissue destruction by means of freezing. It has been used in the management of various oral lesions like the leukoplakia, oral submucous fibrosis, pyogenic granuloma, actinic cheilitis, vascular lesions, mucocele, keratoacanthoma, and papillomatous hyperplasia of the palate. Cryosurgery has some advantages such as absence of bleeding, low incidence of secondary infection, minimal pain, and low treatment cost. It can also be used for high-risk group patients like those with a pacemaker, the elderly, and those with coagulopathies. In addition, it would be the first choice in the case of multiple and extensive lesions, areas of difficult surgical access, and areas where esthetics is important.

Available cryosurgery apparatus are classified into open and closed systems. Open system involves the direct application of cryogen liquid (usually liquid nitrogen) to the lesion with a cotton swab or spray. Whereas in a closed system the tissue is frozen using a cryoprobe.
them to be replaced. In addition, the patient reported a history of chutta smoking 10-15/day for the last 60 years and was also occasionally alcoholic since 40 years. On intra-oral examination, a diffuse greyish white patch measuring approximately 2.0 cm × 1.5 cm roughly oval in shape was noted in the right buccal mucosa. It extended antero-posteriorly 3 cm away from the commissure of the mouth (Figure 2). On palpation, the lesion is non-tender and non-scrappable. With these features, the present lesion was diagnosed provisionally as homogenous leukoplakia over left buccal mucosa.

Patient was advised for routine blood investigations and also for incisional biopsy. Blood investigations report was normal, and the histopathology revealed moderate dysplasia and a final diagnosis of oral leukoplakia was given.

Both the patients were scheduled for cryosurgery. The procedure of cryosurgery was performed using N₂O refrigerant gas with a depth of freezing marked by a peripheral margin of about 4-5 mm. After placing the cryoprobe over the lesion coolant gas is allowed to flow through the channels in the metal tip of the cryoprobe for duration of about 7 s after which lesion is allowed to thaw to complete one freeze thaw cycle. The hypothermia produced by this procedure resulted in ice crystal formation (Figure 3), leading to destruction of the tissue.

The patients were followed up on the 3rd, 7th, 21st, and 28th day, 3rd month and 6th month, which revealed uneventful progressive healing at 3rd week follow-up (Figures 4 and 5). The operated area appeared very similar to adjoining oral mucosa with no other associated complaints.

**DISCUSSION**

Oral submucous fibrosis is a well-recognized premalignant condition of the oral cavity. This occurs commonly in countries where betel nuts are chewed habitually. Local irritants (betel nuts, tobacco, and spicy food), general nutrition, and vitamin deficiencies are considered to be risk factors for oral submucous fibrosis.²

Treatment is based on the severity of the condition. In general, if the condition is noted before development of trismus, cessation of the betel habit will often resolve the disease. Once trismus has developed it is considered mild to moderate. Medical and surgical therapy aims to maintain oral function and limit progression of the disease.³

Surgical treatment is indicated in patients with severe trismus and biopsy revealing dysplastic or neoplastic changes. Surgical modalities include: Simple excision of the fibrous bands, use of lasers and cryosurgery for band excision also has been documented.⁸

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**Figure 3:** Ice crystal formation at the site of lesion after cryotherapy

**Figure 4:** Complete healing at 3rd week (first case)

**Figure 5:** Complete healing at 3rd week (second case)
Leukoplakia a white patch or plaque is not associated with any physical or chemical causative agent, except for the usage of tobacco. It is well-known that leukoplakia is more common in males, with the most common site being the commissure in men.9

Various surgical as well as non-surgical treatment options are available for management of leukoplakia. These include scalpel surgery, laser therapy, cryotherapy, electrocautery, fulguration, and medicinal therapy with antioxidants. Perhaps, the general consensus is that the surgical excision of oral leukoplakia is one of the best treatment options for this lesion. Among the surgical procedures, cryosurgery is the technique of choice.5

Cryosurgery is a surgical procedure where there will be deliberate destruction of tissue by application of extreme cold, and it has been used in dentistry for over 30 years. Arnott a British physician was the first person to use cryosurgery in the year 1851. Initially, its use was limited to the treatment of cancer of the lip and oral cavity. At present, cryosurgery has an extensive application in the treatment of both benign and malignant lesions in the head and neck region.10

The fundamental principle of the closed system of cryosurgery is Joule–Thompson expansion that enables substance to undergo a drop in temperature, when there is movement of gaseous particles from a high-pressure area to a low-pressure zone. When nitrous oxide gas is released from high-pressure inside the cryoprobe to the low-pressure cryotip, the drop in temperature allows for freezing of the tissues that are in contact with the cryoprobe.10

In the present case reports, patient with leukoplakia alone and patient with oral submucous fibrosis associated with leukoplakia after being treated with cryosurgery showed complete remission within 3 weeks after the treatment and patient was under regular follow-up for about 3 months and no signs of recurrence were noticed in this period.

In a study conducted by Narula and Malik with a sample of 34 patients with various benign and premalignant lesions of oral maxillofacial region, which included four patients with leukoplakia. All cases of leukoplakia showed normal healing between second and 4th week post-operatively that was in accordance with the present findings.11

Furthermore, cryosurgery is well accepted by patients due to the relative lack of discomfort, absence of bleeding, and minimal to no scarring. Apparently, post-operative healing does not cause tissue retraction particularly in the alveolar ridge, which is beneficial to prosthetic rehabilitation. Cryosurgery is a relatively painless procedure. This is due to the immediate blockage of neural transmission in the area. The early complications include pain and vesicle formation. Furthermore, it helps in preventing the seeding of the dysplastic cells in adjacent soft tissue areas.

CONCLUSION

Management of oral potentially malignant lesions with cryosurgery prevents not only recurrence and malignant transformation, but also post-operative dysfunction. Hence, cryosurgery that is not much used in dentistry has got a vital role when used properly in the treatment of oral potentially malignant lesions which are resistant to all other conventional treatments.

Nitrous oxide cryosurgery is very safe, inexpensive and easy performing technique for use on an outpatient basis for treatment of various oral lesions. The patients who have the fear of knife and needle will be more comfortable with this modality of treatment. Although the follow-up period is very short, the results obtained are promising.

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