"Vital" staining – A simple chair side oral cancer screening technique

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Introduction

The World Health Organization strongly recommends that prevention as well as early detection play a major role for the control of oral cancer. Population-based mass screening of oral cancer has emerged as an important health promotion strategy which has led to a significant increase in survival rate.[1] According to literature, oral cancer is 90% curable when found in its early stages. Various chair side investigations are therefore very essential for the prompt diagnosis and treatment plan of potentially malignant disorders related to the oral cavity. (Box 1) This clinical tip highlights the use of intra-vital staining as a chair side investigation for oral cancer screening.

Vital staining is the staining of cells or tissues in their living state. The earliest technique was developed by Paul Ehrlich in the year 1885 and involved the immersion of freshly removed tissue in methylated blue. It not only helps to choose the best site for biopsy but is also very helpful in screening of oral cancer in high risk patients and for the follow up of patient with premalignant lesions.

It is indicated for demonstrating dysplastic areas in potentially malignant disorders like leukoplakia, erythroplakia, speckled leukoplakia and oral lichen planus.

There are two types of vital staining

a) *Toluidine blue staining* - It is used for demonstrating dysplasia as well as potentially malignant lesions which are clinically not recognizable. Staining is based on the fact that dysplastic and neoplastic cells contain quantitatively more nucleic acids as compared to normal tissues. Also, malignant epithelium contains intracellular canals that are wider than normal epithelium, which facilitate the easy penetration of the dye.[2]

Staining Procedure :

1. Ask the patient to rinse the mouth twice with water for about 20 seconds.
2. Rinse with 1% acetic acid for 20 seconds.
3. Gently dry suspicious mucosal area with gauze avoiding abrasion of tissue.
4. Apply 1% toluidine blue solution to the lesion with cotton swab and wait for 20 seconds.
5. Ask the patient to rinse again with 1% acetic acid for 1 minute, then rinse with water.

Positive result (lesion retains the blue colour): If mucosa is stained positive, the lesion is suspected for dysplasia. Repeat the procedure in 1 to 2 weeks, if positive again then biopsy is required.

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b) *Lugol's Iodine* - Lugol's iodine, named after the French physician Lugol (1786-1851), is a solution of elemental iodine and potassium iodide in water. It is often used as an antiseptic and disinfectant, for emergency disinfection of drinking water, and as a reagent for starch detection in routine laboratory and medical tests.

Iodine reacts with glycogen in the cytoplasm and the reaction, known as the iodine–starch reaction is visualized by a colour change.[3] The glycogen content in the tissue is inversely proportional to the amount of keratinization. Due to the loss of cellular differentiation and the increase glycolysis in the cancer cells, the iodine-starch reaction is not promoted.[4]

Staining Procedure :

1. Ask the patient to rinse the mouth twice with water for about 20 seconds.
2. Gently dry suspicious mucosal area with gauze avoiding abrasion of tissue.
3. Apply 2% Lugol's iodine solution to the lesion with cotton swab.

Box-1

Other chair-side investigation techniques for oral cancer screening

- Chemiluminescence(ViziLite)
- Velscope
- Identafi 3000
- Direct visual microscopy (Colposcopy)
- Confocal Microscopy (Laser Activated Fluoroscopy)
- Optical coherence tomography (OCT)

4. Wait for 1 minute.

Positive Result: If mucosa appears white, i.e, if the brown color disappears, the lesion is suspected for dysplasia. Repeat the procedure in 1 to 2 weeks, again positive then biopsy is required.

Conclusion

A recent Cochrane review[5] concludes that no robust evidence exists that indicates whether other screening methods (including fluorescence imaging, or brush biopsy) are either beneficial or harmful. Hence Toluidine blue and Lugol's iodine staining are useful, safe, non-invasive and cheap adjunctive aids in oral cancer surveillance.

References

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