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Exfoliative Cytology- Need of the Hour

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Oral cancer is becoming more common over the world. Oral cancer patients have a low survival rate when compared to other types of cancer. This is primarily due to a delay in diagnosis, which causes tumour metastasis and, as a result, secondary cancers. Diagnosing oral precancer or oral cancer, especially when the disease is in its early stages, is extremely difficult and crucial for the dental profession. Early detection and treatment planning for patients with oral cancer rely heavily on early screening and improved diagnostic tools. The analysis in microscope of exfoliated cells from surface of epithelium is known as oral exfoliative cytology (OEC). It is an easy, non-intrusive, and sensitive technique of staining that is utilised as an alternative to biopsy or when biopsy is not possible, also for mass screening [1].

Cytopathology is a technique for examining diseases that affect a wide range of bodily sites, and it is frequently used to aid in the diagnosis of cancer, as well as some viral diseases and other inflammatory ailments. The Pap smear, for example, is a typical cytopathology application that is used to detect precancerous cervical lesions that may lead to cervical cancer. This approach is only used to analyse surface cells and must be confirmed with additional cytological investigation. Smears can be taken from the buccal mucosa, the dorsum of the tongue, the floor of the mouth, the hard and soft palate junction, and the lower labial region. Because the materials are

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smeared across a glass microscope slide for staining and microscopic analysis, cytopathologic tests are also known as smear tests. They help in prevention of the disease from turning into severe one.

Keywords: Cytology; public awareness; cancer diagnosis; oral pathology; oral screening; oral cancer; advanced aids.

1. INTRODUCTION

Cancer of oral cavity is the world's sixth most frequent disease, with an annual incidence of 36.2 million cases and an estimated 8.2 million deaths every year. Cancer of Oral cavity is the third most frequent disease in India, affecting 20 individuals out of every 100,000 people, accounting for almost 30% of all cancers. Tobacco, alcohol usage, a positive cancer history of the family, viral infections such as HPV, traumatic teeth, and poor oral hygiene are all frequent etiological factors. When compared to other systemic cancers such as lung cancer, colon cancer, breast cancer,and so on, oral cancer is sometimes overlooked by the general public. They can, however, be extremely dangerous if left untreated, even during the very early stages of the lesion. According to the SEER programme of the National Cancer Institute, which gathers statistics on oral cancer, there has been little or no change in the incidence of the disease. Unfortunately, the majority of people are diagnosed when the disease has progressed to an advanced stage. As a result, early detection is critical in boosting public awareness and improving access to oral health care for all groups of people. Squamous cell carcinoma of the mouth is almost invariably preceded by dysplasia, a visible precancerous tumour. During routine exams, dentists are among the first to notice benign and potentially malignant oral abnormalities. There maybe an unquestionably increase in the survival rate by using modern diagnostic modalities that detect the disease in its early stages. The oral mucosa has a high rate of cell turnover, and these exfoliated cells are crucial in the identification of potentially malignant conditions. The morphology of cytoplasm and nucleus changes in the exfoliated cells disclose the many body processes that occur , which are reflected in oral cavity.

Oral cytology has been shown in the literature to be useful in diagnosing possibly malignant diseases or advance cancer in non-symptomatic patients with benign lesions. Immediate diagnosis of such lesions improves the tolerance of patient and reduces their despair. Organic phenomena of cells and nucleus, nuclear budding, hyperchromatism and micronuclei, cells of inflammation, indented cellular outline, and intracytoplasmic vacuoles are all common cytological atypia features in such illnesses. The application of cytology in the oral cavity was earlier studied by Montogometry and Von Haam.

2. THE MECHANICS OF THE PROCEDURE

The physiology of epithelial cells justifies exfoliative cytology.

The typical epithelium experiences peeling of its superficial cells due to physiological turnover.

The cells in the deeper stratum are regular followers of one another.

When a neurotic situation occurs, the cells may lose their cohesion, and the cells in the deeper layer may shed along with the shallow cells.

These peeled cells, like cells extracted from specified instruments by procedures, can be concentrated statistically or subjectively [2].

3. TECHNIQUE

Oral cytology requires a1-2 glass slide, a swab stick/frozen yoghurt stick/metal spatula or cytobrush, and a fixative such as Spray cyte or liquor.

Before you start the method, make sure the patient understands why you're doing it.

A label or precious stone marker must be used to name the identity of the patient, date and anatomic area of the smear on one side of the glass slide.

A gauze piece must be used to clear excess salivation from the area that will be distributed.

Scratch and pivot the cytobrush or swab stick enthusiastically.

Spread it out on the glass slide, and a white film-like layer should appear.

Spray cyte around the outside of the glass slide to act as a fixative.

Liquor (95 percent alcohol) can also be used as a fixative.

One of the most important steps in the process is obsession or protection, Antiquities such as atomic bending and vacuolization are common when cells are dried before obsession.

Send the smear that has been fixed to the pathologist's research facility for analysis [3].

Figures illustrating nuclear pleomorphism, micronuclei and nuclear budding in numerous cells.

Class 1 (normal) smear interpretation: only normal cells are seen.

Minor atypia related to inflammation is classified as Class 2 (atypical).

There are no indicators of cancer.

Wider atypia with severe dysplasia, carcinoma in situ, or malignancy in class 3 (intermediate).

Few epithelial cells with malignant alterations are seen in Class 4 (suggestive of malignancy).

A biopsy is required.

Class 5 (cancer positive): Cells exhibit characteristic malignant alterations.

A biopsy is required.

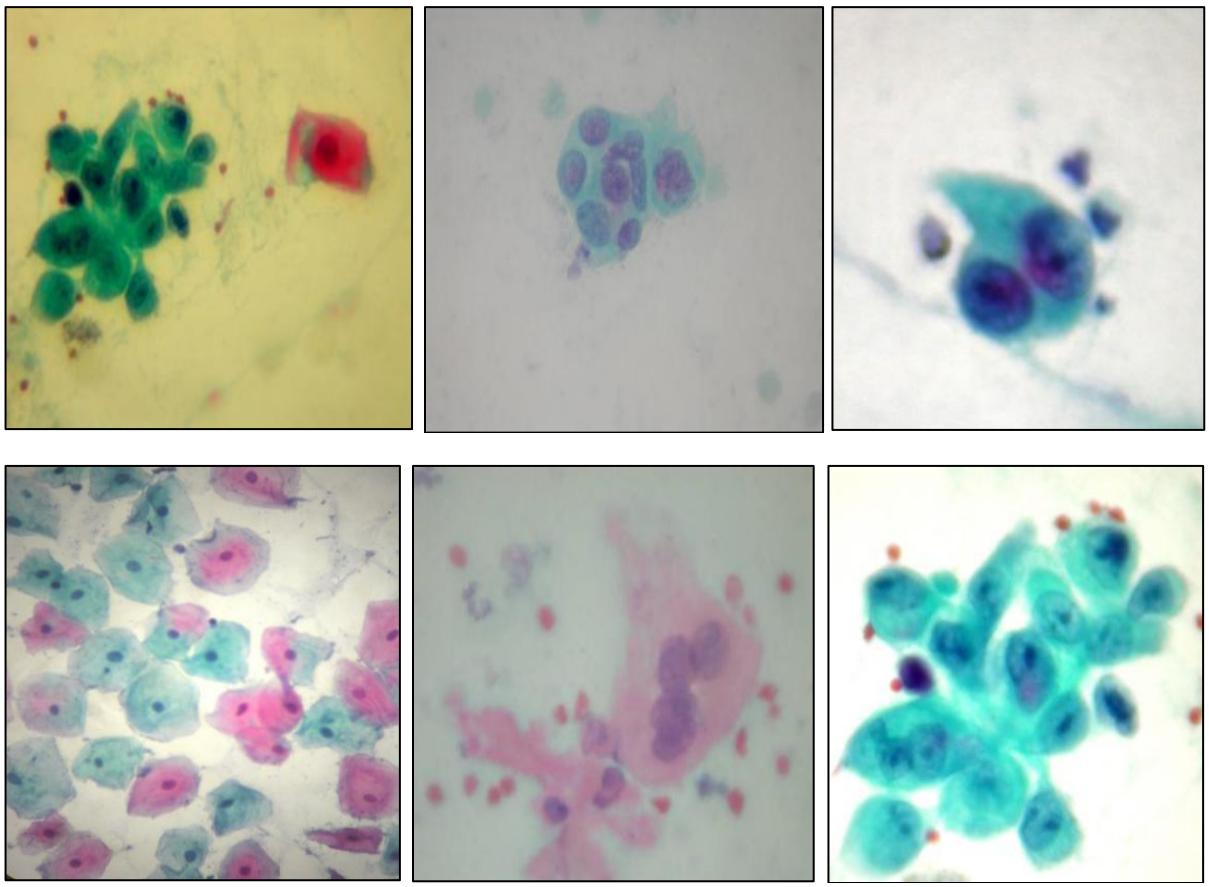

Fig. 1.

4. VARIOUS STAINS

-Hematoxylin, a stain of nucleus, is used to recolor cell cores.

The yellow tint could be due to the unmordanted haematein.

-Counterstain with OG-6 for the first time (-6 signifies the preowned centralization of phosphotungstic corrosive; different variations are OG-5 and OG8).

-Keratin is recolored with orange G. Its one-of-a-kind job was to recolor the keratinizing squamous cell carcinoma cells found in sputum [4-6].

A second EA (Eosin Azure) counterstain with three hues; the number indicates the colour range, for example, EA-36, EA-50, and EA-65.

The superficial epithelial squamous cells, nucleoli, cilia, and red platelets are stained with Eosin Y [7,8].

The cytoplasm of many cells, including nonkeratinized squamous cells, is stained with Light Green SF yellowish. Because this colour is currently highly costly and not easy to obtain, a few manufacturers are switching to Fast Green FCF, nonetheless, it gives outwardly various other results does not look good by some. The restained sample should show tints from the entire range when done correctly: red, orange, yellow, green, blue, and violet. The chromatin patterns are more visible, the cells with minor damage are easier to identify, and the photomicrographs are clearer [9]. The restaining creates simple cells, allowing for the decipherment of much thicker examples with covering cells. The cell cores are fresh blue to dark in a continuous and consistent pattern. Cells containing keratin are yellow, and glycogen stains yellow as well. The colour of shallow cells ranges from orange to pink, whereas the colour of midway and parabasal cells ranges from turquoise green to blue. Cells that metastasize stain both green and pink without hesitation on a regular basis [10].

5. EXFOLIATIVE CYTOLOGY'S APPLICATIONS

1. Forensic dentistry is a type of dentistry that is used in court cases (age and sex determination).

2. Assessment of iron insufficiency in the diet.

3. Research on issues such as smoking, drunkenness, diabetes mellitus, pregnancy, and ageing.

4. Predicting the tumor's biological reaction to irradiation.

5. Evaluation of a genetic condition for harmful effects after malignancy.

6. Carcinoma of oral cavity, microbiological disorders (candidiasis and viral infections), and skin injuries can all be detected early (pemphigus).

6. THE BENEFITS [11,12]

1. No pain, no blood loss, no invasiveness.

2. It is quick, easy, practical and requires less intrumentation.

3. In dentistry practice of practioners, a simple chairside approach is available.

4. Appropriate for patients with a basic infection who are unable to get a biopsy.

5. Protects against false negative biopsies.

6. It is possible to eliminate post-biopsy ambiguity.

7. It is useful for large-scale screening.

8. Has the potential to detect hazardous damage early.

9. Can be used to review a follow-up evaluation to show the right location for a diffuse sore biopsy.

10. Patient compliance.

11. Affordability.

12. Diagnosis of lesions at an early stage.

7. CONSEQUENCES [13]

1. There's a lot less data here than on histology specimens.

2. Positive outcomes are solid, but negative outcomes are not.

3. Intended solely for cells of epithelium.

4. Rarely used for Computed Tomography scan evaluation.

5. It is merely a supplement and extra mentor, never a replacement for biopsy.

6. A competent and skilled clinician in pathology is required for interpretation.

7. There is no way to survey a tumour review.

8. Sensitivity is low.

9. Contamination.

10. Sample size not adequate.

8. OBSERVATIONS [14]

1. Injury to the mucosa is not harmful and would not be biopsied in any circumstance.

2. Evaluation of broad mucosal damage while performing the requisite incisional biopsies for proper testing is outside the scope of possibility.

3. Follow up with individuals who have a previous diagnosis of a potentially dangerous or precancerous damage to the mucosa.

4. If the medical condition of patient is too weak for a biopsy or the patient is not able to undergo one.

5. As a means of detecting recurring cancer.

6. Red lesions that are numerous or huge.

7. If you fear you have herpes or candida.

8. Elderly patients who are unable to have surgery.

9. A patient with a bleeding condition who is taking an anticoagulant medication.

10. The dentist or the patient is hesitant to do a biopsy.

11. The lesion is harmless or does not raise suspicion.

12. A lesion that is positioned in a difficult-to-operate-on area.

13. Technology for partition and embedding is not available.

9. INDICATIONS FOR AVOIDANCE [15]

1. The majority of benign lesions are resistant to cytologic smears.

2. Lesions with a smooth surface, such as fibroma, cannot be biopsied.

3. Because there are no se cells in the smear, leukoplakia does not suit the cytologic diagnosis.

4. An untrustworthy patient.

5. Lesion of the submucosa.

6. The lips may have a dry or crusty lesion.

10. EXFOLIATIVE CYTOLOGY'S LATEST TRENDS [16]

-Tblue with ViziLite Plus
-VEL scope
-DL Microlux
-Oral CDx
-Orascoptic DK

11. CONCLUSION [17]

Oral cytology is becoming more essential in the early detection of oral cancers as a method of acquiring cell samples that can then be analysed using sophisticated diagnostic techniques such cytomorphometry, DNA cytometry, and molecular studies.

Techniques such as Toluidine blue staining, brush biopsy, and the use of powerful computer programmes have transformed the landscape and made the interpretation of findings significantly more reliable than before [18].

The cytological examination of oral cavity cells is easy and quick, non-destructive, and somewhat pain-free, making it suitable for regular use in early detection of suspect lesions, before and after treatment monitoring of confirmed malignant lesions. Early diagnosis of a premalignant oral lesion has the potential to increase the survival probability of individuals with these diseases.In these conditions,OEC can be used as a complement to biopsy, allowing larger number of patients to be examined in less time, making cancer screening more mangeable [19].

Exfoliative cytology of oral cavity’s function in prediction of the premalignant potential of oral

submucous fibrosis would need to be established in larger studies with a larger study population.

As a result, it should be made a normal procedure in every clinic so that patients can be diagnosed at a young age and the spread of precancerous lesions can be avoided.As we all know its better to prevent the disease priorly so that there is no need for the treatment [20].

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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