ORAL CANCER, DYSPLASIA AND ORAL MUCOSAL AUTOFLUORESCENCE

Clinical Tip

PIERREL | GOGGLES EYES ON PREVENTION

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Introduction

Oral cancer is a malignant tumor that develops in the tissues of the mouth. It belongs to a larger group of cancers called head and neck cancers. Most develop as oral squamopus cell carcinomas, i.e. from the squamous epithelial cells of the oral mucosa that serve as the superficial lining of the mouth, the tongue and the lips.
Oral cancer is a relatively frequent cancer: in 2018, oral cancer occurred globally in about 355,000 people, and resulted in 177,000 deaths and unfortunately the late detection in advanced stage is a common problem worldwide.
Early discovery is the most important step in reducing the mortality rate: when detected in first stage, patients have an 80 to 90 percent survival rate at 5 yrs

Risk factors for oral cancer include:

- Smoke, the high concentration of carcinogenic substances contained in tobacco make it very harmful and capable to irreversibly damage the cells of the oral mucosa.
- Betel quid chewing, with or without added tobacco, increases the risk of oral/ oropharyngeal cancer.
- Alcohol abuse, heavy alcohol consumers have a 6 times higher risk than non-drinkers.
- Mechanical trauma from dental anomalies, altered dentitions or prosthetic appliances in poor condition (frequent in elderly subjects).
- Papillomavirus infection, with HPV types with high oncogenic potential; HPV plays a more prominent role for tumors of the oropharynx, i.e. in the in the back of the tongue and in the throat.

It must be highlighted that 25% of oral cancer patients neither drink nor smoke.

Usually, oral cancer appears as a white or red lesion of the oral mucosa, a lump or a growth often ulcerated which spontaneously does not heal; the lesion is painful and easily bleeding in advanced stages.
It can appear also as a later cervical lymph node swelling, or with a mass of the lateral cervical region hard on palpation, not very mobile on the underlying strata, with intact skin, of increasing volume, expression of local metastasis.
The knowledge of the risk factors of patients and a periodical clinical examination, including the screening of entire mouth mucosa, are essential for the early detection of cancerous and precancerous lesions.
The screening of the oral tissues is fundamental for early diagnosis in order to reduce the morbidity and mortality associated with oral cancer.
Detecting a malignant lesion in the early stages when the prognosis for the patient is better allows to proceed more successfully to the suitable surgical or medical cures.
Oral premalignant conditions are a group of mucosal lesions, i.e. leukoplakia and erythroplakia, that arise below the mucosal surface and could grow to occupy the entire epithelium. In the oral premalignant lesion is more frequent the development of cancer.

Dysplasia and staging of dysplasia

Dysplasia is a modification of mucosal epithelium that loses its normal and benign characteristics without already being malignant. The oral lesions in which is histologically detectable the epithelial dysplasia more frequently and rapidly evolve to squamous cell carcinoma.

Different stages of dysplasia are recognized:

- Mild
- Moderate
- Severe

The severe dysplasia can rapidly involve the entire thickness of epithelium and evolve to “in situ” carcinoma, and subsequently to “invasive carcinoma” if tumour cells grow and invade the submucosal tissues through the basement membrane.

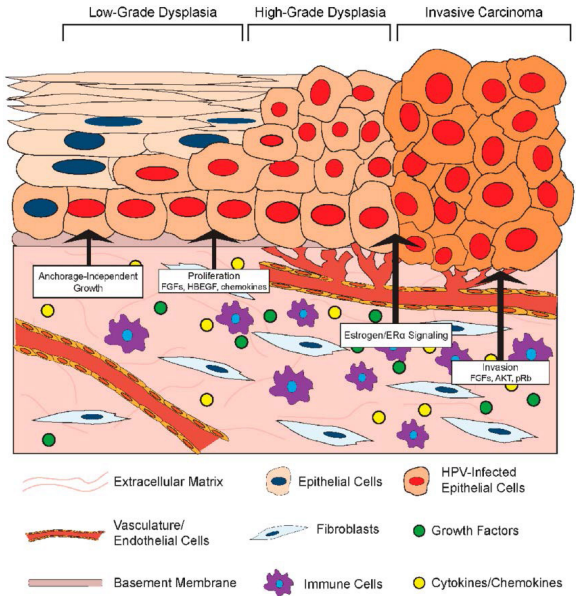

Fig. 1 Degrees of dysplasia in oral cancer

Oral dysplasia, cancer and the loss of normal autofluorescence

Dysplastic and neoplastic oral mucosa can display a decreased intensity or a loss of the normal fluorescence of the mucosa. The sound and normal oral mucosa show a proper green “autofluorescence” if enlighted with a blue light optically filtered with the Goccles eyewear.

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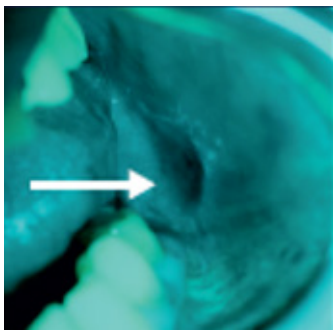

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Essentially the loss of fluorescence in the presence of dysplasia and/or epithelial malignancy is caused by four main conditions:

1. The increased metabolic activity of dysplastic cells in the epithelium causes a decrease in FAD synthesis with a consequent reduction in fluorescence.
2. The breakdown of collagen matrices as a prelude to the advancement of cancer cells leads to a decrease in fluorescence.
3. Morphological changes that can occur in dysplastic and neoplastic cells involve a modified scattering of light in the epithelial layer. This increases the backscattering of blue light which excites the fluorescent component of the cells, with a consequent evident decrease in fluorescence, visible even with the naked eye.
4. An increased microvascularity and blood flow in the connective tissue under or around the pretumour and tumour tissue the and therefore a greater absorption of light by the hemoglobin of the blood cells. These processes will result in a diminished fluorescence.

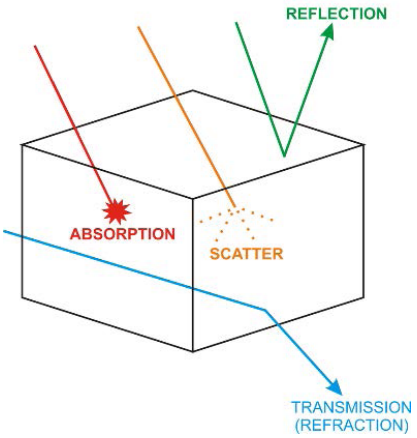

Fig. 2 The behavior of light incident to an object

The loss of autofluorescence is not only caused by dysplasia or oral cancer, and this represents a limitation of this technique. Various causes can cause the reduction or loss of normal autofluorescence and can be highlighted with examination with the Goccles instrument: areas of prominent vascularization, areas of inflammation and excessive melanic pigmentation.

For this reason, after visualizing areas with loss of fluorescence, it is essential to follow the patient in the following 2/4 weeks and perform a clinical control to look at the regression or persistence of the mucosal lesion.

The use of fluorescence in preventive screening

Oral screening consists of a clinical examination of the patient which includes anamnesis with evaluation of the risk factors of tumors, visual and palpatory clinical examination of the oral mucosa with white light, external palpation and palpation of the lymph nodes of the neck and the evaluation of the autofluorescence with GOCCLES glasses.

In the presence of areas with loss of fluorescence, it is essential to arrange controls in the following 2-4 weeks to follow the clinical case and to be able to verify the regression or persistence of the lesions.

The only way to accurately determine the diagnosis is to perform a biopsy of the lesion and the histopathological examination which allows the identification of the tumor or a false positive.

When screening for tissue autofluorescence, it may be helpful to have support for clinical image assessment from a pathologist or oral surgeon who has experience with this method.

GOCCLES offers this support.

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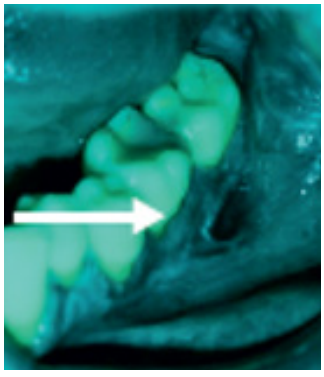

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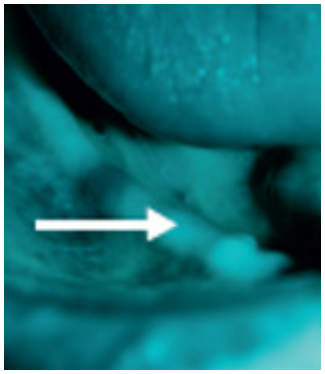

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