



Oral Leukoplakia and Toluidine Blue Staining

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Clinical Image

A predominantly white oral mucosal lesion which cannot be related to any other causes and cannot be wiped off of oral mucosa is defined as oral leukoplakia (OL) [1-3]. This lesion is observed in 0.2% to 4.9% of the world population [3-5], and long-standing OLs are considered as antecedents of oral cancer lesions [4,6] with malignant transformation rate reaching up to 34% in some populations [3] within a follow-up period of 1 to 30 years [3,4]. A specific prevention method of this malignant transformation is not known yet, therefore successive and close follow up every OL lesion is recommended [7-9].

In order to assess the malignancy potential of OLs, various adjuncts have been utilized and toluidine blue (TBlue) staining is one of these methods [10-14]. This cationic metachromatic dye that selectively binds to free anionic groups of large molecules [11] and stains deoxyribonucleic acid and/or may be retained in intracellular spaces of dysplastic epithelium and clinically appear as royal blue areas *in vivo* [13,14]. Even though it is recommended that only dark royal blue staining in color should be regarded positive [15-18], others considered any uptake of blue dye positive, or classified pale staining either as positive or negative, or assigned to another category [14,19]. Healthy oral mucosa does not stain; but the dye may be noticed in retentive structures such as the fissures of the teeth and the papillae of the tongue. Additionally, other parts of oral cavity may stain very weakly with the tint of the saliva and appear as diffuse, filmy, and amorphous. Swabbing the area with acetic acid would remove the stain, and this may serve as an aid to differentiate these areas from actual suspicious sites [20]. Although nonmalignant areas of inflammation may also stain because inflammatory and ulcerative lesions tend to retain the dye due to greater cell activity and mechanical retention, false-positive results may be reduced by restraining fourteen days later after elimination of presumed etiological factors, at which time inflammatory changes usually resolve [16-20]. Retention of the stain is difficult in OL lesions because of increased thickness of the upper layer of oral mucosal epithelium (Figure 1 and 2). Thus, lower penetration of the toluidine blue

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Figure 1: A white patch at the anterior part of the floor of the mouth before and after toluidine blue staining. Histological diagnosis was parakeratotic hyperkeratosis.



Figure 2: White patch on left buccal mucosa, near to the commissure before and after toluidine blue staining. Histological diagnosis revealed hyperkeratosis with mild dysplasia.

dye through the white patches due to the hyperkeratotic nature of OL results with low sensitivity of this adjunct method. Therefore, the suitability of toluidine blue vital staining in primary care centers where a high proportion of white patches encountered are benign disorders appears debatable. With this argument, provided that weak penetration of the dye in hyperkeratotic lesions disguise the efficacy of toluidine blue in revealing the dysplastic oral mucosal tissues, the wide range of sensitivity and specificity values of toluidine blue staining in OLs may need to be reconsidered.

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