

Assessment of Toluidine Blue in Oral Leukoplakia

Sathish Kumar,¹ N.Vezhavendhan,² Sridhar Reddy V³

ABOUT THE AUTHORS

1. Sathish Kumar

Professor
Department Of Oral Pathology
and Microbiology,
Indra Gandhi Institute of
Dental Sciences.
Pondicherry - 11.

2. N.Vezhavendhan

Assistant Professor
Department Of Oral Pathology
and Microbiology,
Indra Gandhi Institute of
Dental Sciences.
Pondicherry - 11.

3. Dr. V. Sridhar Reddy

Professor,
Dept. of Oral Pathology
SVS Institute of Dental
Sciences, Mahabubnagar, A.P.
India.

Corresponding Author:

Sathish Kumar

Professor
Department Of Oral Pathology
and Microbiology,
Indra Gandhi Institute of
Dental Sciences.
Pondicherry - 11.

Abstract

Squamous cell carcinoma is the most common cancer of the oral cavity and the prognosis of the tumor depends on the early detection of the carcinoma. Toluidine blue is a metachromatic dye of the thiazine group that has been effectively used as a nuclear stain because of its binding capacity with DNA. The objective of the study was to find the specificity and sensitivity of the toluidine blue supra vital staining technique in oral leukoplakia. The study comprised of 17 clinically suspicious cases of oral leukoplakia. The effect of toluidine blue staining and histopathological features were also studied. The toluidine blue staining is a sensitive vital staining method for leukoplakia. It is the useful chair side diagnostic test with the sensitivity of 92% and specificity of 100%.

KEYWORDS: Oral Leukoplakia, toluidine blue

Introduction

Oral leukoplakia is a premalignant lesion which has 4% risk of transforming into squamous cell carcinoma. Squamous cell carcinoma is the most common cancer of the oral cavity and the prognosis of the tumor depends on the early detection of the carcinoma. 90% of the head and neck cancers are squamous cell carcinomas, originating from the mucosal lining epithelium of these regions. Head and neck cancers often spread to the lymph nodes of the neck, and this is usually the first manifestation of the disease at the time of diagnosis. Unlike other cancers due to its accessible location oral cancer can be detected at an early stage.

Toluidine blue is a metachromatic dye of the thiazine group that has been effectively used as a nuclear stain because of its binding capacity with DNA^{1,2,3}, it is based on the fact that dysplastic and anaplastic cells contain quantitatively more nucleic acid than normal cells, it was hypothesized that premalignant lesions will retain toluidine blue stain when compared to normal unaffected oral mucosa^{4,5,6}. The objective of the study is to find the specificity and sensitivity of the toluidine blue supra vital staining technique in oral leukoplakia.

OBJECTIVE

The objective of the study was to find the specificity and sensitivity of the toluidine blue supra vital staining technique in oral leukoplakia

MATERIALS AND METHODS

The study group comprises of thirty clinically suspicious cases of oral leukoplakia. With the proper concern of the patient, Toluidine blue stain was applied over the lesion areas, the lesion which has taken toluidine blue stain was recorded. Biopsy was performed in all the cases for histopathological confirmation.

MATERIALS AND METHODS

The study group comprises of 17 clinically suspicious cases of oral leukoplakia. With the proper concern of the patient, Toluidine blue stain was applied over the lesion areas, the lesion which has taken toluidine blue stain was recorded. (Fig1. & 2). Biopsy was performed in all the cases for histopathological confirmation.



Fig 1. Leukoplakia lesion before toluidine blue application.

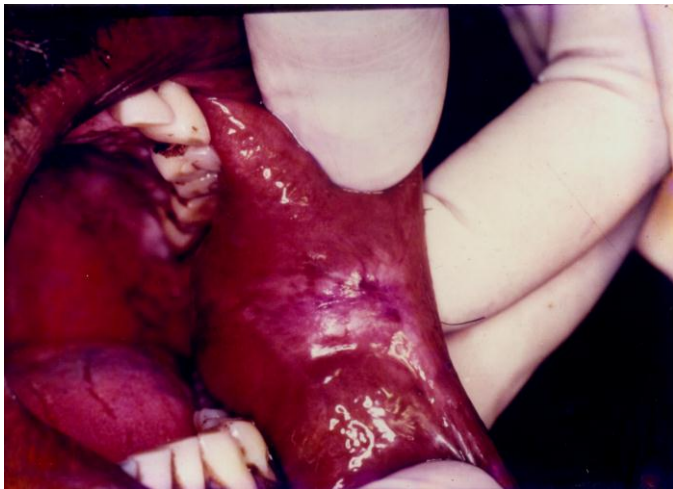


Fig 2. Leukoplakia lesion after toluidine blue application.

RESULTS

Out of 17 cases, 12 cases were toluidine blue positive and five cases were toluidine blue negative. In histopathological finding, out of 17 cases 4 cases showed mild dysplasia,

3 cases showed moderate dysplasia, 2 cases showed hyperkeratosis and epithelial atrophy, 2 cases showed hyperkeratosis and epithelial dysplasia, 3 cases showed epithelial atypia, 2 cases showed hyperkeratosis and 1 case showed malignant changes.

Out of 17 cases, 12 cases were toluidine blue positive and histopathology showed dysplastic features, one patient was toluidine blue negative and histopathology showed dysplastic features, 4 patients were toluidine blue negative and histopathology showed no evidence of dysplastic features. (Table 1) Toluidine supravital staining had 92% sensitivity and 100% specificity.

Histopathological Finding	Toluidine Blue	
	+ve cases	-ve cases
Hyperkeratosis	0	2
Hyperkeratosis & Epithelial atrophy	0	2
Hyperkeratosis & Epithelial atypia	2	0
Epithelial Atypia	3	0
Mild Dysplasia	3	1
Moderate Dysplasia	3	0
Squamous Cell Carcinoma	1	0
TOTAL	12	5

Table 1. Summary of the 17 cases considered in the study.

DISCUSSION

During 1960 a suggestion was made that toluidine blue may stain malignant epithelial cells in vivo while the normal tissues failed to retain the dye. Since then toluidine blue has been used in a number of clinical studies to differentiate between the neoplastic, dysplastic and benign lesions and between the oral cavity and the uterine cervix. Vital staining of the oral epithelium has also been suggested as a means of surveillance in patients who are at risk of developing oral cancer and for those who had their neoplasm's confirmed in other parts of the aero digestive tract. The results and accuracy of these studies are variable, with differing false-positive and false-negative rates.

Silverman studied 30 cases of oral dysplasia, giving false negative result of 2% and sensitivity of 91% for oral epithelial dysplasia. Johnson NW studied 39 cases of oral dysplasia, giving false negative rate of 20.5% and a sensitivity of 79.5% for oral epithelial dysplasia.

In our study, we found toluidine blue was very effective in diagnosing dysplasia with a sensitivity of

92%. In patients who showed no staining, hyperkeratotic layer was seen histopathologically. Since toluidine blue stains only the DNA, this may explain the reason for non-staining.

Silverman S (1984) reported that filiform papillae always retained the dye. Although the mechanism for the reaction is unknown, it might be related to a high protein synthesis rate. In our study also the dorsal surface tongue in the filiform papillae distributed area showed toluidine blue positivity.

CONCLUSION

The study comprised of 17 clinically suspicious cases of oral leukoplakia. The effect of toluidine blue staining and histopathological features were also studied. The toluidine blue staining is a sensitive vital staining method for leukoplakia. It is the useful chair side diagnostic test with the sensitivity of 92% and specificity of 100%.

REFERENCES

1. Johnson N W et.al sensitivity and specificity of oral scan toluidine blue mouth rinse in the detection of oral cancer and pre cancer. *J Oral Pathol Med.* 1996; 25:97-103.
2. Kerawala C J , Beale v . The role of vital tissue staining in the margin control of squamous cell carcinoma. *Int J oral maxillofacial surgery.* 2000;29,32-35.
3. Lungren J olfsson J Hellquist H. Toluidine blue an aid in the microlaryngoscopic diagnosis of glottis lesion. *Arch otolaryngol.*1979;155-169.
4. Martin I C et al The application of toluidine blue as a diagnostic adjunct in the detection of epithelial dysplasia. *J Oral surg. Oral Med Oral Pathol* 1998;85:444-446.
5. Silverman S Jr Migliorati C Barhosa J Toluidine blue staining in the detection of oral precancerous and malignant lesion. *J Oral Surg Med Oral Pathol* 1984;57:379-82.
6. Mashberg A et al Tolonium rinse – a screening method for the recognition of Squamous cell carcinoma: continuing study of oral cancer *JAMA* 1981; 245:240-10.