



Reliability of Toluidine blue stain in diagnosis of oral cancer and precancer: Database study

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Abstract

Early diagnosis is the single most factors that improve the prognosis and survival rate of cancer patients. Numerous adjuncts are available to aid in its diagnosis. Vital tissue staining using Toluidine blue is one such key adjunct used in the diagnosis of cancer. Toluidine blue is a basic metachromatic stain that demonstrates affinity for DNA and RNA. It offers a potentially simple, inexpensive, and sensitive chair-side solution for screening of early oral squamous cell carcinoma and high-grade dysplasias. Aim and objective: The aim of this study is to provide a comprehensive review on accuracy of toluidine blue stain in oral cancers and precancer. Materials and methods: Literature search was performed using Pubmed, google scholar, ICMJE from past 5 years research based on efficacy of Toluidine blue staining as diagnostic aid in oral cancer and precancer cases. Sensitivity and specificity, as well as positive and negative predictive values for the toluidine blue, were calculated. Results:

Toluidine blue stain is expected to be a reliable aid when clinical examination is unable to differentiate lesions at high risk of progression and hence, improving early diagnosis for oral cancer and precancer.

Keywords: oral cancer, precancer, toluidine blue, vital stain

Introduction

In India, oral cancers constitute 83% of all cancers and rank as the most common cancer in men and third most common cancer in women. [1] The disease is life threatening, with high morbidity resulting from late treatment. However, if it is diagnosed at an early stage, oral cancer is often curable and inexpensive to treat. Techniques that are promoted or assessed to improve earlier detection and diagnosis of oral malignancy include toluidine blue, vizilite plus with touidine blue, velscope brush biopsy, etc. [2] Toluidine blue is a cationic metachromatic dye that may selectively bind to free anionic groups such as sulfate, phosphate, and carboxylate

radicals of large molecules. [3] It has been used for decades as an aid to the identification of mucosal abnormalities of the cervix as well as in the oral cavity. It has been valued by surgeons as a useful way of demarcating the extent of a lesion prior to excision. [1]

Objective

The aim of this study is to provide a comprehensive review on accuracy of toluidine blue stain in oral cancers and precancer.

Material and Method

The literature on the use of toluidine blue dye as a screening tool to detect oral cancer was sought using structured searches on the internet, Medline and Pub-Med databases, and by scrutiny of the references of all identified studies. All study designs were included provided that the diagnosis of oral cancer was confirmed using the gold standard test of biopsy and histological examination. Papers which only reviewed other studies, described the technique, offered only expert opinion, or described interim results of included studies were excluded. The quality of these studies was assessed and relevant data extracted. Randomized control studies and studies on high risk population assessing the role of Toluidine blue as adjunct in oral cancer diagnosis were included.

The studies which provided only background information on Toluidine blue or the staining technique and provided interim results or no results were excluded.

Result

A total of 70 articles were collected from the database. Of the 70 articles, fourteen met the inclusion criteria. There were also four literature reviews which offered no additional or new data.

In primary care, findings suggest that use of Toluidine blue can benefit as an adjunct in clinical examination of oral cancer in high risk populations.

Discussion

The correlation between the intensity of Toluidine blue staining and the severity of dysplasia has been debated. The variability in the reporting of Toluidine blue staining patterns was seen in different studies, in which some reported only 'a royal-blue' intense stain as positive, whereas others reported any staining as positive. [4, 5]

Gandolfo et al. reported that all OSCC stained toluidine blue positive and that none of the OSCC lesions stained pale blue. [6,7]

Gray et al. showed that when equivocal staining was included in positive lesions, sensitivity of toluidine blue staining was as low as 40% and as high as 100%. [1]

Zhang et al. conducted a longitudinal study, assessing toluidine blue staining characteristics among high-risk primary OPLs. The data revealed that 36% of the OPLs were toluidine blue positive, and 64% of the OPLs were toluidine blue negative. [2]

Conclusion

Toluidine blue may, therefore, be a useful adjunct to clinical examination for the detection of oral cancer in high-risk populations and in people referred to secondary care with oral lesions when used by trained and experienced clinicians.

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