OBJECTIVE

Oral cancer is the eighth most common cancer worldwide with an estimated annual incidence of 275,000. It is responsible for nearly 130,000 deaths each year. Early detection is critical to optimal outcomes. Patients with early-stage oral cancer experience higher survival rates with less morbidity than patients who present at later TNM stages. Screening for oral cancer in high-risk patients is an important aspect of care. Screening is routinely performed by visual exam alone; however, a number of techniques, such as toluidine blue staining and computer-analyzed brush biopsy, have been developed to serve as adjuncts to the visual exam. The aim of this meta-analysis is to assess the utility of these adjunctive screening techniques.

METHODS

A PubMed search was performed for 2001-2010. Criteria for inclusion were based on the study design to the gold-standard (surgical biopsy), a minimum of 10 subjects, and availability in English. Seventeen studies were identified as eligible for analysis. All studies provided quantitative data which was extracted and used to calculate sensitivity, specificity, PPV, and NPV.

RESULTS

The 17 studies analyzed reported 27 sets of screening results, since several studies included multiple techniques and/or multiple test groups, and provided a total of 2198 cases. The number of data sets for each screening technique was as follows: 15 for fluorescence techniques, 5 for computer-analysis of brush biopsy with the Oral CDx system, 3 for toluidine blue staining, 2 for optical spectroscopy, 1 for brush biopsy without computer analysis, and 1 for methylene blue staining. A range of results from 0.00 to 1.00 were observed for sensitivity, specificity, and PPV. NPV ranged from 0.11 to 1.00. Three studies included no negative cases and therefore provided no information on NPV.

A summary of individual study results is provided in Table 1. Mean values for the studies are provided in Table 2. Calculation of mean values weighted by N resulted in sensitivity of 0.824, specificity of 0.680, PPV of 0.597, and NPV of 0.791.

CONCLUSIONS

Early detection of oral cancer greatly improves 5 year survival and decreases morbidity. Advancement of screening techniques is therefore highly desirable. Current adjunctive measures, however, have not proven adequate levels of either sensitivity or specificity to justify their use as screening techniques. It is worth noting that all visual exams in these studies were performed by specialists such as dentists and oral surgeons. Since all biopsy lesions were detectable by visual exam, it is clear that these techniques were less sensitive than the naked eye of a trained specialist. There may be some role, however, for these screening aids to be used in the examination of at-risk patients in non-specialist offices. Another possible role includes the identification of the optimal area of mucosa to biopsy in the setting of widespread dysplastic disease (Figure 1). Future studies may wish to explore the utility of relatively cheap screening aids, such as toluidine blue, in the hands of non-specialized health care workers at family practices or at screening fairs.

REFERENCES