Comparison of Conventional Caries Detection and Caries Detector Dye

F. Arbabzadeh Zavareh and M. Yazdizadeh
Department of Operative Dentistry, Dental School, Isfahan Medical Science University, Isfahan, Iran

Abstract: Tactile and visual methods are not completely efficient in caries diagnosis. A visual method reinforced by a dye (Kuraray, Japan) was used to evaluate accuracy of the conventional methods. Two hundred and four teeth with cavities (class i and ii) already confirmed caries free by specialists in patients were chosen. The cavities dried and stained with a drop of the dye and were washed by water after 10 sec. Chi-square and z-tests were used for statistical analyses. The remained caries, especially in dentinoenamel junction (DEJ) stained dark pink color. Out of 102 class I cavities, 43 (42%) were stained in DEJ (10 in mesial, 14 in distal, 19 in buccal and 19 in lingual walls). Out of 102 class ii cavities, 49 (48%) were stained in DEJ (27 in gingival, 10 in lingual, 19 in buccal, 3 in mesial or distal (axial), 19 in buccal box and 8 in lingual box walls). The difference observed between class I and class ii cavities was not significant ($p < 0.05$). In class I cavities no significant differences was observed among different parts involved ($p < 0.05$). In class ii cavities the rate of caries was significantly higher in gingival wall ($p < 0.05$). Out of 44 maxillary and 58 mandibular teeth of class I cavities 17 and 26 had remained caries, respectively. The difference was not significant ($p < 0.05$). Out of 57 mandibular and 45 maxillary teeth of class ii cavities 34 and 15 had remained caries, respectively. The difference was significant ($p < 0.05$). Totally the rate of caries was significantly higher in mandibular teeth ($p < 0.05$). Accuracy of tactile and visual method was about 55%; therefore, more attention should be paid in diagnosis and removal of caries in DEJ. The use of caries detector dye was suggested.

Key words: Conventional caries detection, caries detector dye, diagnosis, cavity

INTRODUCTION

In cavity preparation conventional tactile and visual methods considering the color and hardness are used to assess caries status of the enemal-dentin junction. However the estimation of hardness of the remaining dentine by tactile procedures may not be reliable guide for the clinical removal of caries (Banerjee *et al.*, 2003). Only in chronic caries discoloration is considered to be reliable (Fusayama *et al.*, 1996; Sato and Fusayama, 1976). Therefore, discoloration is also not a reliable guide for removal of infected dentin (Yip and Beeley, 1994). The use of a dye which specifically stains infected dentine is very useful clinically.

The application of caries detector dyes such as 1% acid red in propylene glycol, basic fuchsin and other methods have improved the detection of caries (Al-Shehaibany *et al.*, 1996; Kidd *et al.*, 1989; Sato and Fusayama, 1976; Tassery *et al.*, 2001) and removal of residual bacterial contamination (Allaker *et al.*, 1998). On the other hand the use of caries detector dyes can lead to clinically significant over-preparation and unnecessary tissue removal of cavities when compared to tactile method (Fusayama *et al.*, 1996; Kidd *et al.*, 1993; McCombm, 2000).

These controversial results necessitate more investigations, so the efficacy of a visual method reinforced by a dye was examined.

MATERIALS AND METHODS

A visual method reinforced by a dye (1% acid red in propylene glycol) (Kurary, Japan) was used to evaluate accuracy of the conventional methods. Two hundred and four teeth with cavities (class I and II) already confirmed caries free by specialists in patients were chosen. The cavities dried and stained with a drop of the dye and were washed by water after 10 sec. Chi-square and z-tests were used for statistical analyses.

RESULTS

Remained caries was observed in 45% of the cases. They stained dark pink color especially in dentinoenamel junction (DEJ).
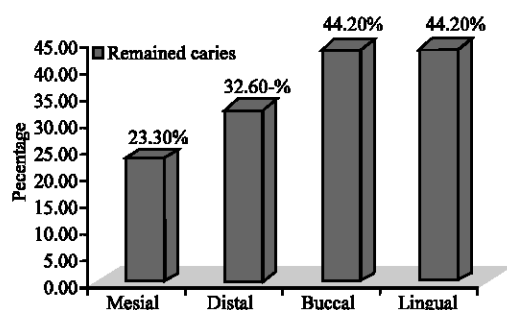
Corresponding Author: Farahnaz Arbabzadeh Zavareh, Department of Operative Dentistry, School of Dentistry,
Isfahan Medical Science University, Isfahan, Iran

Fig. 1: Distribution of remained caries in different tooth walls of class I cavtities

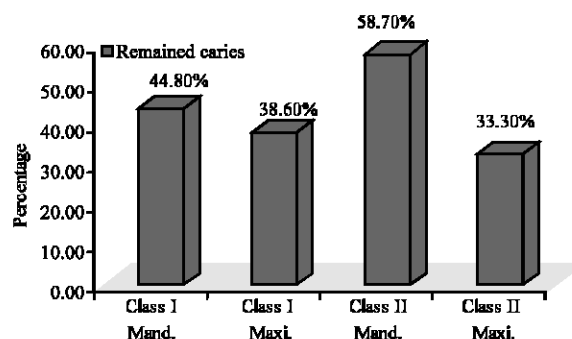Fig. 2: Distribution of remained caries in different walls of class II cavtities

Fig. 3: Distribution of remained caries in class I and class II cavtities of mandibular (Mandi) and maxillary (Maxi) teeth
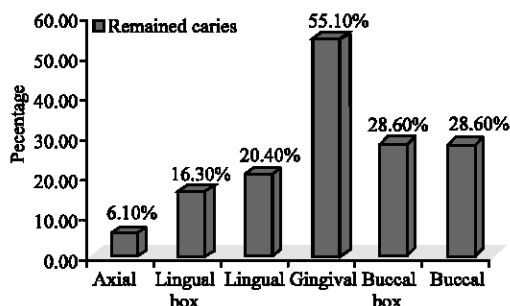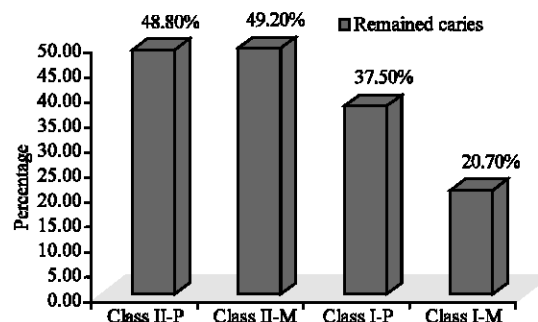

Fig. 4: Distribution of remained caries in class I and II cavtities in molar (M) and premolar (P) teeth

Out of 102 class I cavities, 43 (42%) were stained in DEJ. The distribution of the remained caries in mesial, distal, buccal and lingual walls is shown in Fig. 1. The differences observed among different walls were not significant (p>0.05).

Out of 102 class II cavities, 49 (48%) were stained in DEJ. The distribution of the remained caries in gingival, lingual, buccal, mesial or distal (axial), buccal box and lingual box walls are shown in Fig. 2. The rate of caries was significantly higher in gingival walls (p<0.05).

The difference observed between class I and class II cavities was not significant (p>0.05).

Out of 44 maxillary and 58 mandibular teeth of class I cavities 17 and 26 had remained caries, respectively. The difference was not significant (p>0.05). Out of 57 mandibular and 45 maxillary teeth of class II cavities 34 and 15 had remained caries, respectively. The difference was significant (p<0.05). Totally, the rate of caries was significantly higher in mandibular teeth (p<0.05) (Fig. 3). The number of remained caries in class I and class II cavities in premolar and molar teeth were compared (Fig. 4). The difference between remained caries in class I and II cavities in molar and premolar teeth were not significant (p>0.05).

DISCUSSION

Accuracy of tactile and visual methods was 55% which was nearly the same as the results (57% accuracy) observed by Kidd *et al.* (1989). Therefore, more attention should be paid in diagnosis and removal of caries in DEJ. Remained caries in gingival wall of class II cavities was significantly higher than the other walls. As the possibility of remained caries is higher in this site, more attention is needed for diagnosis and removal of caries in gingival walls.

The remained caries in class II cavities of the madibular teeth was significantly higher which needs more attention in diagnosis and removal of them.

REFERENCES

Allaker, R.P., S.V. Seddon, C. Tredwin and E. Lynch, 1998. Detection of Streptococcus mutans by PCR amplification of the spaP gene in teeth rendered caries free. J. Dent., 26: 443-445.

Al-Shehaibany, F., G. White and J.T. Rainey, 1996. The use of caries detector dye in diagnosis of occlusal carious lesions. J. Clin. Pedatr. Dent., 20: 293-298.

Banerjee, A., E.A. Kidd and T.F. Watson, 2003. *In vitro* validation of carious dentin removed using different excavation criteria. Am. J. Dent., 16: 228-230.

Fusayama, T., K. Okuse and H. Hosoda, 1996. Relationship between hardness, discoloration and microbial invasion in carious dentin. J. Dent. Res., 45: 1033-1046.

Kidd, E.A.M., S. Joyston-Bechal and D. Beighton, 1993. The use of a caries detector dye during cavity preparation: A microbiological assessment. Br. Dent. J., 175: 312-313.

Kidd, E.A.M., S. Joyston-Bechal, M.M. Smith and R.S. Smith, 1989. The use of caries detector dye in cavity preparation. Br. Dent J., 167: 132-134.

McComb, D., 2000. Caries detector dyes-how accurate and useful are they?. J. Can. Dent. Assoc., 66: 195-198.

Sato, Y. and T. Fusayama, 1976. Removal of dentin by fuchsin staining. J. Dent. Res., 55: 678-683.

Tassery, H., J. Dejou, A. Chafaie and J. Camps, 2001. *In vivo* diagnostic assessment of dentinal caries by junior and senior students using red acid dye. Eur. J. Dent. Edu., 5: 38-42.

Yip, H.K. and J.A. Beeley, 1994. The specificity of caries detector dyes in cavity preparation. Br. Dent. J., 176: 417-421.