Abstract  OBJECTIVE:

The aim of this in vitro study was to investigate the influence of the adjacent tooth surface on pen type laser fluorescence (LFpen) and light-emitting diode (LED) device readings in detecting approximal caries lesions in permanent teeth.

BACKGROUND DATA:

Early detection of noncavitated dental caries is important, because disease progression can be easily halted at this stage with certain applications, such as fluoride therapy, antibacterial therapy, dietary changes, or low-intensity laser irradiation.

MATERIALS AND METHODS:

A total of 87 permanent molars with 156 approximal surfaces were assessed with LED- and LF-based devices in contact with sound tooth surfaces (the control group) as well as approximal amalgam, composite, zirconia, and full ceramic restorations. All teeth were assessed once by one trained examiner. After the LF and LED assessments, the teeth were histologically evaluated using stereomicroscopy as the gold standard. The sensitivity, specificity, accuracy, and area under the receiver operating characteristics (ROC) curve were calculated according to the appropriate thresholds (T1, sound surface or enamel caries; T2, dentin caries).

RESULTS:

For the LFpen device, higher sensitivity and accuracy was found when the adjacent surface was sound at the T1 threshold and no significant differences were found among accuracy at the T2 threshold. For the LED-based device, no significant differences were found among sensitivities at the T1 threshold. At the T2 threshold, specificity was higher when the adjacent tooth had a zirconia restoration.

CONCLUSIONS:

It was found that both devices could be used effectively for evaluating approximal surfaces with adjacent restored teeth, regardless of the different kinds of restorative materials.