Effect of Computer-aided Detection for CT Colonography in a Multireader, Multicase Trial

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Purpose

To assess the effect of using computer-aided detection (CAD) in second-read mode on readers' accuracy in interpreting computed tomographic (CT) colonographic images.

Methods and Materials

The contributing institutions performed the examinations under approval of their local institutional review board, with waiver of informed consent, for this HIPAA-compliant study. A cohort of 100 colonoscopy-proved cases was used: In 52 patients with findings positive for polyps, 74 polyps of 6 mm or larger were observed in 65 colonic segments; in 48 patients with findings negative for polyps, no polyps were found. Nineteen blinded readers interpreted each case at two different times, with and without the assistance of a commercial CAD system. The effect of CAD was assessed in segment-level and patient-level receiver operating characteristic (ROC) curve analyses.

Results

Thirteen (68%) of 19 readers demonstrated higher accuracy with CAD, as measured with the segment-level area under the ROC curve (AUC). The readers' average segment-level AUC with CAD (0.758) was significantly greater (P = .015) than the average AUC in the unassisted read (0.737). Readers' per-segment, per-patient, and per-polyp sensitivity for all polyps of 6 mm or larger was higher (P < .011, .007, .005, respectively) for readings with CAD compared with unassisted readings (0.517 versus 0.465, 0.521 versus 0.466, and 0.477 versus 0.422, respectively). Sensitivity for patients with at least one large polyp of 10 mm or larger was also higher (P < .047) with CAD than without (0.777 versus 0.743). Average reader sensitivity also improved with CAD by more than 0.08 for small adenomas. Use of CAD reduced specificity of readers by 0.025 (P = .05).

Conclusion

Use of CAD resulted in a significant improvement in overall reader performance. CAD improves reader sensitivity when measured per segment, per patient, and per polyp for small polyps and adenomas and also reduces specificity by a small amount.

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