

VC finds early niche in screening

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9/27/2006

In an important validation of virtual colonoscopy's utility as a complementary colorectal cancer screening exam, Wisconsin researchers reported a high correlation between VC and optical colonoscopy results in patients referred for follow-up polypectomy.

Moreover, the referral rate from VC to colonoscopy in the mostly average-risk screening population was low, undercutting concerns that widespread VC screening for colorectal cancer might lead to excessive demand for colonoscopy.

Due largely to mixed results from large multicenter trials and a lack of third-party reimbursement, virtual colonoscopy has yet to achieve widespread acceptance or implementation, noted Dr. Perry Pickhardt, Dr. Andrew Taylor, and colleagues from the University of Wisconsin Hospital and Clinics in Madison. "Managed care organizations at the national level continue to view CT colonography (CTC or virtual colonoscopy [VC]) as largely investigational" (*Radiology*, September 18, 2006).

Insurance coverage is further along in the Midwest, however, where in 2004 the Madison facility became the first in the U.S. to offer reimbursed VC screening in cooperation with major third-party payors in Wisconsin. The *Radiology* article details the results of the screening program's first year ended April 2005.

The program requires colorectal cancer screening subjects to undergo a purgative bowel cleansing and also a fecal and fluid tagging regimen the day before the exam consisting of sodium phosphate (45 mL), 2% barium suspension (250 mL), and diatrizoate (60 mL).

Virtual colonoscopy exams are scheduled for the next morning, with conventional colonoscopy generally scheduled later the same day for patients with one or more 10-mm or larger polyps detected at VC.

Patients with a medium-sized polyp (6-9 mm) are offered the choice of same-day colonoscopy or VC surveillance (two years for 6-7 mm lesions and one year for 8-9 mm lesions). VC-detected lesions smaller than 6 mm in diameter are not reported "because the accuracy of (VC) at this polyp size is low, matching at optical colonoscopy is problematic, the risk of diminutive lesions does not clearly outweigh the risk of optical colonoscopy, and the presence or absence of such lesions does not ultimately affect our management decisions," the team wrote. For negative VC exams, the recommended rescreening interval was set at five years.

In all 1,100 consecutive screening subjects (585 women, 525 men; mean age 58.1) underwent primary VC screening, using an eight- or 16-detector scanner (LightSpeed series, [GE Healthcare](#), Chalfont St. Giles, U.K.) using 1.25-mm collimation, 1-mm reconstruction intervals, 120 kVp, and 50-75 mAs. Postprocessing and primary 3D interpretation were performed by two experienced radiologists on a V3D colon workstation ([Viatronix](#), Stony Brook, NY).

One of nine experienced gastroenterologists (three to 25 years of experience; median 14.2 years) performed the conventional colonoscopy exams using standard techniques and endoscopes (Pentax Medical, Montvale, NJ), and were given the VC results prior to the exams. "Whenever possible, all polyps that were detected at optical colonoscopy and that were deemed to be of clinical importance were retrieved or biopsy was performed for histologic evaluation," they wrote.

The polyp-matching algorithm allowed for some uncertainty in localization. To match, a polyp had only to be in the same or adjacent colonic segment, and polyp size measurements were given a 50% margin of error, Pickhardt and colleagues wrote. The aim of the study was to establish the positive predictive value of VC; detection rates were evaluated both by polyp and by patient, with an emphasis on the latter reflecting its relevance "to the overall care of the patient."

According to the results, VC detected large polyps in 43 (3.9%) of 1,110 patients and medium-sized lesions in 77 (6.9%) patients, 31 (40%) of whom chose colonoscopy and 46 (60%) of whom chose VC surveillance.

Matched lesions included 50 tubular adenomas, 12 tubulovillous adenomas, two villous adenomas, one adenocarcinoma, one malignant carcinoid tumor, and one mucinous adenoma of the appendix. Most non-neoplastic matched lesions were hyperplastic polyps, the team wrote. Fifty-four percent (36/67) of lesions 6 mm and larger that were matched on the two exams were proximal to the splenic flexure.

At colonoscopy, matching lesions were detected in 65 of 71 patients, for a positive predictive value of 91.5%. At least one matching lesion was neoplastic in 49 of 65 patients. In all, 61 of 71 (86%) colonoscopy procedures were performed on the same day, avoiding the need for a separate bowel prep in most patients referred for colonoscopy.

"The overall (VC) test-positive rate for 6-mm (or larger) polyps was 10.8% (120/1,110 patients)," they wrote. "Because most patients with medium-sized polyps chose to undergo follow-up with (VC), the actual endoscopic referral rate for patients with positive findings at 6.4% (95% CI: 5.0%, 8.0%; 71 of 1,110 patients). If all patients with either a polyp measuring 6 mm or larger (n = 120) or a nondiagnostic segment (n = 12) had undergone subsequent endoscopy, the maximum referral rate would have been 11.9% (95% CI: 10.0%, 13.9%; 132 of 1,110 patients).

There were no clinically notable complications for either procedure, but two colonoscopy patients were hospitalized for postpolypectomy syndrome and abdominal pain.

"The results of our program suggest that combining (VC) with an existing optical colonoscopy practice can be a viable and generalizable means of achieving the goal of detection and removal of large polyps in the majority of the screening population," the authors wrote, adding that technical elements that caused shortcomings in earlier studies are critical to success.

"Reliable colonic cleansing and adequate colonic distention are also critical," they wrote. "Reader inexperience or the steeper learning curve for primary 2D polyp detection may

also have had a detrimental effect" on some earlier studies. And the multicenter study by Pickhardt's team relied on experienced readers and 3D primary interpretation that "did not vary significantly according to site or over the course of the trial, which suggests a much simpler learning curve for this approach," they wrote.

Since the earlier trials, other improvements in software, preparation and distention techniques, including improvements in the Viatronix equipment, have yielded exams of consistently higher quality, they noted.

"Gastroenterologists should not feel threatened by the implementation of (VC), as we have found it to be a useful complement to optical colonoscopy rather than a potential replacement," the authors stated. "The complementary nature becomes readily apparent because optical colonoscopy may occasionally demonstrate synchronous lesions that are not prospectively identified at (VC), just as some polyps that were detected at (VC) would have gone undetected at optical colonoscopy.... The theoretic concerns that the implementation of (VC) might decrease the overall volume of patients who undergo colonoscopy are trumped by the vast untapped supply of patients who are in need of screening and by the continued need for therapy (i.e., polypectomy)."

Furthermore, a higher percentage of truly therapeutic colonoscopy exams "would represent a better use of a limited resource that is more costly and more invasive than CT colonography," they wrote.

As for potential limitations, only a single vendor's system was used to interpret the results, and limited referrals to colonoscopy made it impossible to directly compare sensitivity and specificity between the two exams. Finally, they noted that the outcome of VC surveillance is unknown, and will be examined in a future study.

"The low endoscopic referral rate and high positive predictive value not only demonstrate the clinical effectiveness of this approach, but also provide encouraging data for cost-effectiveness analyses," the group concluded.