

LOS ANGELES

COLON AND RECTAL SURGICAL ASSOCIATES

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March 2005

Virtual Colonoscopy

THE PROBLEM:

Approximately 150,000 new cases of colorectal cancer are diagnosed each year in the United States. It is the second leading cause of cancer mortality, resulting in almost 60,000 deaths every year.¹ Cancer of the colon and rectum most commonly develop from precursor adenomatous polyps that increase in size over time.^{2,3} Early detection and removal of these premalignant polyps usually prevents them from developing into invasive cancer.^{4,5} This is the rationale behind the colorectal cancer screening recommendations from the American Cancer Society and the American College of Gastroenterology.

CURRENT SCREENING OPTIONS:

Current screening options to evaluate the colon and rectum consist of a digital rectal exam, fecal occult blood testing, combined flexible sigmoidoscopy and an air contrast barium enema, and fiberoptic colonoscopy. The limitation of the flexible sigmoidoscopy alone, centers around the inability of this procedure to examine the right half of the colon. The limitations of an air contrast barium enema examination alone center around its decreased effectiveness at polyp detection when compared to

colonoscopy,^{6,7} its difficulty examining the sigmoid colon, and its inability to perform biopsies and remove polyps. Flexible sigmoidoscopy, when combined with a barium enema examination, has a somewhat increased ability to detect a larger number of colonic polyps. However, the sensitivity and specificity of the combined modalities still lag behind those of a colonoscopic examination. Additionally, the combined examinations may not allow for mucosal biopsies or polyp removal.

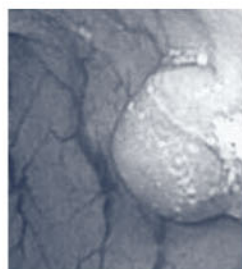
Conventional colonoscopy, while the current gold standard for colorectal inspection, has the disadvantages of requiring sedative and analgesic medication, and is associated with a small risk of injuring the colon during the procedure.⁸ There is also evidence that in 5-10% of conventional colonoscopic examinations, the entire colon is not fully visualized.^{9,10}

THE NEW KID ON THE BLOCK:

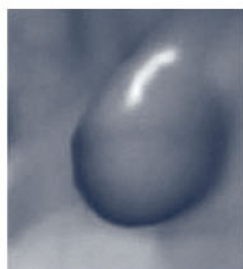
Computed tomographic colonography (CT Colonography), or 'virtual colonoscopy', is a radiologic examination requiring a thin-section spiral CT scanner to generate cross-sectional images.

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"A recent study in *The Journal of The American Medical Association*...raised doubts about the readiness of the current software and stressed the need for a more standardized method of scan interpretation..."



A small polyp seen with conventional colonoscopy.



The same polyp seen with virtual colonoscopy.

These images are reformatted in three dimensions to generate views of the colon resembling those obtained during conventional colonoscopy. The colon must be 'clean' prior to the exam so that residual fecal material can be differentiated from polyps. This is performed with a standard bowel preparation. The patient is then placed on the CT table and a flexible rubber catheter is placed into the rectum in order to insufflate and distend the colon with air. This allows for the normally collapsed colon to be more easily visualized. Once adequate distention is achieved, two sets of images are typically obtained; one in the supine position, and one in the prone position. The examination requires approximately three minutes to complete. The resulting prone and supine data sets allow for better differentiation between a polyp and colon residue. To reconstruct the colorectal anatomy, the two dimensional and three dimensional images are generated with the computer software. The final set of images are read and interpreted by colon and rectal surgeons or by specially trained radiologists.

PRESENT STATUS: GOOD AND NOT-SO-GOOD:

Numerous studies have compared conventional colonoscopy to CT colonoscopy. Overall, the CT colonoscopy was found to have a diagnostic sensitivity similar to conventional colonoscopy for polyps greater than 6.0mm in diameter. For polyps smaller than 6.0mm in diameter, the sensitivity of CT colonography decreased significantly, to the range of 25-50%.^{11,12} A recent study in *The Journal of The American Medical Association* demonstrated that with the current software, the ability of independent reviewers, each interpreting the same scans, to accurately interpret the findings on each scan varied widely. This study raised doubts about the readiness of the current software and stressed the need for a more standardized method of scan interpretation.¹³

Despite efforts to screen patients effectively, colorectal cancer remains a highly prevalent disease. A possible reason for this may be related to patient reluctance to

undergo "invasive" screening as currently recommended.^{14,15} CT colonoscopy usually requires no sedation, and is performed relatively rapidly. It may avoid the small risk of colon perforation which can result from conventional colonoscopy. Patient reluctance to undergo colon screening might possibly diminish with this less invasive procedure, and thus, enable the medical community to more effectively screen the general population for colon and rectal polyps or malignancies.

TOMORROW:

The present limitations of CT colonoscopy center around the accuracy of interpretation of the examination, the inability of the examination to reliably detect small polyps, and the need for a repeat bowel preparation and colonoscopy if lesions are found during CT colonoscopy. Finally, the radiation dose exposure is equal to that of a double contrast barium enema. Continued research may address these limitations. CT colonoscopy holds promise for the future.

TODAY:

Flexible sigmoidoscopy combined with an air contrast barium enema may be used for colorectal polyp and cancer screening.

However, in the early diagnosis of colorectal polyps or malignancies, conventional colonoscopy remains the procedure of choice.

CONCLUSION

"...in the early diagnosis of colorectal polyps or malignancies, conventional colonoscopy remains the procedure of choice."

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