CT Colonography after incomplete colonoscopy in 100 patients: the advantages to offer a complete evaluation of the colon

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Learning objectives

To retrospectively evaluate the value of Computed Tomographic Colonography (CTC) performed in 100 patients who were referred for further examination after incomplete colonoscopy.
Background

The technique of choice for the detection of colorectal cancer and its precursors is optical colonoscopy. However, up to 10% of colonoscopic examinations are technically difficult, and experienced colonoscopists may be unable to complete the colonoscopy and intubate the cecal pole for a variety of reasons (poor bowel preparation, redundant colon, colonic spasm, marked diverticulosis, obstructing masses or strictures, and angulation or fixation of colonic loops).

Full colonic evaluation is especially important in patients with obstructing colorectal cancer because of the high prevalence of synchronous adenomas (27-55%) and carcinomas (1.5- 9%).

When colonoscopy is incomplete, double-contrast barium enema examination has been performed to complete the inspection of the nonvisualized part of the colon.

Computed Tomographic Colonography (CTC) is a technique for the detection of colorectal cancers and polyps for the adenoma-to-carcinoma sequence. The malignant potential of an adenomatous polyp directly correlates with its size, histologic type, and degree of dysplasia. The concept of "advanced adenoma" is important because it represents the key target lesion for colorectal screening; the term advanced adenoma refers to neoplasms measuring 10 mm and/or demonstrating high-grade dysplasia, a prominent villous component, or focus of malignancy.

Its sensitivity is better than that of double contrast barium enema examination for detection of colonic cancer and polyps, and several centers have shown that CTC has accuracy similar to that of conventional colonoscopy in high-risk groups, so CTC is a reasonable alternative to double-contrast barium enema examination in patients with incomplete colonoscopy.
Imaging findings OR Procedure details

100 Computed Tomographic Colonography (CTC) examinations were performed because of incomplete colonoscopy between 2011 and 2012. CTC was performed a mean of 1-2 weeks after the incomplete colonoscopy.

Patient Preparation

All patients ingested low residue diet, without cathartics, in combination with oral administration of iodine contrast agents 3 days before CTC.

We used electronic cleansing by tagging residual fecal matter and colonic fluid.

Acquisition of Data from CT Colonography

A low-dose scanning protocol was used with a 64-section CT scanner (Brilliance; Philips Medical Systems) with 1.5-mm section thickness. A low-dose technique was used with a tube current of 50 mAs and a peak kilovoltage of 100 kVp.

Approximately 20-30 puffs of room air were carefully insufflated using a manual balloon per rectum to distend the large bowel.

Scout images (anteroposterior) were initially acquired with the patient in the supine position to confirm adequate colonic distention. This was done to facilitate full evaluation of the circumferential colonic wall. Data acquisition of the entire colon was performed in one breath hold. The patient was then placed in the prone position, and a second scout images was obtained to confirm adequate colonic distention; additional air was insufflated as required. A second single-breath-hold data acquisition of the entire colon was performed. Fig. 1 on page 7

Quantitative Analysis

A primary 2D read was performed on a workstation using a combination of soft-tissue windows and bone windows, multiplanar reformations and 3D endoluminal navigation using "virtual dissection" program.
We used "electronic cleansing" program to identify and remove residual fluid and fecal matter from the CTC images and the computer-aided diagnosis (CAD) software program.  

*Fig. 2 on page 7*

Lesions were confirmed at subsequent colonoscopy examinations performed within a mean of 50 days after CT colonography or postsurgical resection.

Colonic pathologic findings were documented including all colonic masses and large polyps (# 10 mm). Medium polyps 6-10 mm were lost in follow-up, a decision largely dictated by the referring gastroenterologist, so they were not included in this study because we have no histologic results or diminutive lesions (<6 mm).

*Results*

The mean age of our patients was 61 years (range, 36 - 86 years), and 63.3% patients were female.

The main reason for incomplete optical colonoscopy was intolerance (43%) and poor bowel preparation (15%) *Fig. 3 on page 8*

More than half of patients (64%) the CTC was normal or benign lesions, ie diverticulosis.  *Fig. 4 on page 9*

In 20% of our patients significant lesions were detected. These patients underwent repeat colonoscopy. *Fig. 5 on page 10*

16% were reported to have inadequate study. The main cause to have inadequate study was nonvisualized segments of the colon for inadequate cleansing (80%), we do not know if it was because the patients did not understand the instructions for preparation, or because the limitations of the preparation. 13.3% of patients had inadequate distention and very small percentage could not tolerate the examination in its entirety (6.6%).  *Fig. 6 on page 11*

CT colonography depicted 20 endoscopically nonvisualized lesions of 10 mm or larger.

5 masses were identified at CT colonography not visualized at colonoscopy. The masses comprised 3 adenocarcinomas and 2 endometriomas.  *Fig. 7 on page 11*
CT colonography depicted 15 large polyps in the proximal part of the colon not visualized at colonoscopy: 13 adenomatous polyps with advanced adenoma criteria (10 mm and greater, high-grade dysplasia or villous component) and 2 adenomatous polyps. *Fig. 8 on page 12.*

These findings represented a change in the subsequent therapeutical approach.

4 patients with a obstructing sigmoid adenocarcinoma that was not reached by the colonoscopy had an additional synchronous adenomas (advanced adenoma) and 1 patient had a synchronous adenocarcinoma in the cecum. All masses were correctly identified at CT colonography. These findings changed the initial surgical plan, more aggressive surgery with subtotal colectomy. *Fig. 9 on page 13, Fig. 10 on page 13*

At CT colonography, more than one lesion of 10 mm or larger per patient was depicted in 5 patients.

No new endoluminal lesions were found at repeat colonoscopy that were not seen at the CT colonographic examination that was performed after the original incomplete colonoscopy.

Patients in whom CT colonography depicted polypoid lesions of 6-9 mm in diameter was lost to follow-up. *Fig. 11 on page 14*
Fig. 1: Puffs of room air were carefully insufflated using a manual balloon per rectum to distend the large bowel. A scout images anteroposterior were initially acquired with the patient in the supine position to confirm adequate colonic distention. The patient was then placed in the prone position, and a second scout images was obtained to confirm adequate colonic distention.

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Fig. 2: Adenocarcinoma detected using a primary 2D read (below) and 3D endoluminal navigation using "virtual dissection" program with the computer-aided diagnosis (CAD) software program (colored in blue).

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Fig. 3

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Fig. 4: Benign lesions, diverticulosis, in 2D and and 3D endoluminal navigation using virtual dissection program.

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Fig. 6
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**Fig. 7:** Mass in the cecal pole that was not visualized at colonoscopy, it was an adenomatous polyp with foci of adenocarcinoma.

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Fig. 8: A large polyp was not visualized at colonoscopy, it was an adenomatous polyp with advanced adenoma criteria (more than 10 mm and greater and villous component)

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Fig. 9: Obstructing mass makes it impossible to complete the colonoscopy

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**Fig. 10:** Patient with an obstructing sigmoid adenocarcinoma that was not reached by the colonoscope had an additional synchronous advanced adenoma.

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Fig. 11: Polypoid lesions of 6-9 mm in diameter

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Conclusion

2-10% of colonoscopic examinations performed by experienced endoscopists are incomplete. Our study findings indicate that CT colonography has the potential to become an accepted technique for evaluation of the nonvisualized part of the colon after incomplete colonoscopy and that it can increase the diagnostic yield of masses and clinically important polyps in this part of the colon.

These findings represented a change in the subsequent therapeutical approach, especially in patients with stenotic neoplasms and synchronous lesions.

CTC is technically feasible, safe, and well tolerate by patients, very few patients do not tolerate CTC. In our study, and we did not detect any incidence, this is important for elderly and frail patients.
References

- Laurian Copel, MD; Jacob Sosna, MD; Jonathan B. Kruskal, MD. CT Colonography in 546 Patients with Incomplete Colonoscopy. Radiology Volume 244: Number 2-August 2007.

- Bernard Levin, MD; David A. Lieberman, MD; Beth McFarland. Early Detection of Colorectal Cancer and Adenomatous Polyps, 2008: A Joint Guideline from the American Cancer Society, the US Multi-Society Task Force on Colorectal Cancer, and the American College of Radiology. CA Cancer J Clin 2008;58:130-160


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