

Correlation between Water-Soluble Contrast CT Colonography Findings and Colonic Anastomotic Complications: Experience Based on Three Case Reports

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Abstract

Introduction: Postoperative anastomotic complications of the colon, including strictures and fistulas, are a major cause of morbidity after colorectal surgery. Early detection relies on high-precision imaging that allows characterization of the lesion and helps guide the therapeutic strategy. The aim of this study was to assess the contribution of water-soluble contrast CT colonography in the postoperative follow-up of colorectal anastomoses. **Observations:** We report three cases of patients who underwent a water-soluble contrast CT colonography to evaluate complications that occurred within two months after a colorectal anastomosis. This is a prospective descriptive study carried out in the imaging department of Polyclinique Pasteur over a six-month period (from January 1 to June 30, 2025), including three patients who had undergone surgery with a colonic anastomosis. The three patients in the study were examined using a contrast-enhanced CT scan. This single-center study, limited by a small sample size and the inexperience of the radiology technicians, showed a male predominance (sex ratio = 1.5). The surgical indications were digestive perforation complicating a diverticular sigmoiditis, an adenocarcinoma of the upper rectum, and an obstruction caused by a sigmoid volvulus. Two patients had an end-to-end colonic anastomosis and the other had an end-to-side anastomosis. The complications observed included an anastomotic stricture, three anastomotic fistulas without involvement of nearby organs, and a hydro-aeric

effusion complicated by peritonitis. Finally, only one patient received care through interventional radiology. **Conclusion:** This work highlights the high diagnostic value of CT colonography in the postoperative monitoring of patients who have had colon surgery and its essential role in detecting and characterizing anastomotic complications.

Keywords

CT Colonography, Water-Soluble, Anastomosis, Colorectal, Fistulas, Stenosis

1. Introduction

Colorectal anastomosis is the restoration of digestive continuity after the removal of all or part of a digestive organ [1].

Water-soluble contrast CT colonography is a colon-specific imaging method that involves opacifying the recto-colic lumen with a water-soluble contrast agent, diluted at a very low concentration (10/100) [2]. It is considered a reference exam for diagnosing early postoperative complications of colonic anastomoses, especially intra-abdominal abscesses and anastomotic fistulas, as well as for detecting long-term recurrences after surgery due to its quick execution and accessibility [1].

Mortality after colorectal anastomoses has been reduced to less than 5%, but morbidity remains high due to the many complications that can occur both during and after surgery [3]. Reported complication rates vary widely, ranging from 2% to 51% in the available literature [4] [5]. In Mali, postoperative complication rates of 15.4% and 14.07% were found in study conducted in 2018 by A.H. Maiga in the visceral surgery departments of Fousseiny DAOU Hospital in Kayes and Gao Hospital [6]. A study conducted in the Netherlands by C.C.M. Marres *et al.* in 2017 showed that overall anastomotic leaks after colorectal surgery, identified by water-soluble contrast CT scans, were 7.8% (49 out of 622) [7]. In this study, we illustrate the correlation between CT colonography features and postoperative complications of colonic anastomoses through three clinical cases showing different types of anastomotic lesions. The goal of this study was to assess the contribution of water-soluble CT colonography in the postoperative follow-up of colorectal anastomoses.

2. Materials and Methods

The observations were made using a colon CT scan (abdominal-pelvic scan with colonic opacification) to assess the shape of the colon and surgical anastomosis areas. This technique combines CT scanning and retrograde filling of the colon for a detailed analysis of the intestinal wall and possible fistulas.

Method Steps:

Patient preparation: They were kept fasting for 6 to 8 hours beforehand. Then, we performed an evacuation enema or bowel preparation using a laxative solution (sodium phosphate) to clear out fecal matter and improve the visibility of the mucosa.

Setting up the opacification device: We inserted a flexible rectal cannula under manual control and then performed a slow injection (about 200 mL/min) of a water-soluble contrast agent (Omnipaque 350 mg) diluted in water at 1/10, in order to opacify the colonic segments and, if needed, visualize any fistulas.

CT scan acquisition: The abdominopelvic CT scan with thin slices (1 to 2 mm thick) was performed in helical mode with multiplanar reconstructions (axial, coronal, sagittal). We injected an iodinated contrast agent intravenously to distinguish the wall structures, assess vascularization, and look for possible signs of inflammation or collections. The portal phase was mainly used to optimize the contrast between the wall and the colonic lumen.

The image analysis focused on looking for signs of anastomotic leakage, perianastomotic collections, fistulas, and local inflammatory abnormalities. This analysis involved identifying the fistulas, including their pathway, number, location, and relationship with neighboring organs. We also looked for any intra- or extra-peritoneal fluid accumulation. Finally, we assessed wall thickness, colonic haustrations, and surrounding structures like fat, the abdominal wall, and the pelvis.

Equipment Used:

- CT scanner: A multi-slice scanner (16 slices), providing high spatial and temporal resolution, was used.
- Colonic opacification equipment:
- Flexible rectal cannula with balloon.
- Controlled air or CO₂ insufflation system.
- Diluted water-soluble iodine solution (Gastrografin or equivalent).
- Automatic injector for iodinated intravenous contrast, controlling injection rate and pressure.
- Image reconstruction and post-processing console, allowing multiplanar reconstructions.

3. Radiological Observations

Case 1: A 56-year-old man experiencing abdominal pain after surgery for a perforation of the sigmoid colon. The CT colon scan shows a long, tight, and regular narrowing at the site of the sigmoid anastomosis, associated with two large-caliber anastomotic fistulas, with no detectable intra-abdominal fluid (**Figure 1**).

Case 2: A 52-year-old woman with a history of partial proctectomy for rectal adenocarcinoma and an end-to-side colorectal anastomosis. CT colonography shows a long, regular stricture involving the rectosigmoid junction and extending into the descending colon. Several anastomotic fistulas are noted, with the main one located posteriorly. Wall thickening and loss of haustration in the descending colon are also observed (**Figure 2**).

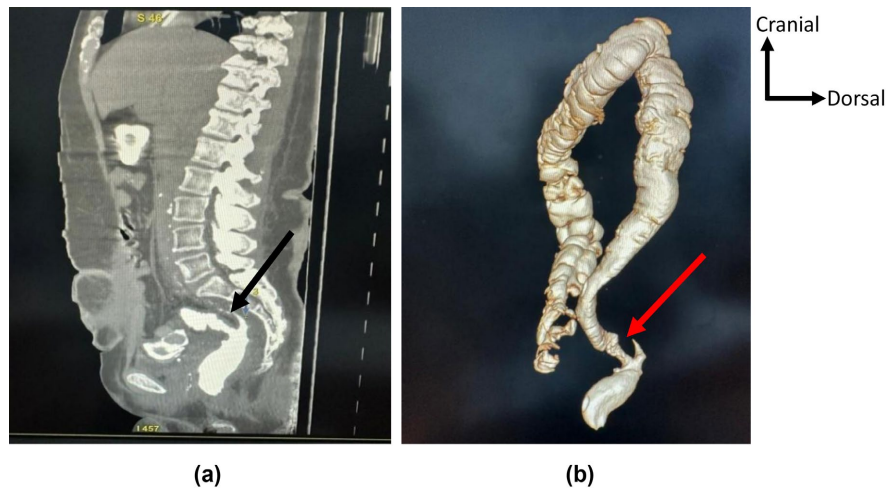


Figure 1. Abdominal CT images in sagittal reconstruction and parenchymal window (a) and 3D (b) after contrast enhancement. Abdominal CT images after contrast in sagittal reconstruction and parenchymal window (a) and 3D (b) showing a post-anastomotic fistula, posterior-superior and anterior-inferior, without communication with neighboring organs (black arrows), and a long, tight, regular stenosis at the colorectal anastomosis site (red arrow).

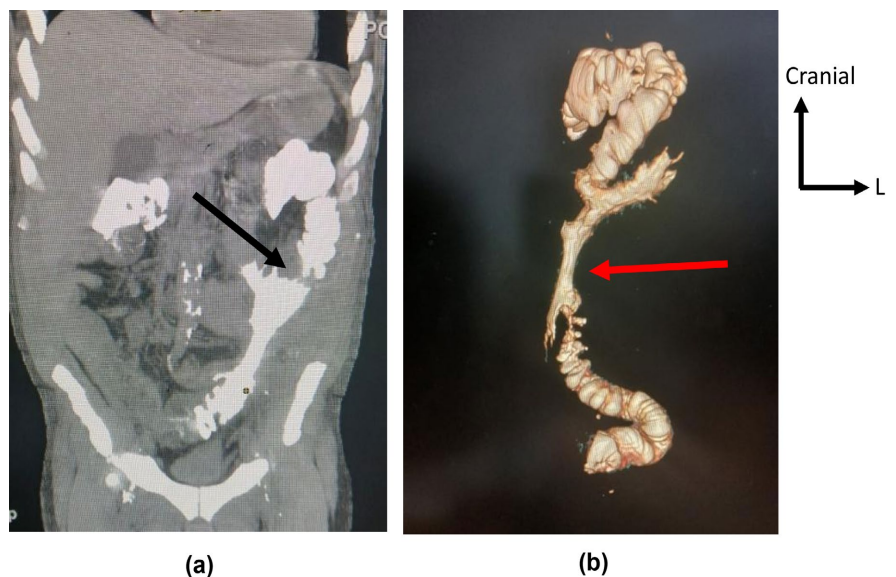


Figure 2. Abdominal CT images after contrast enhancement in coronal reconstruction with parenchymal window (a) and 3D sagittal (b) showing a long, regular, mildly tight stenosis of the colo-sigmoid junction (black arrow) extending to the descending colon and anterior-lower and posterior-upper post-anastomotic fistulas without communication with neighboring organs (red arrows).

Case 3: A 40-year-old man consulting for painful abdominal bloating. History of partial colectomy with end-to-end colorectal anastomosis following a sigmoid volvulus. The CT colon scan shows a moderately tight stricture at the anastomosis area, associated with two posterior fistulas feeding a hydro-aeric peritoneal effusion (**Figure 3**).

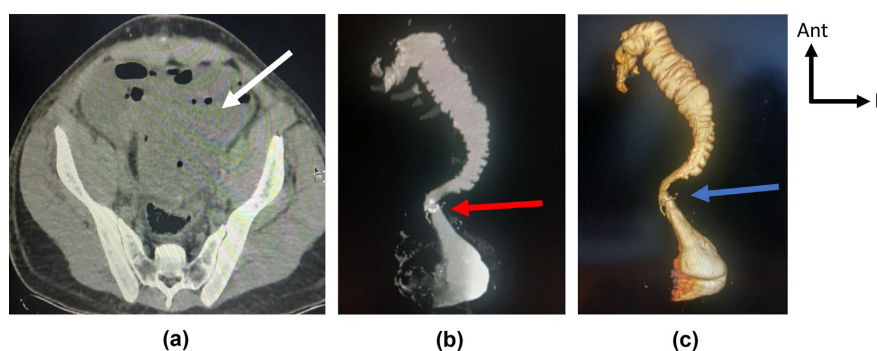


Figure 3. (a) Abdominal CT scan in axial view with parenchymal window in spontaneous contrast showing a large intra-peritoneal air-fluid collection (white arrow). (b) VR reconstruction highlighting an anterior and posterior fistula without communication with neighboring organs (red arrow). (c) 3D reconstruction showing a mildly tight stenosis of the colorectal anastomosis area (blue arrows).

4. Discussion

All three of our study patients had been examined by water-soluble contrast CT colonography. In the literature, authors largely agree that water-soluble contrast CT colonography is the examination of choice for evaluating postoperative colonic anastomotic complications.

The limitations of our study are the single-center nature of the study, the small sample size, and the inexperience of the radiology technicians. Given our small sample, it's doubtful that we can draw solid conclusions. A larger sample could provide more reliable results, covering more patients over a longer period.

The sex ratio in our study was 1.5, with a male predominance. This is similar to what was reported by B. Amina and S. Ikram, with a sex ratio of 1.6 in favor of men [8], and an average age above 45.

In our study, one case of digestive perforation was complicated by diverticular sigmoiditis, one case by high rectal adenocarcinoma, and one case by obstruction due to sigmoid volvulus. In the literature, according to C. Brigand *et al.* [9], high rectal cancer in 43.8% and sigmoid volvulus in 30% were the main indications for colorectal anastomosis.

We recorded 2 cases of end-to-end colorectal anastomosis, one case of end-to-side colorectal anastomosis with the placement of a temporary diversion stoma. In the literature, C. Brigand *et al.* [9] reported in their study a rate of 23% for end-to-side colorectal anastomosis with stoma placement.

The complication rate in our study was 67% (2 patients out of 3) for stenosis, all patients had an anastomotic fistula without communication with neighboring organs, and one case had a hydro-aeric effusion complicated by peritonitis, as illustrated in Figure 2 and Figure 3.

Post-surgical complications are not rare after intestinal resection surgery [10]. The types of complications were mainly dominated by digestive fistulas: 100%, which is much higher than the 37.8% reported by M.A. Majbar *et al.* [10], followed by segmental stenosis: 67%, higher than the 30% anastomotic stenosis reported by

A. Bequis *et al.* [11]. This difference can be explained by the small size of our sample and the surgical conditions in our settings. Regarding oncological outcomes, local recurrence rates in the literature range from 2.6% to 32% [9]. C. Brigand *et al.* reported a recurrence rate of 12.3% in their series. The follow-up duration affects this rate, as a recurrence can be detected up to eight years after the procedure, but 80 to 90% occur in the first two years [9]. None of the patients in our study experienced a recurrence. This could be explained by the short follow-up period, which only took place in the two months after the surgery. Interventional radiology plays an important role in managing complications after colorectal anastomosis, especially in cases of anastomotic fistulas or postoperative collections [2]. Its advantage is that it is less invasive than surgery and it reduces morbidity and mortality after digestive anastomosis [2]. In our study, only one patient benefited from management through interventional radiology. This could be explained by the hemodynamic instability of these patients.

5. Conclusion

CT colonography with water-soluble contrast is the reference exam and should therefore be used systematically for diagnosing postoperative complications of colonic anastomoses. Recognizing complications requires a good understanding of normal appearances and the technique used. The most serious complications are fistulas with anastomotic leaks, abscesses, and strictures.

Ethical Statement

This study was conducted in accordance with ethical standards established by the Declaration of Helsinki. It consists of a descriptive series including three clinical cases observed in the usual setting.

Informed Consent

All patients involved, or their legal representatives when necessary, were informed about the use of their clinical and radiological data for research and scientific publication purposes. Written informed consent was obtained before including the cases in this study. Anonymity and protection of personal information were strictly ensured.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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