

## Short Communication

# Intraoperative Colonoscopy for Stapled Anastomosis in Colorectal Surgery

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### Abstract

Although stapling colorectal anastomosis is widely accepted as an alternative for hand-sewn anastomosis, we continue to experience postoperative complications such as anastomotic hemorrhage and leakage, which sometimes lead to serious morbidity or even mortality. To secure stapling colorectal anastomosis, we adopted intraoperative colonoscopy (IOCS). We performed IOCS in 73 cases of colorectal resection with stapling anastomosis from November 2004 to October 2005. Intraoperative colonoscopy revealed active bleeding from stapling anastomosis in 7 patients (9.6%). Of these, additional sutures were done in 6 patients, while the anastomosis was exteriorized in the other. The air leak test performed by IOCS was positive in 4 patients (5.5%), with additional sutures being done in 2 patients and reanastomoses performed in the other 2. Incomplete cutting of the mucosa was found in one patient, but it was successfully managed. Following the introduction of IOCS, there were no cases of postoperative anastomotic hemorrhage, and only one case of anastomotic leakage (1.4%).

**Key words** Colon · Rectum · Colonoscopy · Stapled anastomosis

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Since circular stapling devices were first introduced in colorectal surgery in the 1970s,<sup>1</sup> stapling colorectal anastomosis has become more and more widely accepted as an alternative for conventional hand-sewn anastomosis.<sup>2</sup> However, we continue to experience complications, such as anastomotic leakage, hemorrhage, or stricture, from stapler anastomosis in spite of the recent advances in stapling devices. Complications from colorectal anas-

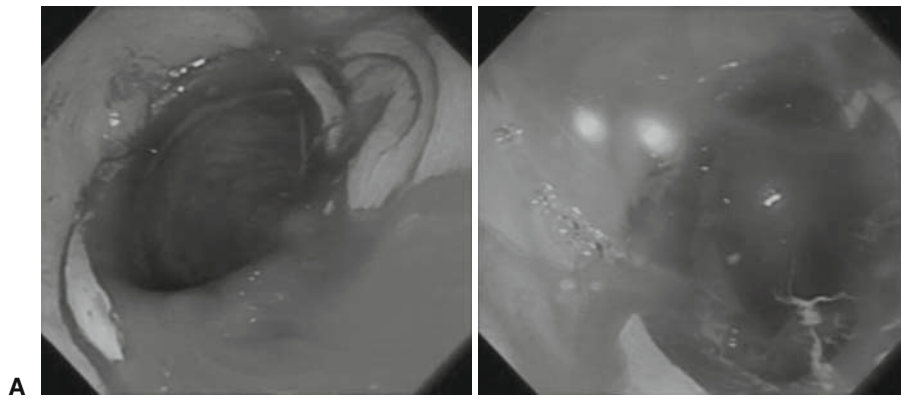
tomosis can result in serious morbidity and sometimes even in death. Therefore, every effort should be made to reduce such complications. In end-to-end anastomosis or the double-stapling-technique (DST) anastomosis, although we can check “the donuts” and perform an air leak test, a direct inspection of the anastomosis to check its perfection or hemostasis is usually impossible. We therefore introduced intraoperative colonoscopy (IOCS) for stapled colorectal anastomosis, and we herein describe our clinical experience of IOCS. From November 2004 to October 2005, IOCS was performed in surgery for 73 consecutive cases undergoing a colorectal resection followed by stapling colo-colonic or colorectal, end-to-end or DST anastomosis. We used Premium Plus CEEA (28 or 31 mm, U.S. Surgical, Norwalk, CT, USA) or ECS (29 or 33 mm, Ethicon Endo-Surgery, Cincinnati, OH, USA) staplers in this study, chosen in accordance with the intestinal caliber to be anastomosed. The colonoscope (Olympus, Tokyo, Japan) was inserted from the anus following the completion of the anastomosis, and we thereby inspected the alignment of the staple line and checked for hemostasis of the anastomosis. Sequentially, an air leak test was done by inflating air into the rectum with the colonoscope.

All IOCSs were performed safely. The indications for these operations were colorectal cancer in 69 patients, and “other” in four patients (two benign disease and two reconstruction after Hartmann’s operation). Intraoperative colonoscopy revealed active and continuous bleeding from the anastomosis (Fig. 1A) intraoperatively in seven patients (9.6%). In some of the cases, flowing blood masked the precise bleeding points and we were therefore unable to identify them. In such cases, filling the intestinal lumen with water made it possible to carry out pinpoint identification of the bleeding site (Fig. 1B). In six patients, the bleeding points were identified and additional sutures were done to achieve complete hemostasis. In one patient the anastomosis

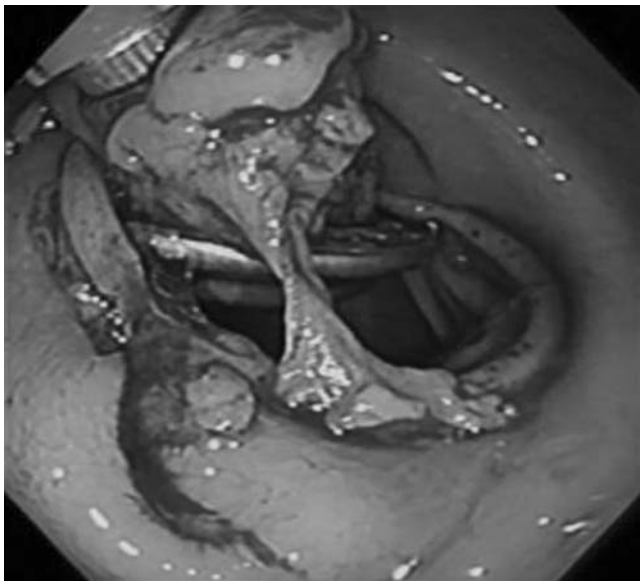
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**Fig. 1.** **A** Active and continuous bleeding from the stapled colorectal anastomosis revealed by intraoperative colonoscopy. **B** Filling the intestinal lumen with water enabled pinpoint identification of the bleeding site by intraoperative colonoscopy



**Fig. 2.** Incomplete cutting of the mucosa at the anastomosis revealed by intraoperative colonoscopy

was exteriorized and a double-barrel colostomy was constructed. No postoperative anastomotic hemorrhage occurred after the introduction of IOCS. The air leak test was positive in four cases (5.5%). Additional sutures were performed in two cases and reanastomoses were performed in the other two. Postoperative anastomotic leakage was noted in one patient (1.4%), however, the intraoperative air leak test was negative. In one case (1.4%), pulling resistance hampered the removal of the stapling device from the rectum after firing. IOCS revealed incomplete cutting of the mucosa at the anastomosis (Fig. 2). Under observation by IOCS, the remaining mucosa was gently torn off without damaging the staple line or causing any bleeding.

Postoperative hemorrhage from stapled colorectal anastomosis is a relatively rare complication that is reported to occur in 0.6%–6.5%.<sup>3–5</sup> Lustosa et al. showed in their review of randomized controlled trials that anastomotic hemorrhage occurs in 5.4% in stapled

versus 3.1% in hand-sewn anastomoses, and concluded that the evidence was insufficient to demonstrate the superiority of the stapling method over handsewing.<sup>6</sup> By IOCS, we found active and continuous bleeding from stapled anastomosis intraoperatively in up to 9.6% of cases, which was more than we had expected. IOCS is unique because we can pinpoint the bleeding point and immediate hemostasis by additional sutures under direct inspection is also possible. Hemorrhage from stapled anastomosis is usually managed conservatively, by non per oral or blood transfusion; however, intervention such as endoscopic hemostasis or even surgery<sup>5</sup> is occasionally necessary. In patients receiving anticoagulation therapy, or those with coexisting systemic morbidity, bleeding from the anastomosis may lead to massive hemorrhaging, thus resulting in shock or other serious conditions. In fact, in cases of intraoperative anastomotic bleeding, anticoagulants were administered in more patients (29%), and more patients (71%) had coexisting systemic morbidity, such as heart, lung, renal, or hepatic failure, than in cases without bleeding (9% and 23%, respectively). Before we introduced IOCS, we had experienced postoperative anastomotic hemorrhage in 1.3% of cases (1 out of 75 consecutive cases). Since the introduction of IOCS, we have experienced no postoperative hemorrhage from stapled anastomosis. In one case, an incomplete cutting of the mucosa at the anastomosis was found by IOCS. Incomplete cutting of the anastomotic ring sometimes occurs due to an imbalance of the “tissue load” to be cut out by the stapler knife. The blind removal of the stapler can result in damaging the anastomosis or in hemorrhaging. In our case, we were able to confirm hemostasis and ensure that the anastomosis was not damaged after the removal of the stapler by IOCS. In conclusion, IOCS can be easily performed and it is useful for securing the anastomosis, especially in high-risk patients, patients under anticoagulation therapy, or those with coexisting systemic morbidities, in order to prevent anastomotic hemorrhage. Furthermore, the air leak test can be performed simultaneously.

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