CASE REPORT

Iatrogenic colorectal perforation induced by anorectal manometry: Report of two cases after restorative proctectomy for distal rectal cancer

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INTRODUCTION

Anorectal manometry is an objective test for evaluating a patient's resistance to spontaneous defecation provided by the sphincter mechanism, as well as the sensory capabilities of the rectum in terms of the sensation of imminent defecation^[1]. Currently, anorectal manometry is widely performed for the tracking of anorectal physiological changes occurring after low anterior resection for rectal cancer, as the test allows for a numerical value evaluation of pre- and post-operative anorectal function, including rectoanal inhibitory reflex, rectal compliance, and anal resting pressure^[2-4]. This procedure is generally thought to be safe, and the incidence of critical complications associated with anorectal manometry has not been reported. We recently encountered two unusual cases of iatrogenic perforation occurring following anorectal manometry in rectal cancer resection patients.

Abstract

There are no reports regarding perforation of the colorectum induced by anorectal manometry. We report two cases of colorectal perforation that occurred during manometry in the patients undergoing restorative proctectomy for distal rectal cancer. In the first patient, computed tomography showed an extraperitoneal perforation in the pelvic cavity and a rupture of the rectal wall. A localized perforation into the retroperitoneum was managed conservatively. In the second patient, a 3 cm linear colon rupture was detected above the anastomotic site. A primary closure of the perforated colon and proximal ileostomy were conducted, but the patient died 2 wk later. We hypothesize that the perforation induced by anorectal manometry may be associated with the relative weakening of the proximal bowel wall due to anastomosis, decreased compliance, and abnormal rectal sensation. We suggest that measurement of the maximum tolerable volume should not be routinely performed after restorative proctectomy for distal rectal cancer.

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Key words: Iatrogenic perforation; Anorectal manometry; Rectal cancer; Low anterior resection

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CASE REPORT

Case 1

A 72-year-old male patient received ultra-low anterior resection with coloanal anastomosis for the treatment of rectal cancer 22 mo ago. The patient's primary tumor was located 4 cm from the anal verge. He complained of frequent defecation in excess of 10 bowel movements a day, as well as urgency and tenesmus. We performed anorectal manometry in order to measure changes in the patient's anorectal function. Anorectal manometry (Model UPS-2020 Stationary GI Motility System, MMS, Netherlands) was conducted using the water-perfusion technique, with an 8-channel micro tip catheter connected to a perfusion pump. We evaluated the rectal sensation via inflation of a latex balloon with an air flow of 1 mL per second. The threshold volumes for the first minimum sensation, defecatory desire, urge, and maximum tolerance were determined. In this study, the maximum resting pressure (48.25 mmHg) determined was significantly lower than that observed in the normal controls (normal value:

Figure 1 Abdomino-pelvic CT at the level of acetabula showing air bubbles mixed with small solid particles surrounding both lateral aspects of the rectum (arrow) (A) and coronal view of extraluminal air in the pelvic cavity (arrow) and rupture of the left lateral wall of the rectum (arrow head) (B).

53-90 mmHg), and the maximum squeezing pressure (117 mmHg) was not reduced in comparison with the normal controls (normal value: 100-200 mmHg). During the test, the patient complained of slight discomfort in the lower abdomen during measurement of the maximum tolerable volume. When the balloon catheter was removed, however, the surface of the balloon observed was slightly blood stained. As the patient had normal vital signs and appeared to be relatively healthy, he was discharged after examination. Seven hours later, the patient revisited the emergency room because of persistent lower abdominal pain, anal pain, and a sensation of “chilling”. Upon physical examination, the patient experienced mild lower abdominal tenderness with palpation but no symptoms of generalized peritonitis. His temperature was 39.2°C initially, and decreased within three hours to 38.5°C. His heart rate was 110 per minute and no hypotension was found. The most noteworthy feature of his laboratory studies was an elevated white blood cell count of 17000/mm³. Upright chest and abdomen films were normal. However, abdominal CT showed a moderate amount of extraperitoneal air in the pelvic cavity and a rupture of the rectal wall (Figure 1A and B). Perforation into the retroperitoneum was localized, and no signs of intraperitoneal perforation were observed. The patient was hospitalized and received no treatment by mouth, total parenteral nutrition, and intravenous broad-spectrum antibiotics. Daily physical examinations were conducted. We verified improvement in radiologic signs on a CT examination conducted seven days later. The patient was discharged on the 14th d of hospitalization.

Case 2

A 78-year-old female patient underwent an ultra-low anterior resection and coloanal anastomosis following preoperative radiotherapy (50.4 Gy during 5 wk) coupled with infusion of 5-FU for low rectal cancer 23 mo ago. The patient had a history of angioplasty due to unstable angina 4 years ago. She presented at the hospital for frequent defecation and urgency to defecate, which persisted after surgery. We performed anorectal manometry to measure the function of her anorectum in the same manner as in Case 1. No abnormalities were detected with the exception of loss of rectoanal inhibitory reflex and a reduction in resting pressure. However, when the rectal balloon was gradually inflated with 130 mL air for measurement of the maximum tolerable volume, a steep

Figure 2 Abdomino-pelvic CT at pelvis level showing a large amount of extraluminal air (arrow heads) mixed with a complicated collection of fluids, probably primary extraluminal feces (arrow).

fall in intra-balloon pressure (from 130 mmHg to 65 mmHg) was detected, and the examiner could actually feel her resistance against the decrease in air injection. During the test, she complained of an abrupt discomfort in the abdomen and abdominal distension. An urgent CT scan of the abdomen and pelvis was conducted, which evidenced a large quantity of free intraperitoneal gas and fluid within the abdomen consistent with the perforation of a gas-containing viscous body (Figure 2). Emergency laparotomy was immediately conducted, and a 3 cm linear colon rupture was detected above the coloanal anastomosis suture area. Accordingly, primary closure of the perforation site and a diverting ileostomy were performed. The patient's underlying heart condition deteriorated rapidly after surgery, and she died two weeks later, despite aggressive resuscitation.

DISCUSSION

We experienced two iatrogenic colorectal perforations (0.13%) in 1501 anorectal manometry tests in the past three years. Both patients had a history of rectal cancer resection. Anorectal manometry has been widely adopted as a means for evaluating physiological changes in the anus and rectum of patients undergoing low anterior resection. To our knowledge, no iatrogenic perforation has been reported as a complication arising from anorectal manometry conducted following low anterior resection^[3,5-7].

We consider that this colorectal perforation is

associated with certain characteristics of the neorectum following low anterior resection and anastomosis, including relative weakening of the proximal bowel wall due to anastomosis, decreased compliance, and abnormal rectal sensation. The pressure of balloon inflation can exert undue stress on the weakened proximal bowel wall to fibrotic anastomosis, causing rupture on the neorectum. The vulnerable part, which evidences low compliance, can be readily ruptured by the application of physical force via artificial balloon inflation. As the rectal balloon is inflated, patients are instructed to inform the examiner of the rectal sensation according to changes in the air injection level. However, patients with dull rectal sensation are not able to appropriately express it. In the case of the aged, who undergo rectal surgery or to whom radiotherapy is administered, there is some risk that the balloon may be inflated over the actual maximum threshold volume.

In treatment of iatrogenic colonic perforation, nonoperative management of colonic perforation is advocated for patients who are clinically stable with no evidence of peritonitis^[8-10]. For selected patients with incidental intramural or small retroperitoneal perforations but no evidence of barium spillage, favorable results have also been reported as the result of conservative treatment consisting of bowel rest combined with total parenteral nutrition, intravenous fluid treatment, and broad-spectrum antibiotics^[11,12]. On the basis of our experience with the two cases, this indication for conservative management after iatrogenic perforation may also be applied to perforation occurring during anorectal manometry. However, we believe that there may be a higher risk for perforation during anorectal manometry than for other types of perforation because (1) anorectal manometry is conducted without reasonable bowel preparation and (2) diagnostic delays are likely to occur as physicians tend not to recognize the possibility of perforation. Therefore, a more cautious approach should be taken when selecting patients who can receive conservative treatment for perforation occurring during anorectal manometry.

In order to avoid iatrogenic perforations during anorectal manometry, it is important to assess the high risk factors associated with perforation prior to anorectal manometry. History taking should focus on age, previous rectal surgery, bowel inflammation, and bowel obstruction. Meticulous digital rectal examination preceding anorectal manometry, for the detection of unsuspected anorectal abnormal lesions, is necessary for patients with a history of rectal surgery. This facilitates catheter insertion and provides information on anorectal conditions. We believe that the process of measuring the maximum tolerable volume may be omitted in patients following low anterior

resection and anastomosis for distal rectal cancer. The maximum tolerable volume may be highly distorted in patients undergoing rectal resection in comparison with patients with normal rectum, as sensations of rectal distension differ in accordance with the patterns and rates of balloon inflation, which are dependent on examiners and laboratories^[13]. We suggest that measurement of the maximum tolerable volume should not be routinely performed in patients undergoing restorative proctectomy for distal rectal cancer.

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