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

Jun-Seok Park, Sung-Bum Kang, Duck-Woo Kim, Na-Young Kim, Kyoung-Ho Lee, Young-Hoon Kim

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.

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:

© 2007 WJG. All rights reserved.

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

Park JS, Kang SB, Kim DW, Kim NY, Lee KH, Kim YH. Iatrogenic colorectal perforation induced by anorectal manometry: Report of two cases after restorative proctectomy for distal rectal cancer. World J Gastroenterol 2007; 13(45): 6112-6114

http://www.wjgnet.com/1007-9327/13/6112.asp
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 17 000/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 rectoanl 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 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[35-7].

We consider that this colorectal perforation is
associated with certain characteristics of the neo-
rectum 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
erect 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.\textsuperscript{[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\textsuperscript{[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 is 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\textsuperscript{[13]}. We suggest that measurement of
the maximum tolerable volume should not be routinely
performed in patients undergoing restorative proctectomy
for distal rectal cancer.

REFERENCES

1. Efthimiadis C, Basdanis G, Zatagias A, Tzeveleki I, Kosmidis
   C, Karamanlis E, Harlaftis N. Manometric and clinical
evaluation of patients after low anterior resection for rectal
cancer. Tech Coloproctol 2004; 8 Suppl 1: s205-s207
2. Williamson ME, Lewis WG, Finan PJ, Miller AS, Holdsworth
   PJ, Johnston D. Recovery of physiologic and clinical function
   after low anterior resection of the rectum for carcinoma: myth
   or reality? Dis Colon Rectum 1995; 38: 411-418
3. Nakahara S, Itoh H, Mibu R, Ikeda S, Oohata Y, Kitano
   K, Nakamura Y. Clinical and manometric evaluation of
   anorectal function following low anterior resection with
   low anastomotic line using an EEA stapler for rectal cancer.
   Dis Colon Rectum 1988; 31: 762-766
4. Paty PB, Enker WE, Cohen AM, Minsky BD, Friedlander-Klar
   H. Long-term functional results of coloanal anastomosis for
   rectal cancer. Am J Surg 1994; 167: 90-94; discussion 94-95
5. Batignani G, Monaci I, Ficari F, Tonelli F. What affects
   continence after anterior resection of the rectum? Dis Colon
   Rectum 1991; 34: 329-335
6. O’Riordain MG, Molloy RG, Gillen P, Horgan A, Kirwan WO.
   Rectoanal inhibitory reflex following low stapled anterior
   resection of the rectum. Dis Colon Rectum 1992; 35: 874-878
7. Jehle EC, Haehnel T, Startlinger MJ, Becker HD. Level of the
   anastomosis does not influence functional outcome after
   anterior rectal resection for rectal cancer. Am J Surg 1995; 169:
   147-152; discussion 152-153
8. Gedebou TM, Wong RA, Rappaport WD, Jaffe P, Kahsai
   D, Hunter GC. Clinical presentation and management of
   iatrogenic colon perforations. Am J Surg 1996; 172: 454-457;
discussion 457-458
9. Kavin H, Sincrope F, Esker AH. Management of perforation
   of the colon at colonoscopy. Am J Gastroenterol 1992; 87:
   161-167
10. Fry RD, Shemes EL, Kodner JJ, Flesham JW, Timmcke AE.
    Perforation of the rectum and sigmoid colon during barium-
    enema examination. Management and prevention. Dis Colon
    Rectum 1989; 32: 759-764
11. deFeiter PW, Soeters PB, Dejong CH. Rectal perforations after
    barium enema: a review. Dis Colon Rectum 2006; 49: 261-271
12. Weiss Y, Grünberger P, Aronowitz S. Asymptomatic rectal
    perforation with retroperitoneal emphysema. Dis Colon Rectum
    1981; 24: 545-547
13. Sun WM, Read NW, Prior A, Daly JA, Cheah SK, Grundy D.
    Sensory and motor responses to rectal distention vary accord
    ing to rate and pattern of balloon inflation. Gastroenterology 1990;
    99: 1008-1015

S-Editor Liu Y  I-Editor Wang XL  E-Editor Liu Y