Showa Univ J Med Sci **23**(3), 191～195, September 2011

Case Report

Anastomotic Recurrence due to Tumor Implantation using the Double Stapling Technique after Curative Surgery for Sigmoid Colon Cancer

Takahiro UMEMOTO, Kazuaki YOKOMIZO, Mitsuo SAITO, Kazuyoshi ISHIBASHI, Gaku KIGAWA, Hiroshi NEMOTO and Kenji HIBI

Abstract : Recurrence at the site of a stapled anastomosis is generally believed to result from the luminal implantation of viable cancer cells during stapling. We report a 57-year-old woman who underwent radical surgery for sigmoid colon cancer and developed anastomotic recurrence ten months after the initial operation. Her serum carcinoembryonic antigen (CEA) levels were within normal limits during the postoperative follow-up. The patient subsequently underwent a partial colon resection for the anastomotic recurrence. The clinicopathological findings revealed that possible tumor cell implantation caused the recurrence. We encountered a case of anastomotic recurrence due to possible tumor implantation after curative surgery for sigmoid colon cancer. Follow-up colonoscopy was more helpful for the diagnosis of anastomotic recurrence than CEA monitoring.

Key words : anastomotic recurrence, tumor implantation, sigmoid colon cancer

Introduction

Anastomotic recurrence is often encountered following colonic or colorectal anastomoses. Tumor cell implantation has been reported as a possible mechanism of anastomotic recurrence, with an incidence rate of 5–10%[1-3]. Out of 489 patients who underwent surgery at our institution for colon or rectal cancer from April 2006 to January 2011, 8 patients had an anastomotic recurrence. We herein report such a case of anastomotic recurrence after radical surgery for sigmoid colon cancer.

Case Report

A 57-year-old woman presented at our hospital with constipation in February 2010. The laboratory data were within normal limits (CEA : 2.3 ng / ml, CA19-9 : 38 U / ml). Barium enema and colonoscopy showed an elevated lesion with depression in the sigmoid colon.

Department of Gastroenterological Surgery, School of Medicine, Showa University Fujigaoka Hospital, 1–30 Fujigaoka, Aoba-ku, Yokohama, 227–8501, Japan.

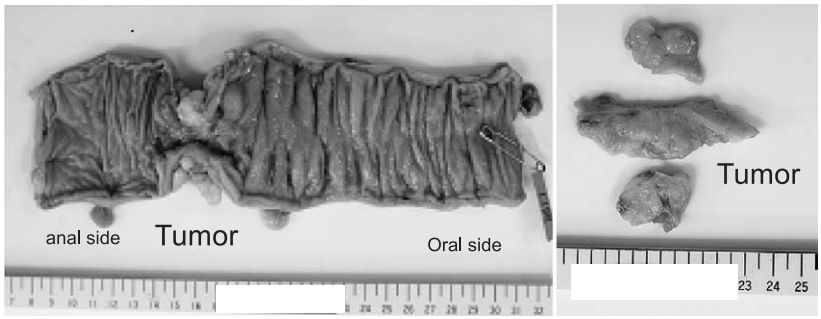

Fig. 1. Macroscopic view and histological diagnosis of resected specimen
Tumor, 55 × 25 mm in size, was located in the sigmoid colon. Histological examination revealed the tumor to be a well-differentiated adenocarcinoma invading the subserosa with no lymph node metastases (tub1, pSE, sci, INFb, ly1, v1, N0, M0). Tumor cells were not identified at the surgical margins.

Pathological findings on biopsy confirmed a diagnosis of adenocarcinoma. We performed a high anterior resection with lymphadenectomy. Macroscopic examination showed a tumor of 55 × 25 mm in size in the sigmoid colon. Histological examination revealed the tumor to be a well-differentiated adenocarcinoma invading the subserosa with no lymph node metastases (tub1, pSE, sci, INFb, ly1, v1, N0, M0) (Fig. 1). Tumor cells were not identified at the surgical margins. The patient was followed up as an outpatient. At postoperative month 3 and 6, computed tomography (CT) showed no distant organ metastasis or local recurrence in the pelvis.

The patient subsequently visited our hospital complaining of constipation and abdominal pain. Anastomotic recurrence was suspected at the suture line following colonoscopy and a gastrografin enema in December 2010 (Fig. 2). Pathological examination of a biopsy showed malignant cells in the specimen, and CT revealed a stenosis and tumor at the anastomotic region (Fig. 3). However, both the serum CEA level (2.4 ng / ml) and the CA19-9 level (39 U / ml) were within normal limits at this time (Table 1). We performed a partial colon resection for this recurrence of disease in January 2011. The lesion of recurrence was located in the suture line macroscopically, and a few peritoneal disseminations were detected in the small intestinal and colic mesenterium. The lesion was identified histologically as a well-differentiated adenocarcinoma invading the subserosa (Fig. 4), with three metastases in regional lymph nodes. The patient was thereafter followed up in the outpatient department with adjuvant chemotherapy.

Discussion

Local recurrence after potentially curative colorectal cancer surgery reportedly occurs in 2.6% to 32% of patients[4]. For example, a study of 418 patients (247 males) with a median age of 63 years (range 24 to 88 years) who underwent laparoscopic resection of the colon and rectum reported anastomotic recurrence in 2.9% of patients and systemic

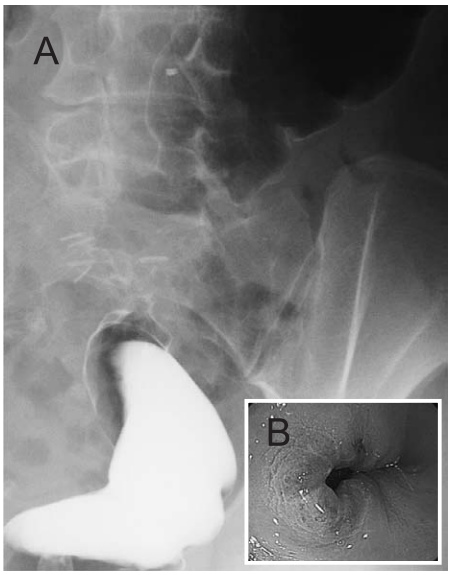

Fig. 2. Enema and colonoscopy findings
A gastrografin enema showed a stenosis at the suture line (A). The anastomotic recurrence was suspected following colonoscopy (B).

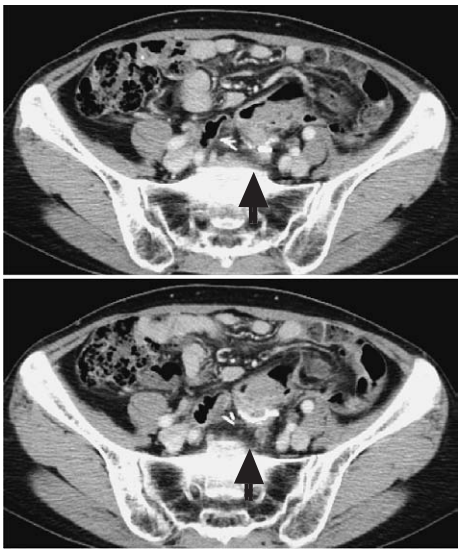

Fig. 3. Computed tomography
CT showed a stenosis and tumor at the anastomotic region.

Table. 1 Transition of serum CEA and CA19-9 level

	Initial surgery	Postoperative three months	Postoperative five months	Postoperative seven months	Postoperative ten months
Serum CEA (ng / ml)	4.4	1.4	2.3	4.3	5.0
Serum CA19-9 (U / ml)	29	29.8	23.1	29.7	25.7

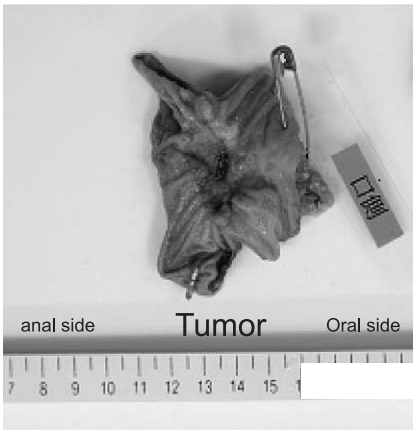

Fig. 4. Surgical specimen
Pathological examination of the surgical specimen revealed the presence of anastomotic recurrence of sigmoid colon cancer

recurrence in 10%[5]. However, out of 489 patients who underwent surgery for colon or rectal cancer at our institution from April 2006 to January 2011, only 8 patients experienced anastomotic recurrence (1.6%). Anastomotic recurrence after curative surgery of colorectal cancer may be due to several causes including implantation of exfoliated cancer cells during anastomosis[6–8], instability of the mucosa at the site of anastomosis or positive distal margins of resection[9, 10], incomplete resection[11, 12], and migration of cancer cells into the lymphatics[13]. Furthermore, Law and Chu[14] reported that lymphovascular invasion is a major factor in local recurrence.

Sigmoid colon cancer is generally associated with mild lymphangial and vascular invasion (ly1, v1) with no lymph node metastases. In the present case, histological examination revealed the recurrence tumor to be a well-differentiated adenocarcinoma invading the subserosa with three lymph node metastases (pSS, N1, M0), but showed the surgical margins to be free from cancer cells. Therefore, the implantation of exfoliated cancer cells was considered the most likely cause of local recurrence in our case, although the definitive cause is difficult to confirm.

Several researchers have reported tumor cell implantation as the mechanism of anastomotic recurrence[15, 16]. Multiple clusters of malignant cells have been observed on circular stapling devices after the completion of an anastomosis during an anterior resection for rectal cancer. In 9 of 10 cases of low anterior resection, malignant cells were identified in centrifuged saline that had been used to wash rings of tissue resected using an EEA stapler, even though histological examination had shown the tissues to be tumor free[7]. Wind *et al*[17] suggested that recurrence might develop at scars in the anal mucosa when a staple gun has been introduced for anastomosis, with cancer cells penetrating and migrating through the needle holes and then entering the bruised mucosa. Irrigation of the lumen with 5% povidone-iodine (PVP-I) could thus be useful in preventing anastomotic recurrence[18–21]. To prevent tumor cell implantation, we routinely wash the large bowel with more than 2,000 ml of a 5% PVP-I solution or physiological saline before EEA anastomosis stapling.

Recurrent colorectal carcinoma does not have a favorable prognosis, and can only be detected either by clinical presentation (obstruction, pain, bleeding, etc.), routine imaging studies such as endoscopy and CT scan, or by an elevated carcinoembryonic antigen (CEA) blood level. However, it is difficult to detect an early anastomotic recurrence and an early peritoneal dissemination. Although serum CEA levels are considered to be a good predictor of recurrent disease, Moertel *et al*[20] reported that CEA testing is most sensitive for hepatic or retroperitoneal metastasis and relatively insensitive for local, pulmonary, or peritoneal involvement. Minton *et al*[21] also demonstrated that the highest resectability rate for recurrent colorectal cancer occurred in patients with a CEA level below 11 ng / ml. In the present case, colonoscopy was more useful for identifying a patient with occult anastomotic recurrence than CEA monitoring ; follow-up was done in the outpatient department together with adjuvant chemotherapy.

References

1) Pihl E, Hughes ES, McDermott FT and Price AB : Recurrence of carcinoma of the colon and rectum at the anastomotic suture line. *Surg Gynecol Obstet* **153** : 495-496 (1981)
2) Stulc JP, Petrelli NJ, Herrera L and Mittelman A : Anastomotic recurrence of adenocarcinoma of the colon. *Arch Surg* **121** : 1077-1080 (1986)
3) Umpleby HC and Williamson RC : Anastomotic recurrence in large bowel cancer. *Br J Surg* **74** : 873-878 (1987)
4) Abulafi AM and Williams NS : Local recurrence of colorectal cancer : the problem, mechanisms, management and adjuvant therapy. *Br J Surg* **81** : 7-19 (1994)
5) Wong MT, Ng KH, Lim JF, Ooi BS, Tang CL and Eu KW : 418 cases of laparoscopic colorectal resections : a single-institution experience and literature review. *Singapore Med J* **51** : 650-654 (2010)
6) Umpleby HC, Fermon B, Symes MD and Williamson RCN : Viability of exfoliated colorectal carcinoma cells. *Br J Surg* **71** : 659-663 (1984)
7) Gertsch P, Baer HU, Kraft R, Maddern GJ and Altermatt HJ : Malignant cells are collected on circular staplers. *Dis Colon Rectum* **35** : 238-241 (1992)
8) Tsunoda A, Shibusawa M, Tsunoda Y, Kamiyama G, Yamazaki K and Kusano M : Effect of povidone-iodine on anastomotic tumor growth in an experimental model of colorectal cancer surgery. *Anticancer Res* **19** : 1149-1152 (1999)
9) Roe R, Fermor B and Williamson RC : Proliferative instability and experimental carcinogenesis at colonic anastomoses. *Gut* **28** : 808-815 (1987)
10) McCue JL, Sheffield JP, Uff C and Phillips RK : Experimental carcinogenesis at sutured and sutureless colonic anastomoses. *Dis Colon Rectum* **35** : 902-909 (1992)
11) Quirk P, Durdey P, Dixon MF and Williams NS : Local recurrence of rectal adenocarcinoma due to inadequate surgical resection. *Lancet* **2** : 996-999 (1986)
12) Scott N, Jackson P, Al-Jaberi T, Dixon MF, Quirke P and Finan PJ : Total mesorectal excision and local recurrence : a study of tumour spread in the mesorectum distal to rectal cancer. *Br J Surg* **82** : 1031-1033 (1995)
13) Gricouroff G : Pathogenesis of recurrences on the suture line following surgical resection for carcinoma of the colon. *Cancer* **20** : 673-676 (1967)
14) Law WL and Chu KW : Local recurrence following total mesorectal excision with double-stapling anastomosis for rectal cancers : analysis of risk factors. *World J Surg* **26** : 1272-1276 (2002)
15) Hubens G, Lafullarde T, Van Marck E, Vermeulen P and Hubens A : Implantation of colon cancer cells on intact and damaged colon mucosa and serosa : an experimental study in the rat. *Acta Chir Belg* **94** : 258-262 (1994)
16) McGregor JR, Galloway DJ, McCulloch P and George WD : Anastomotic suture materials and implantation metastasis : an experimental study. *Br J Surg* **76** : 331-334 (1989)
17) Wind P, Douard R, Poupardin E and Cugnec PH : Anal implantation of exfoliated tumour cells from a rectal adenocarcinoma after colorectal stapled anastomosis. *Eur J Surg* **165** : 905-906 (1999)
18) Sayfan J, Averbuch F, Koltun L and Benyamin N : Effect of rectal stump washout on the presence of free malignant cells in the rectum during anterior resection for rectal cancer. *Dis Colon Rectum* **43** : 1710-1712 (2000)
19) Agaba EA : Does rectal washout during anterior resection prevent local tumor recurrence? *Dis Colon Rectum* **47** : 291-296 (2004)
20) Moertel CG, Fleming TR, Macdonald JS, Haller DG, Laurie JA and Tangen C : An evaluation of the carcinoembryonic antigen (CEA) test for monitoring patients with resected colon cancer. *JAMA* **270** : 943-947 (1993)
21) Minton JP, Hoehn IL, Gerber DM, Horsley JS, Connolly DP, Salwan F, Fletcher WS, Cruz AB Jr, Gatchell FG and Oviedo M : Results of a 400-patient carcinoembryonic antigen second-look colorectal cancer study. *Cancer* **55** : 1284-1290 (1985)

[Received February 14, 2011 : Accepted March 10, 2011]