Case Report

En Bloc Resection for Locally Advanced Right-sided Colon Cancer with a Duodenocolic Fistula: Report of Two Cases

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A 52-year-old man, who had right-sided colon cancer that had invaded the duodenum, pancreas, and liver, had a curative resection that included a right hemicolectomy, a pancretoduodenectomy (PD), and a right hemihepatectomy. The pathological findings confirmed a well differentiated adenocarcinoma, which directly invaded the pancreas, liver, and duodenum. Eighty-five months after the operation, the patient is still alive and disease-free. A 73-year-old man, who had right-sided colon cancer that had invaded the duodenum, gall bladder, and liver, underwent a curative resection that included a right hemicolectomy, PD, and a partial hepatectomy. The pathological findings confirmed a moderately differentiated adenocarcinoma, which directly invaded the gall bladder, bile duct, liver, and duodenum. Six months after the operation, the patient is still alive and disease-free. Invasion of the duodenum, pancreas, and liver by a right-sided colon carcinoma does not mean that the patient has incurable disease. In fact, this condition can be resected with en bloc PD, colectomy, and hepatectomy, which offers the patient a chance for survival.

Key Words: pancretoduodenectomy, en bloc resection, colon cancer

Introduction
Colorectal cancer invading adjacent organs is not an infrequent event and occurs in 5.5%–16.7% of all colorectal malignancies; true direct tumor infiltration may occur in 45% to 70% of the cases. Intraoperatively, the surgeon is confronted with a dilemma regarding the neoplastic or inflammatory nature of adhesions. Combined resections for locally advanced right-sided colon cancer that include pancretoduodenectomy (PD) are not new, but the role of combined surgery is not well established. We report two patients, both of whom had a duodenocolic fistula, who were successfully treated with en bloc right hemicolectomy, PD, and hepatectomy for locally advanced right-sided colon cancer.

Case Reports

Case 1
In April, 1999, an otherwise healthy 52-year-old man was admitted to the hospital with severe watery diarrhea. On physical examination, he was mildly pale, and there was a palpable abdominal mass in the right upper quadrant with a diameter of 10 cm. Laboratory data confirmed that he was anemic (red blood cells (RBCs), $339 \times 10^4/mm^3$; hemoglobin (Hb), 10 g/dl; hematocrit (Ht), 29.5%) and had a low serum albumin (3.1 g/dl). The serum car-
Carcinoembryonic antigen (CEA) level was normal (1.9 ng/ml; normal <5 ng/ml). On colonoscopy, a tumor in the hepatic flexure with a large ulcer was found. On pathological finding of the biopsy specimen, a well differentiated adenocarcinoma was diagnosed. Upper gastrointestinal endoscopy demonstrated a duodenal ulcer in the second part, that had created a communication with the colon. On hypotonic duodenography, a duodenocolic fistula was evident (Fig. 1A). Abdominal computed tomography (CT) showed a large mass involving the duodenum, liver, and right-sided colon without evidence of distant metastasis (Fig. 1B). At laparotomy, the liver appeared normal; there was no ascites or peritoneal tumor seeding. The primary colonic tumor was located at the hepatic flexure with firm adhesions to the head of the pancreas, duodenum, and liver. A right hemicolectomy associated with PD and a right hemihepatectomy were performed, with en bloc resection and adequate free margins. The patient had a standard PD because the tumor had dense adhesions to the first and second parts of the duodenum. The intra-operative estimated blood loss was 1200 ml, and the operation took 565 min. Pathological finding confirmed a well differentiated adenocarcinoma, measuring 7 cm in its greatest diameter, that infiltrated the pancreas, liver, and duodenal wall (Fig. 2A); there was a giant duodenocolic fistula (Fig. 2B). The resection margins were free of tumor. There was no neoplastic lymph node metastasis. The final staging classification was T4N0M0 consistent with stage II B disease (UICC TNM classification).

The patient recovered uneventfully and was discharged from the hospital on the 32nd postoperative day and could tolerate oral feeding very well. The patient received adjuvant oral chemotherapy (tegafur/uracil) and is currently alive with no signs of disease recurrence after 85 months of follow-up.

Case 2

In October 2005, a 73-year-old man was admitted to another hospital with abdominal pain and vomiting. On colonoscopy, he had a tumor in the hepatic flexure with a large ulcer. Upper gastrointestinal endoscopy showed a duodenal ulcer in the second part of the duodenum that communicated with the colon. The patient was diagnosed as having an intestinal obstruction due to right-sided colon cancer that
had formed a duodenocolic fistula. At the previous hospital, a long tube was inserted through the duodenocolic fistula to deal with the intestinal obstruction. Laboratory test results showed an iron deficiency anemia (RBC, $458 \times 10^4$/mm$^3$; Hb, 10.9 g/dl; Hct, 35.2%; iron, 17 $\mu$g/dl; unsaturated iron-binding capacity 476 $\mu$g/dl; and total iron-binding capacity, 493 $\mu$g/dl), and elevated serum levels of CEA (11.8 ng/ml) and carbohydrate antigen (CA) 19-9 (110.2 U/ml; normal <37 U/ml). Upper gastrointestinal fluorography revealed a duodenocolic fistula. A A long tube was inserted to the duodenocolic fistula (arrow). B Abdominal computed tomography showed a large mass involving the duodenum, liver, and right-sided colon. A long tube was demonstrated in the colon through the duodenocolic fistula (arrow).
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A long tube was inserted through the duodenocolic fistula (Fig. 3A). An abdominal CT showed a large mass involving the duodenum, right-sided colon without evidence of distant metastasis. A long tube was demonstrated in the colon through the duodenocolic fistula (Fig. 3B). At laparotomy, the liver appeared normal; there was no ascites or peritoneal tumor seeding. The primary colonic tumor was located at the hepatic flexure with firm adhesions to the duodenum, gall bladder and liver. A right hemicolectomy combined with PD and a partial hepatectomy were performed, with en bloc resection and adequate free margins. The patient had a standard PD due to dense adhesions, as had the previous case. The intra-operative estimated blood loss was 2412 ml, and the operation took 612 min. Pathological finding confirmed a moderately differentiated adenocarcinoma, measuring 7 cm in its greatest diameter, infiltrating the liver, gall bladder, bile duct, and the duodenal wall. A definite duodenocolic fistula was demonstrated (Fig. 4A, B). The resection margins were free of tumor, and there was no neoplastic lymph node metastasis. The final staging classification was T4N0M0, consistent with stage II B disease (UICC TNM classification)5). The patient developed a postoperative complication and was referred for the treatment of anastomotic leakage of the posterior bile duct to the jejunum; the patient gradually recovered with conservative treatment. The patient received adjuvant oral chemotherapy (tegafur/uracil and leucovorin). The patient was discharged from hospital on the 90th postoperative day and could tolerate oral feeding very well. The patient is currently alive and has no signs of disease recurrence after 6 months of follow-up.

Discussion

Although right-sided colon cancer does not
frequently involve the duodenum and pancreas, this condition presents a challenge for the surgeon because an extended radical resection may be needed. A locally advanced right-sided colon cancer that invades adjacent structures causes dilemma for the surgeon, because he must decide during operation quickly and properly whether or not to perform a combined PD. In right-sided colon cancer, 40% of adhesions to the head of the pancreas and duodenum have been shown to be inflammatory on pathological examination. Biopsies and frozen-sections should not be routinely done because they are associated with a high rate of false-negative results and the risk of tumor exfoliation and dissemination, which results in recurrence rates of 90% to 100% of right-sided colon cancer. Five-year survival seems different between patients who underwent tumor dissection away from the adherent organs (0%-23%) and who underwent en bloc resections (40%-61%). Therefore, en bloc resection of the tumor with the adherent organs is indicated. Thus, once adhesion of the colon cancer to another structure is observed, the preferred strategy is to perform extended en bloc resection followed by thorough pathological examination. Combined resections for locally advanced right-sided colon cancer including PD are not new, but the role of combined surgery has not yet been well established. In 1956, Van Prohaska et al. were the first to describe a PD in a patient with colon cancer. Since then, different series have reported extended operations for right-sided colon cancer that include en bloc PD with a right colectomy. In the 4 studies that have specifically analyzed the role of combined PD and colectomy for right-sided colon cancer with adhesions to adjacent organs, only 17 patients had an en bloc PD. Data on morbidity and mortality rates for extended colorectal resections associated with PD are scant. Curley et al. reported that there were no operative deaths and no complications related to the multiple gastrointestinal anastomoses. A superficial wound infection and delayed gastric emptying complicated the postoperative course in 2 (28%) of 7 patients. In the 2 present cases, there was minor morbidity and no operative deaths. Mortality rates seem to be higher in patients with combined resections (12%) when compared to patients treated by colorectal resections alone (6%). On the other hand, survival rates of patients treated by extended or combined resections have shown significant improvements. Overall, the mean survival rates for locally advanced colorectal cancer after bypass procedures, non-extended resections, and radical extended resections are 9, 11, and 40 months, respectively. The survival benefit observed in patients treated with extended radical resections for locally advanced colorectal tumors may be correlated to other pathological features, such as lymph node metastasis, tumor differentiation, and the local inflammatory response. Since nodal status is a major survival determinant in colorectal cancer, the T4N0 lesions noted in both of the cases presented may have influenced the benefit of extended radical resection and may reflect a specific biological behavior of locally advanced tumors. In several articles, N0 tumors represented from 45% to 75% of all locally advanced colorectal cases were treated with extended resections. Similar results have been observed in patients who had combined PD for locally advanced right-sided colon cancer. There is no doubt that the complete resection of the tumor can benefit a patient by improving survival time. Twenty patients with disease-free long-term survival times between 24 and 72 months after combined PD have been reported. Curley et al. reported 4 of 7 patients who had en bloc PD living free of
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recurrence at a median follow-up of 42 months. Another study reported 3 of 4 patients who had a combined PD alive between 24 and 30 months later without evidence of disease. Two patients of ours had their tumors resected with clear margins, and they are alive, free of disease; in fact, they are survivors (6 and 85 months).

In conclusion, in patients with a locally advanced right-sided colon cancer and no evidence of metastatic disease, en bloc resection is justified when the operation can be performed with low morbidity and mortality. Such an approach provides the patient with a chance for significant survival.

References