Adenocarcinoma with Extensive Neuroendocrine Differentiation Arising in an Ileal Diverticulum: Report of a Case

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Abstract
A 62-year-old man presented with right-sided abdominal pain. Radiologic examinations disclosed a solid tumor in the ileocecal mesentery that obstructed the right ureter, thus resulting in urinary extravasation. An en bloc tumor resection with the ascending colon, the terminal ileum, and a portion of the right ureter was performed. Histopathologically, the tumor was adenocarcinoma with extensive neuroendocrine differentiation which had arisen in an ileal diverticulum. The patient developed metastases to the lymph nodes, liver, and brain, and died 18 months after surgery.

Key words Adenocarcinoma · Neuroendocrine carcinoma · Small intestinal diverticulum · Extrarenal urinary extravasation

Introduction
Diverticula of the small intestine occur in a small but significant portion of the general population. Most of these small intestinal diverticula are asymptomatic, although a wide range of complications including bleeding, obstruction, perforation, and malabsorption have been reported. The development of a neoplasm is an extremely rare complication which is difficult to diagnose. We herein describe a case of adenocarcinoma which showed extensive neuroendocrine differentiation and arose in an ileal diverticulum. The patient initially presented with extrarenal urinary extravasation.

Case Report
A 62-year-old man presented with right-sided abdominal pain in February 1999. Excretory urography detected an extravasation of contrast medium from the right kidney, which also showed distension of the renal pelvis and the upper ureter down to the level of the L5 vertebra. Computed tomography (CT) and magnetic resonance imaging (MRI) showed a 4-cm mass in the right retroperitoneal space medial to the cecum, obstructing the ureter (Figs. 1 and 2). Angiography demonstrated feeding arteries to the tumor originating from the ileocolic artery. Retrograde ureterography located the level of right ureteral stenosis at L5-S1 and showed the obstructing mass to be extraureteral. Exfoliative cytologic examination of urine showed no malignant cells. Laboratory studies revealed an elevated serum concentration of carcinoembryonic antigen (CEA) of 27.5 ng/ml and normal concentrations of neuron-specific enolase (NSE), α-fetoprotein (AFP), carbohydrate antigens (CA)19-9, CA125, and squamous cell carcinoma antigen (SCC). Gastrointestinal examinations including colonic fiberscopy, gastric fiberscopy, and barium examinations were unremarkable. Laparotomy was performed with a preoperative diagnosis of mesenteric tumor. A mass measuring 5 cm in diameter was present at the mesenteric aspect of the terminal ileum. The tumor appeared to infiltrate the right ureter. Branches of the ileocolic artery and vein were encased by the tumor. A para-aortic lymphadenopathy was evident. An en bloc resection of the tumor was performed including the terminal ileum, cecum, ascending colon, and a portion of the right ureter. A para-aortic lymph node dissection was also performed.

Sections of the resected specimen revealed a solid tumor with a medullary consistency, measuring 4 × 4 × 6 cm and protruding into the ileocecal mesenterium from the terminal ileum. On examining the cut surface of the tumor, a small cystic area was seen to com-
municate with the ileal lumen through a narrow canal (Fig. 3A). A histologic examination revealed a well- to moderately differentiated adenocarcinoma showing papillotubular growth and a large focus of neuroendocrine differentiation (Fig. 3B). In the latter, the tumor cells were arranged in a trabecular pattern in some areas and in solid nests in others, associated with scattered rosette-like structures. The canal connecting the tumor with the ileal lumen was lined by ileal mucosa showing slight dysplastic change. Beneath the mucosa this communication showed attenuation of the muscularis propria, thus identifying it to be an ileal diverticulum. Metastases to the para-aortic lymph nodes consisted of only the neuroendocrine component. Immunohistochemical staining with anti-CEA antibody (Dako, Glostrup, Denmark) demonstrated immunoreactivity in extensive areas of the tumor. Focal positive immunoreactivity was seen with antibodies against NSE (Nichirei, Tokyo, Japan) and chromogranin (MBL, Nagoya, Japan) in areas with neuroendocrine features (Fig. 3C).

The immediate postoperative course was unremarkable; the serum CEA concentration became normal (3.2 ng/ml). The patient underwent two courses of systemic adjuvant chemotherapy. Six months after the operation, the CEA level in the serum again became elevated (8.6 ng/ml). A physical examination disclosed right inguinal lymphadenopathy, which was confirmed by CT. Examination of a needle biopsy specimen from the inguinal node confirmed metastasis showing neuroendocrine carcinoma cells which appeared to be identical to those in the primary lesion. The patient underwent systemic chemotherapy, but developed metastases to the liver and brain. He died 18 months after the operation.

**Discussion**

Primary malignant neoplasms of the small intestine are uncommon, constituting only 1%–2% of all primary gastrointestinal cancers. Carcinoid tumors and lymphomas are the most common histological types, followed by adenocarcinomas. Malignant neoplasms arising in a diverticulum of the small intestine are extremely rare.