Successful surgical treatment for implanted intraperitoneal metastases of hepatocellular carcinoma

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Abstract We report here two patients with hepatocellular carcinoma who experienced implanted metastases in the abdominal cavity after hepatectomy or microwave coagulonecrotic therapy. Hepatic resection and microwave coagulonecrotic therapy were successful for these tumors, and the postoperative status was satisfactory in both patients. Implanted metastases were discovered in the abdominal cavity of each of these two patients 6 months after surgery. It is necessary to look not only for the presence of liver metastasis but also for the recurrence of the tumor in the abdominal cavity during the follow-up period. Generally, surgical resection for intraabdominal implanted tumors arising from any other abdominal organs is not indicated for improving the patient’s quality of life. However, resection of metastatic tumors that occur in the abdominal cavity, arising from hepatocellular carcinoma may be of value in improving patient survival.

Key words Hepatocellular carcinoma (HCC) · Peritoneal metastasis · Surgical treatment

Case reports

Case 1
A 70-year-old man who had had a left hepatic lobectomy for a ruptured HCC with liver cirrhosis 6 months previously began to show elevated serum alpha-fetoprotein (AFP) levels. The initial tumor was located in segment 3 (S3 liver segment as defined by Couinaud) and was 34 mm in size. Abdominal computed tomography (CT), and ultrasonography (US) revealed recurrent small intrahepatic tumors and large extrahepatic abdominal tumors (Fig. 1). The abdominal tumors were asymptomatic at that time. At second surgery, multiple intrahepatic metastases (in S6, 7, and 8; 23, 17, and 19 mm in size, respectively) and three implanted metastases, which adhered to the transverse colon, liver, and abdominal wall, respectively, were found. Therefore, tumor resections with colectomy were performed, and MCN was employed for the liver tumors. Microscopically, all three implanted metastatic tumors were confirmed to be moderately differentiated hepatocellular carcinoma, whereas the pathological features of the initial tumor showed moderately-to-poorly differentiated HCC. After the second operation, the patient received hepatic arterial infusion (HAI) chemotherapy for the residual liver tumors. There were at least nine tumors in the liver after the initial operation, and these tumors decreased in size and number after the HAI chemotherapy. The patient’s postoperative course was uneventful and his serum AFP and prothrombin induced by vitamin K absence for factor II (PIVKA-II) levels have returned to normal range at this time.

Case 2
A 62-year-old man had partial hepatectomy for S6 HCC and MCN for S8 HCC with chronic hepatitis. The S6 tumor was visible on the liver surface. Before the initial
operation, he had received HAI chemotherapy and transarterial embolization (TAE) therapy for multiple HCC (in S2, 6, 7, and 8) and had shown a partial response to this treatment. During the initial operation, intraoperative US revealed two abnormal lesions (in S6 and 8), and a biopsy for the S8 HCC was performed. There was no apparent rupture of the tumor during surgical manipulation. The histological diagnosis was poorly differentiated HCC with sarcomatous change. The surgical margin was negative. Six months after the initial operation, follow-up CT (Fig. 2) and US revealed two large masses in his abdomen, but he had no symptoms, such as abdominal pain, nausea, or vomiting. There was no recurrent tumor in the liver. Under the diagnosis of recurrent HCC in the abdominal cavity, a laparotomy was performed. At surgery, two tumors were discovered in the abdominal cavity; one was in the ileocecal mesenterium, and the other was found at the posterior side of the ascending colon. There were no other tumors in the abdominal cavity. Therefore, an ileocecal resection was performed, with tumor resection. Histological examination of these tumors showed moderately-to-poorly differentiated HCC, which was the same as the finding in the primary tumor. Values for tumor markers such as AFP and PIVKA-II have returned to normal, and follow-up CT showed no new lesion in the liver or abdomen at this time.

**Discussion**

The usual mode of extrahepatic spread from HCC is hematogenous metastasis, most frequently to the lung. Lymphogenous and infiltrating metastases are relatively infrequent. The incidence of peritoneal implantation from HCC has been reported to be 2%–16% in autopsy or laparotomy patients, and it is markedly lower than the incidence of peritoneal metastases from other primary hepatic malignancies, such as cholangiocarcinoma (46.3%), mixed cholangio-hepatoma (66.6%), and hepatoblastoma (33.3%).

The pathway of peritoneal seeding from HCC is thought to be via the rupture of exophytic HCC or via needle-track seeding of HCC cells into the peritoneal cavity and subsequent seeding of metastatic deposits. Nakashima et al., on the basis of autopsy, reported 14 cases of peritoneal seeding of HCC in the Douglas pouch, and none exhibited marked generalized implants involving the entire peritoneum, or so-called carcinomatosis peritonei.

There are 24 reported cases of implanted metastases from HCC in the literature including our patients, (Table 1). These patients consisted of 23 men and 1 woman (age range, 35–72 years; mean, 56.9 years). As for location of the implanted metastases, 13 of these 24 patients had omental metastases, 5 had mesocolon metastases, 2 had metastases to the entire peritoneal or pelvic cavity, and 3 patients had metastatic tumors of the abdominal wall, diaphragm, or perihepatic space. The period from the time of initial surgical treatment or tumor rupture until detection of the abdominal masses ranged from zero to 84 months, exceeding 12 months in 6 patients. The initial treatments of these patients were: hepatectomies in 16, hepatectomy and MCN in 1, TAE in 2, MCN or incisional biopsy in 2, and no treatment in 3 patients. Eleven patients had episodes of tumor rupture, and the tumor extruded during operation in 3 patients.

Of our two patients, one had an exophytic HCC with previous history of spontaneous rupture, and the other had experienced previous resection and MCN of exophytic HCC that may have been a cause of iatrogenic tumor spread. In our patient 2, the tumor located at the posterior side of the ascending colon occurred along the

![Fig. 1. Computed tomography demonstrated two extrahepatic abdominal tumors with internal necrosis in the right upper quadrant](image1)

![Fig. 2. Computed tomography showed an extrahepatic abdominal tumor in the right lower quadrant](image2)