

• RAPID COMMUNICATION •

Catheter tract implantation metastases associated with percutaneous biliary drainage for extrahepatic cholangiocarcinoma

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Abstract

AIM: To estimate the incidence of catheter tract implantation metastasis among patients undergoing percutaneous transhepatic biliary drainage (PTBD) for extrahepatic cholangiocarcinoma, and to provide data regarding the management of this unusual complication of PTBD by reviewing cases reported in the literature.

METHODS: A retrospective analysis of 67 consecutive patients who underwent PTBD before the resection of extrahepatic cholangiocarcinoma was conducted. The median follow-up period after PTBD was 106 mo. The English language literature (PubMed, National Library of Medicine, Bethesda, MD, USA), from January 1966 through December 2004, was reviewed.

RESULTS: Catheter tract implantation metastasis developed in three patients. The cumulative incidence of implantation metastasis reached a plateau (6%) at 20 mo after PTBD. All of the three patients with implantation metastasis died of tumor progression at 3, 9, and 20 mo after the detection of this complication. Among the 10 reported patients with catheter tract implantation metastasis from extrahepatic cholangiocarcinoma (including our three patients), two survived for more than 5 years after the excision of isolated catheter tract metastases.

CONCLUSION: Catheter tract implantation metastasis is not a rare complication following PTBD for extrahepatic cholangiocarcinoma. Although the prognosis for patients with this complication is generally poor, the excision of the catheter tract may enable survival in selected patients with isolated metastases along the catheter tract.

INTRODUCTION

Percutaneous transhepatic biliary drainage (PTBD) has been widely employed as a biliary decompression procedure for malignant biliary obstruction^[1-5]. It may cause implantation metastasis along the catheter tract, which has generally been considered as an unusual and lethal complication^[6,7]. Although sporadic cases of such implantation metastasis have been reported^[6-10], the incidence of this complication following PTBD is yet to be determined. Also, there is a paucity of data regarding the management of this complication. Taken together, these facts prompted us to conduct the current study.

The aims of this study were to estimate the incidence of catheter tract implantation metastasis among patients undergoing PTBD for extrahepatic cholangiocarcinoma, and to provide data regarding the management of this unusual complication by reviewing cases reported in the literature.

MATERIALS AND METHODS

Patient population

A total of 87 patients with carcinoma arising from the extrahepatic bile ducts (extrahepatic cholangiocarcinoma) underwent resection with curative intent at our department during the 15-year period between January 1988 and December 2002. Carcinoma arising from the cystic duct was categorized as extrahepatic cholangiocarcinoma according to the tumor-node-metastasis staging system^[14]. Three patients who also had gallbladder carcinoma were excluded. Of the remaining 84 patients, 67 jaundiced patients underwent PTBD before the resection. They formed the basis of this retrospective study, and included 39 men and 28 women with a median age of 65 years (range: 35-88 years). All patients were Japanese.

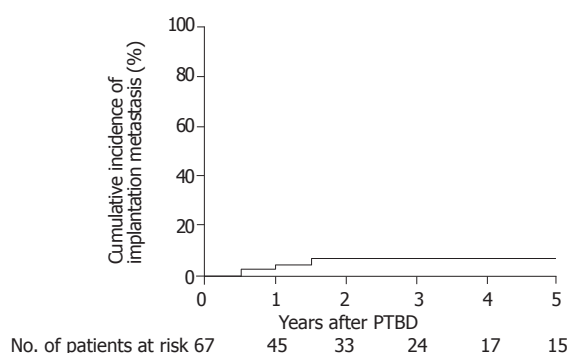


Figure 1 The cumulative incidence of catheter tract implantation metastasis after percutaneous transhepatic biliary drainage among 67 patients who underwent resection of extrahepatic cholangiocarcinoma.

Resectional procedure of the primary tumor

The resectional procedures were chosen according to the primary tumor location. Forty-one patients with hilar cholangiocarcinoma underwent a hepatectomy with bile duct resection, 12 with non-hilar tumor underwent a Whipple procedure or a pylorus-preserving pancreaticoduodenectomy, six underwent a bile duct resection, and eight underwent a combination of hepatectomy and pancreaticoduodenectomy. Regional lymphadenectomy was performed in all patients.

Pathologic examination

The resected specimens were submitted to the Department of Surgical Pathology at our hospital for histologic evaluation. The histologic findings were described according to the tumor-node-metastasis staging system^[14]. The histologic grade was determined based on the areas of the tumor with the highest grade^[14]. Adenocarcinoma was identified as the primary tumor in 64 patients and adenosquamous carcinoma was identified in three patients.

Patient follow-up

Patients were followed up regularly at outpatient clinics every 3 mo. The median follow-up period after PTBD was 106 mo (range: 4 to 186 mo). By the time of disease status assessment, 38 patients had died of tumor recurrence. Seven patients had died of other causes with no evidence of tumor recurrence. One patient was alive with recurrent disease, and the remaining 21 patients were alive without disease.

Review of the literature

The English language literature (PubMed, National Library of Medicine, Bethesda, MD, USA), from January 1966 through December 2004, was reviewed, and revealed that a total of seven patients undergoing resection of extrahepatic cholangiocarcinoma suffered from catheter tract implantation metastasis following PTBD^[7-13].

Statistical analysis

Medical records and survival data were obtained for all the

67 patients. The causes of death were determined based on the medical records. The follow-up period was defined as the interval between the date of PTBD and that of the last follow-up. The Kaplan-Meier method was used to estimate both the cumulative incidence of catheter tract implantation metastasis and the cumulative patient survival rates. The differences in survival were evaluated using the log rank test. All statistical evaluations were performed using the SPSS 11.5J software package (SPSS Japan Inc., Tokyo, Japan). All tests were two-sided, and the differences with *P* values of <0.05 were considered statistically significant.

RESULTS

The incidence of catheter tract implantation metastasis after PTBD in the current series

Catheter tract implantation metastasis after PTBD presented as a subcutaneous nodule in 3 of the 67 patients during the follow-up period. The interval between PTBD and the detection of implantation metastases was 7, 14, and 20 mo for those 3 patients. The cumulative incidence of this complication reached a plateau (6%) at 20 mo after PTBD (Figure 1).

Of the three patients with implantation metastases, one underwent a resection of the catheter tract (patient 9 in Table 1), one underwent local radiation (patient 8), and the other received the best supportive care (patient 10). They died of disease at 3, 9, and 20 mo after the detection of this complication.

A review of the literature on catheter tract implantation metastasis from extrahepatic cholangiocarcinoma

An analysis of the 10 reported patients (including our three patients; Table 1) with catheter tract implantation metastasis revealed that the histologic grade of the primary tumor was well differentiated in four patients, moderately differentiated in three, poorly differentiated in one, and not documented in two. The median interval between PTBD and the detection of this complication was 14 mo (range: 3 to 45 mo).

Catheter tract implantation metastasis was isolated (without recurrences at other sites) in six patients, whereas it was non-isolated (with recurrences at other sites) in the other 4 patients (Table 1). Although the survival after the detection of implantation metastasis was generally poor, two patients who underwent excision of isolated implantation metastases survived for more than five years. Among the nine patients with documented outcomes, those with isolated implantation metastases survived longer than those with non-isolated implantation metastases (*P* = 0.0457; Figure 2).

DISCUSSION

The incidence of catheter tract implantation metastasis after PTBD has been reported to range from 0.6 to 6% in patients with malignant biliary obstruction due to tumors of various origins^[7,11,15-17]. Nimura *et al.*^[18] have reported

Table 1 Implantation metastases along the PTBD tract among patients who underwent a resection for extrahepatic cholangiocarcinoma

n	First author	Sex/age (yr)	Histology of the primary tumor		Detection of implantation metastases after PTBD (mo)	Sites of recurrences other than the PTBD tract	Management of implantation metastases	Outcome after the detection of implantation metastases (mo)
			Type	Grade				
1	Sano ^[7]	M/68	Adeno	G1	45	-	Hx	100; NED
2	Inagaki ^[8]	F/51	As	nd	6	-	Hx, EAW	65; NED
3	Matsumoto ^[9]	F/61	Adeno	G2	21	-	Hx	24; NED
4	Shimizu ^[10]	M/75	Adeno	G2	16	-	Hx	14; NED
5	Tersigni ^[11]	M/66	Adeno	G1	13	-	RTx, CTx	4; DOD
6	Omokawa ^[12]	M/45	Adeno	nd	3	-	Hx	nd; nd
7	Uenishi ^[13]	F/57	Adeno	G1	14	Pleura (right)	Pleuropneumonec-tomy, ECW ²	21; DOD
8	Sakata1	F/63	Adeno	G1	14	Bone, Local	RTx	20; DOD
9	Sakata1	M/70	Adeno	G2	20	Peritoneum	EAW	9; DO
10	Sakata1	M/76	Adeno	G3	7	Local	BSC	3; DOD

PTBD: percutaneous transhepatic biliary drainage; Adeno: adenocarcinoma; As: adenocarcinoma; G1: well differentiated; G2: moderately differentiated; G3: poorly differentiated; Hx: hepatectomy; EAW: excision of the abdominal wall; RTx: radiotherapy; CTx: chemotherapy; ECW: excision of the chest wall, BSC: best supportive care; NED: (alive with) no evidence of disease; DOD: died of disease; nd: not documented. ¹Present case. ²A PTBD catheter had been introduced transpleurally via the right pleural cavity in this patient.

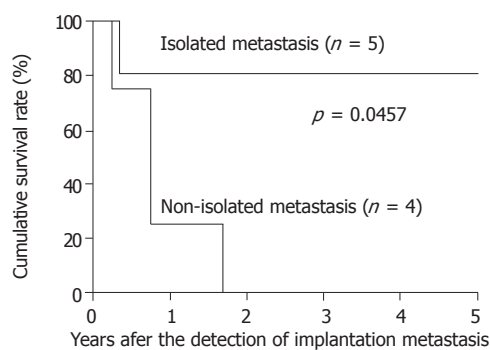


Figure 2 Kaplan-Meier estimates of survival after the detection of catheter tract implantation metastasis among nine patients with documented outcomes (Table 1). The median survival time was not reached with a cumulative 1-year survival rate of 80% in patients with isolated implantation metastasis, whereas it was 9 mo with that of 25% in patients with non-isolated metastasis. Patients with isolated implantation metastases survived longer than patients with non-isolated implantation metastases ($P = 0.0457$).

a 3% incidence of such implantation metastasis among 133 patients with hilar cholangiocarcinoma. In the current series, the cumulative incidence of this complication increased with time and reached a plateau (6%) 20 mo after PTBD (Figure 2). The above data suggests that catheter tract implantation is not a rare complication following PTBD for extrahepatic cholangiocarcinoma.

Uesaka *et al*^[19] have reported that catheter tract implantation metastasis from hilar cholangiocarcinoma occurred more frequently in patients with well differentiated tumors. Among the 10 reported patients with this complication (Table 1), only one had a poorly differentiated tumor, implying that differentiated tumors may be more related to the development of this complication than poorly differentiated ones. The association between implantation metastasis after PTBD and the histologic grade of extrahepatic cholangiocarcinoma warrants further investigation.

Although Sano *et al*^[7] have reported the occurrence of a

late implantation metastasis arising 46 mo after PTBD for extrahepatic cholangiocarcinoma, most of our collected patients suffered from this complication within 21 mo after PTBD (Table 1). Thus, patients undergoing PTBD for extrahepatic cholangiocarcinoma should be monitored for catheter tract implantation for around 2 years.

The survival of patients with catheter tract implantation metastasis from extrahepatic cholangiocarcinoma was found to be generally poor (Table 1), as with our patients. Despite the metastatic nature of this condition, surprisingly, the outcome after the excision of the implantation metastasis was not so dismal in some patients with isolated implantation metastases (patients 1-4). The possibility that the course of deceased patients is unlikely to be reported (a publication bias) may, in part, explain this. In order to excise catheter tract metastases following PTBD, a hepatectomy is usually required, because the catheter tract runs through the liver parenchyma; in some patients, a local excision of the abdominal wall is also required. Two of the five patients who underwent a hepatectomy, with or without a local excision of the abdominal wall, for isolated implantation metastases (patients 1 and 2) survived for more than 5 years with no evidence of the disease. This clearly demonstrates that excision of the metastases offers the only chance for long-term survival.

The issue how to prevent catheter tract implantation metastasis following PTBD is yet to be resolved. Although excision of the catheter tract along with the resection of the primary tumor appears to be effective, it is practically difficult to excise the whole catheter tract between the surface of the skin and the punctured intrahepatic bile ducts. Some authors have advocated ethanol injection into the catheter tract to prevent cancer implantation^[10,19,20]. However, Shimizu and colleagues have reported a case of implantation metastasis following ethanol injection^[10]. Further investigation is warranted to conclude the effects of this procedure.

In conclusion, catheter tract implantation metastasis is not a rare complication following PTBD for extrahepatic

cholangiocarcinoma. Although the prognosis for patients with this complication is generally poor, excision of the catheter tract, which usually requires a hepatectomy, enables long-term survival in selected patients with isolated implantation metastases.

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