In this report, we describe cases of jaundice patients with advanced-stage pancreatic carcinoma in whom recanalization of the bile duct with complete obstruction was achieved after MTC via percutaneous transhepatic cholangioscopy (PTCS), and suggest the utility of PTCS-MTC for the recanalization of complete obstruction of the bile duct due to pancreatic carcinoma in the far advanced stage. With repetitions of cholangioscopic MTC and gentle pushing a thin guide wire, we can usually get the wire pass through the obstructed bile duct. After then, stepwise dilation of the duct by use of covering tubes over the thin wire becomes possible. More often than not, the opposite side of the tip of PTCS catheter is the proper and correct position to begin the procedure of recanalization.

**Key words:** pancreatic carcinoma, far advanced stage, complete bile duct obstruction, recanalization, MTC (microwave tissue coagulation)

Accepted on Aug. 3, 2012
Introduction

We report cases of jaundice women with advanced-stage pancreatic carcinoma in whom recanalization of the bile duct with complete obstruction was achieved after microwave tissue coagulation (MTC) via percutaneous transhepatic cholangioscopy (PTCS) because impossible of conduction of a thin guide wire through the occluded bile duct.

Cases

1. Case 1

A 59-year old woman was referred to our institution because of intolerable pain in the right hypochondrium and the back, and nausea with epigastric distension.

Besides abdominal pain and nausea, she had bulbar and skin jaundice, increased serum bilirubin, enzymes of bile duct origin, tumor markers, and decreased leucocytes (TB: 9.88 mg/dL, Al-p; 820 IU/L, y-GTP: 131 IU/L, CEA: 14.8 ng/mL, CA19-9: 1120 U/mL, NCC-ST-439; 149 U/mL, WBC 2900/mm³, respectively).

Computed tomography (CT) revealed pancreatic carcinoma, lung metastases, bulky cancerous involvement of the hepatoduodenal ligament with the common bile duct (CBD), hepatic artery, portal vein, and pyloric-antral portion of the stomach, and surgical resection was not indicated (Fig. 1).

She underwent percutaneous transhepatic cholangial drainage (PTCD) and percutaneous transhepatic cholecystic drainage (PTCCD) for biliary decompression. Thereafter, she was diagnosed obstructive jaundice caused by spreading of pancreatic carcinoma described above. Fluorography revealed complete obstruction of the CBD, and a guide wire which curled up without passing through the obstruction (Fig. 2).

Therefore, for the purposes of recanalization, cholangioscopic MTC was performed using Microtaze® (Heiwa Electronic Industrial Co. Ltd., Osaka, Japan) and a 1.8 mmφ spherical antenna under radiation of 35 W and several repetitions of 3 to 5 seconds in duration (Fig. 3). Approaching of the antenna was directed toward the opposite side of the concave portion which had been produced by collision and com-
Cholangioscopic microwave tissue coagulation (MTC) and recanalization of the bile duct with complete obstruction due to pancreatic carcinoma in the far advanced stage

pression due to the tip of PTCS catheter, and as if often the case, had been incorrect portion to start recanalization (Fig. 4).

After creating an orifice for recanalization, cholangioscopic MTC was performed furthermore followed by radiography-guided MTC using a 5.0 mm $\Phi$ bullet-shaped antenna covering a thin guide wire (0.028 inch, Cook Co. Ltd., USA) through the CBD under the same conditions and repetition as before $^1$(Fig. 5). Six months after the initial MTC, she died of respiratory insufficiency caused by multiple lung metastases and lymphangitis carcinomatosa. No adverse side effects of MTC were noted.

2. Case 2

A 83-year old woman was referred to our institution because of progressive jaundice and nutritional emaciation with liver cirrhosis. The patient requested that decompression be performed for her biliary congestion.

Figure 3  Fluorography exhibiting recanalization by cholangioscopic MTC
Percutaneous transhepatic cholangioscopic MTC (PTCS-MTC) was performed (a), followed by recanalization of the bile duct with complete obstruction due to pancreatic carcinoma in the far advanced stage of progression (b, c).

Figure 4  Approaching of cholangioscopic MTC
A 1.8 mm $\Phi$ spherical MTC antenna was directed toward the opposite side (arrow) of the ulcerative and concave portion (arrow head) produced by PTCS catheter-tip (a). And an orifice for recanalization obtained by cholangioscopic MTC (b).

Figure 5  Radiography-guided MTC
A 5.0 mm $\Phi$ bullet shaped antenna covering a guide wire through the CBD was shown.
Several years ago, she had undergone anterior resection for rectal carcinoma. CT revealed pancreatic carcinoma with involvement of the hepatoduodenal ligament and multiple low density lesions in the liver. She had increased serum bilirubin, enzymes of bile duct and liver cell origin, and tumor markers (TB; 14.7 mg/dL, Al-P; 1175 IU/L, AST; 148 IU/L, ALT; 206 IU/L, y-GTP; 976 IU/L, CEA; 4.9 ng/mL, CA19-9; 155.8 U/mL, AFP; 6.0 ng/mL, respectively).

After PTCD, recanalization using a thin guide wire was tried to conduct through the obstructed CBD into the duodenum but in failure. The wire for guidance showed its flexion upwards and did not advance further into the bile duct with complete obstruction (Fig. 6). Therefore, cholangioscopic MTC using a 1.7 mm П antenna was performed in the same manner as the Case 1 (Fig. 7). Site of approaching of the 1.7 mm П antenna was also directed opposite the concave and erosive portion caused by compression of PTCS catheter-tip (Fig. 8).

Afterwards, the patient was transferred to her former physician followed by expandable metallic stent (EMS) treatment (Fig. 9), and 7 months later, died of peritonitis carcinomatosa and multiple liver metastases. No adverse effects due to MTC were obtained.

Discussion

Bile duct carcinoma is one of the most lethal and aggressive malignancies, with a majority of patients showing unresectable tumors at presentation, and who have to undergo non-operative treatments.

Long-term survival of over 10 years, by the way, was achieved in jaundice patients with non-resected bile duct carcinoma and with poor health after performing PTCS and radiography-guided MTC1-3. Because of the long-term survival, we suggested a probable treatment with MTC aimed at cure of jaundice and early-stage bile duct carcinoma in elderly patients. Furthermore, our report implied that MTC might be an alternative palliative treatment for jaundice patients with bile duct carcinoma in the far advanced stage of progression and might afford survival of over 4 years4.

The initial procedure of non-operative treatment for patient with obstructive jaundice due to unresectable malignant neoplasm is recanalization of the bile duct with obstruction followed by conduction of a thin guide wire through the obstructed bile duct into the duodenum for successive step-wise dilation of the duct.

Concerning pancreatic carcinoma, very poor prognosis and survival of the patients with unresectable tumors and
Cholangioscopic microwave tissue coagulation (MTC) and recanalization of the bile duct with complete obstruction due to pancreatic carcinoma in the far advanced stage

**Figure 7  Cholangioscopic MTC**
Recanalization of the bile duct with complete occlusion (a) was obtained by PTCS-MTC (b, c).

**Figure 8  Cholangioscopic findings**
Complete occlusion of CBD produced by extracanalicular hard compression due to pancreatic carcinoma in the far advanced stage, irritation by PTCS catheter-tip, neovascularization, and vascular irregularities were presented (a).
Ulcerative concave portion due to irritation by PTCS catheter-tip (b, top, left).
A 1.7 mm antenna and MTC toward the opposite side of the concave portion followed by recanalization (b, top, right).
Conduction of a guide wire through the recanalization of CBD (b, bottom).
jaundice are generally the same as or less than those of bile duct carcinoma. And as for recanalization of the bile duct with complete obstruction due to pancreatic carcinoma, we often meet with the difficulty and failure in passing a thin guide wire through the duct into the duodenum.

Without recanalization of the bile duct and conduction of a guide wire through the duct, we cannot perform stepwise ductal dilation which provides the following non-operative treatments such as catheter prosthesis, EMS, remote after loading system (RALS), light amplification of stimulated emission and radiation (LASER), hyperthermic procedure, radiography-guided MTC, and so on\textsuperscript{1}.

Cholangioscopic precise detection of a concavity at the proximal (i.e. hepatic hilar) side in the obstructed bile duct is helpful to perform recanalization of the duct, where we can start conducting a guide wire into the distal side. Apparently, the procedure of recanalization by use of cholangioscope is superior to that by X-ray fluorography, because we can macroscopically detect and utilize the visual (i.e. 3-dimensional) information around the concavity with cholangioscopy but fluorography. Without detection of any concavity which is suitable for an approach to the obstructed bile duct, we cannot go on the procedure of recanalization. Even in cases in which we could find out the concavity and put a guide wire on it cholangioscopically, we sometimes cannot pass the wire through the bile duct because the complete obstruction pushes the wire back.

When it is impossible of recanalization of the bile duct with complete obstruction, we do usually such operative treatment as choledocho-jejunostomia for internal biliary drainage. However, in this case report, we describe cases of jaundice women with advanced-stage pancreatic carcinoma in whom recanalization of the bile duct with complete obstruction was achieved after MTC via PTCS, and suggest the utility of PTCS-MTC for the recanalization of complete obstruction of the bile duct due to pancreatic carcinoma in the far advanced stage. Cholangioscopically, we apply MTC energy on and around the concavity followed by insertion of a thin, soft and flexible guide wire into the extended concave orifice obtained by MTC. With repetitions of cholangioscopic MTC and gentle pushing a thin guide wire, we can usually get it pass through the obstructed bile duct. After then, stepwise dilation of the duct by use of covering tubes over the thin wire becomes possible.

Microwave tissue coagulator which is useful in mild coagulation, hemostasis and safety, with a soft and flexible RADIFOCUS\textsuperscript{8} guide wire (TERMO Co. Ltd., Tokyo, Japan), can be expected to avoid adverse side effects.

Even if we are not able to pass the wire through the obstructed duct initially, such successive cholangioscopic maneuver in the next week as described above will be successful in passing of the wire through the duct because of mild degeneration of the microwaved tissues at the concave orifice. Not at a time, but weekly or biweekly with repetitional cholangioscopic mild and gentle MTC, we are able to avoid such adverse effects as bleeding and perforation or penetration in the bile duct.

As if often the case, we cannot get recanalization of the obstructed bile duct after an approach to the concavity which was produced by pushing due to PTCS catheter-tip. In such case, we had better not to continue the procedure using MTC at the concavity caused by PTCS catheter but to seek out another concave portion around the concavity. By seeking out another concave which is usually found on the opposite side of the PTCS catheter, and by use of cholangioscopic MTC against the another concavity, we can make progress in

\textbf{Figure 9}  Expandable metallic stenting (EMS)
Expandable metallic stent was positioned after cholangioscopic MTC, recanalization and conduction of a guide wire through the CBD.
recanalization of the bile duct of occlusion. More often than not, the opposite side of the tip of PTCS catheter is the proper and correct position to begin the procedure of recanalization.

We have ever suggested a probable non-operative treatment with cholangioscopic and radiography-guided MTC aimed at cure jaundice and early-stage bile duct carcinoma in elderly patients, and further, an alternative palliative MTC treatment which might afford survival of over 4 years for jaundice patients in the far advanced stage of progression. However, non-operative treatment of the jaundice patients with pancreatic carcinoma in the early-stage of progression as well as in the far advanced stage of progression cannot be a treatment aiming at cure or at long-term survival.

In combination with radiography-guided MTC after recanalization by cholangioscopic MTC, the use of chemotherapeutic agents (e.g. GEM: gemcitabin, TS-1: fluoropyrimidine, CDDP: cisplatin) molecular targeting agents, immunotherapy, and irradiation treatment may be useful and serve to improve survival of the patients with pancreatic carcinoma in the far advanced stage of progression.

Further studies should investigate the non-thermal, i.e. the frequency-specific microwave effect on neoplastic involvement and its extracorporeal and/or laparoscopic application to the patients with pancreatic carcinoma in the far advanced progression.

References