Abstract
Biliary drainage can be achieved by endoscopic or percutaneous drainage (ERBD). Advantages and disadvantages have been reported for each. We have established a new procedure, percutaneous endoscopic trans-gastric biliary drainage (PETGBD). This technique tends not to result in cholangitis, appears associated with fewer critical complications such as bile leakage and peritonitis, and is less painful for patients while providing efficient bile drainage. Tube obstruction is also easily addressed. We performed this procedure on 6 patients. Median total bilirubin (T.Bil) level at first presentation was 6.35 mg/dl. The duration required for T.Bil to decrease to <2 mg/dl was 6 days. No odynophagia, anorexia or tube trouble was recognized. These results suggest that this new method allows stable and continuous biliary drainage, and not only ensures safety, but avoids the discomfort, odynophagia, and loss of appetite associated with use of a nasal tube.

Key words: biliray drainage, preoperative, new method

Introduction
Biliary drainage has been performed for patients with cholangitis or jaundice resulting from pancreaticobiliary tumors using several procedures. Endoscopic retroGrade biliary drainage (ERBD), percutaneous transhepatic biliary drainage (PTBD), and endoscopic nasobiliary drainage (ENBD) are the most accepted methods, and advantages and disadvantages have been reported for each. We have established a new procedure, percutaneous endoscopic trans-gastric biliary drainage (PETGBD), that allows maintenance of food intake, prevents discomfort and odynophagia by not using a nasal tube, and avoids the cholangitis caused by tube obstruction.

Patients and Methods
We performed PETGBD on 6 patients. The procedure is described as follows (Fig. 1):
1) We used a side-view endoscope to bring the papilla of Vater into the field of view, applying the same technique as that used in ENBD.
2) The tube for contrast study was then placed into the bile duct, and cholangiography was performed to obtain information about the biliary tract. A guide wire was fed into the bile duct, and cholangiography was performed to obtain information about the biliary tract.
3) We inserted a straight-view endoscope, and immobilized the gastric anterior wall to the abdominal wall using the instruments according to the procedures for percutaneous endoscopic gastrostomy. A guide wire was then introduced from this point.
4) The guide wire was grasped with a snare, led to the outside of the mouth and then tied to the tube described above with a nylon suture. Again confirming on fluoroscopy that the tube tip was located inside the bile duct, the guide wire was pulled from the mouth.
the wall of the abdomen. The tube was then fixed to the skin.

Results
We performed PETGBD on 6 patients (2 men, 4 women; Table 1) with a median age of 68 years (range, 61–94 years). Three of the patients had been diagnosed with lower bile duct carcinoma, one with pancreatic cancer, and two with obstructive cholangitis caused by choledocholithiasis.

Median total bilirubin (T.Bil) value at first presentation was 6.35 mg/dl. The duration required for T.Bil to decrease to <2 mg/dl was 6 days.

An abdominal wall abscess arose in 1 patient with cholangitis, but easily resolved with drainage. Major complications such as pancreatitis, injury of the bile duct, or bleeding did not develop. Dislocation or obstruction of the tube was not observed. No discomfort of the larynx or pharynx, or odynoralgia, was observed. No cases showed any significant changes in dietary intake during the perioperative

<table>
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<th>Patient no.</th>
<th>Age</th>
<th>Sex</th>
<th>Diagnosis</th>
<th>Initial T.Bil (mg/dl)</th>
<th>Days for T.Bil &lt;2mg/dl</th>
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<tr>
<td>1</td>
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<td>F</td>
<td>Cholangiocarcinoma</td>
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<td>F</td>
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<td>3</td>
<td>61</td>
<td>M</td>
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<td>0</td>
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<td>5</td>
<td>58</td>
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<tr>
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<td>72</td>
<td>F</td>
<td>Cholangiocarcinoma</td>
<td>6.8</td>
<td>5</td>
</tr>
</tbody>
</table>

Fig. 1 Procedural details.
The contrast tube is placed in the bile duct from the papilla of Vater, as in ENBD (1). Cholangiography is then performed (2). A guide wire is fed into the bile duct (3), followed by a biliary drainage tube (arrowhead) (4). The side-view endoscope is withdrawn, leaving part of the tube outside the mouth. A straight-view endoscope is then inserted, the anterior wall of the lower gastric body is elevated and immobilized, and a guide wire (arrow) introduced from this location (5) is grasped with a snare and led through the mouth to the outside (6). The guide wire is tied to the tube described above using a nylon suture (7). While again confirming under fluoroscopy that the tube tip is appropriately located, the guide wire is pulled from the abdominal wall (8–9). The tube is fixed to the abdominal wall, leaving a slight margin inside the stomach (10).
A new method for biliary drainage

period. No obvious body weight loss was encountered.

Discussion
Biliary drainage includes the drainage for cholangitis and decompression for jaundice resulting from obstruction due to a tumor. Basically, the treatment for cholangitis is biliary drainage, except for in mild cases.

PTBD and ENBD have been compared in a randomized clinical trial\(^5\). The low rates of complications such as intraperitoneal hemorrhage and biliary peritonitis, as well as a significantly shorter duration of hospitalization, have led to the conclusion that ENBD is preferable\(^6\).

Controversy remains as to whether preoperative biliary decompression is necessary for hepatobiliary pancreatic cancer. In particular, various reports state that preoperative drainage is unnecessary for carcinoma of the pancreatic head before pancreaticoduodenectomy\(^7\). However, retrospective studies have shown significant results after treating biliary tract malignancies, particularly in those cases requiring widespread liver resection. As the mortality rate due to complications arising from widespread liver resection is currently around 10%, with liver failure representing the main cause of death, preoperative biliary drainage has been recommended\(^8\).

Although PTBD causes less retrograde cholangitis, pancreatitis and inflammatory changes in surrounding tissues, passage through the liver carries risks of hemorrhage or peritonitis. In addition, the procedure is associated with a risk of tumor implantation in the abdominal wall\(^9\)-\(^11\).

Cholangitis does not usually arise due to obstruction during ENBD, which shows few of the complications associated with PTBD\(^1\),\(^3\),\(^4\). This technique also results in significantly fewer hospital days. However, the nasal tube causes considerable patient distress. The diameter of the tube must therefore be small, which in turn can decrease the efficiency of biliary drainage.

ERBD is preferable from a physiological perspective for internal drainage. The success rate, efficacy, and rate of complications for internal ERBD and ENBD are the same\(^12\). Use of an indwelling stent is associated with less post-procedural discomfort and avoids the potential problem of inadvertent removal of the nasobiliary catheter. However, easy release is impossible if obstruction arises. Recent reports suggest that ERBD carries a higher risk of cholangitis complications caused by occlusion in endoscopic biliary stents compared with PTBD\(^10\).

PETGBD represents a combination of established procedures such as percutaneous endoscopic gastrostomy (PEG), which are relatively simple to perform. It is fair to say that the major benefits are minimal patient distress, painless swallowing and no constant sense of discomfort, as compared with ENBD. Pain in the abdominal wall is controllable with oral administration of NSAIDS. The degree of satisfaction of patients appears acceptable. These features decrease the likelihood of reduced oral food intake.

Otherwise, special problem arises such as bleeding from gastric wall, as well as PEG. We can address this by endoscopic coagulation treatment. Furthermore, it is possible to remove PETGBD tube early (for a few days), due to immobilization of the gastric anterior wall to the abdominal wall. From this, it is considered that it is unlikely to develop peritonitis in the case of inadvertent removal. No risk of peritoneal implantation, cholangitis, or hemorrhage is apparent in comparison with PTBD. Postoperative care for PETGBD is relatively easy to manage at home. PETGBD is an endoscopic drainage, which is relatively safe and associated with fewer complications.

The potential exists for this technique to represent a new practical option that reduces the burden on patients without using a drainage tube guided through the nose. In the future, further cases or comparisons with other drainage methods will be needed.

References
5) Speer AG, Cotton PB, Russell RC, et al: Randomised trial of endoscopic versus percutaneous stent inser-