Fine-Needle Percutaneous Cholangiography Followed by Drainage of the Biliary System

An Initial Report

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SUMMARY

Fine-needle percutaneous transhepatic cholangiography has gained popularity for investigating patients with obstructive jaundice, after which percutaneous drainage of the biliary system is frequently carried out. The technique is described and the results from 10 patients in whom the procedure was carried out are discussed.


Fine-needle percutaneous cholangiography has gained popularity as a safe technique in the investigation of the jaundiced patient. The improved diagnosis in patients with hepatobiliary disease by means of this procedure has led to an awareness of the need for decompression as the first step for a reconstruction procedure or as a therapeutic measure for various bile duct diseases. This article describes the technique and results in 10 patients with obstructive jaundice on whom percutaneous catheter drainage was performed after fine-needle percutaneous cholangiography.

SUBJECTS AND METHODS

Percutaneous transhepatic drainage of the biliary tract was attempted in 10 patients with obstructive jaundice of varying aetiology. The patients were prepared in the usual way for percutaneous cholangiography, namely by checking the prothrombin index, and administering gentamicin and penicillin prophylactically.

Using the Chiba technique, fine-needle diagnostic cholangiography was performed. After the site and probable nature of the obstructing lesion had been established, percutaneous catheter drainage was then attempted according to the technique described by Nakayama et al. The technique consists of initially performing fine-needle cholangiography and then catheterizing an intrahepatic duct by: (i) puncture of a dilated intrahepatic duct with a steel needle; (ii) insertion of a guide wire; (iii) removal of the needle; (iv) pushing the catheter over the guide wire; and (v) withdrawal of the guide wire and immobilization of the catheter.

Under fluoroscopic control we introduce a 16-gauge 17-cm long cyst puncture needle consisting of a central steel stilette and an outer plastic sheath, generally at the puncture site used for the fine-needle cholangiography. Using both lateral and anteroposterior screening, the cyst puncture needle can be directed to the desired point of entry. The right hepatic duct close to the common hepatic duct is usually aimed for. Duct movement adjacent to the advancing needle is observed on screening immediately before penetration.

When the duct system has been penetrated the stilette is removed and bile flow through the sheathed portion of the cyst puncture needle occurs. A 0.36 "J" wire with a movable core is then introduced (Fig. 1). Upon entry the movable core may need to be advanced to stiffen the wire for further guiding of the catheter. In cases where reasonably short stricture formation of the duct system is present, 0.35 straight movable or fixed-core Teflon-coated guide

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Date received: 4 April 1979.

Fig. 1. Percutaneous cholangiogram showing a conical obstruction of the lower common bile duct in a patient with suspected carcinoma of the pancreas. A guide wire is shown positioned in the left hepatic duct.
wires have been introduced. Often the wire passes readily through the obstructing lesion and enters the non-dilated distal common bile duct and duodenum. If resistance is encountered by the obstructing lesion, further advance of the catheter will usually result in its recoiling into the dilated proximal duct system.

Once the guide wire is in the desired position, the sheathed portion of the cyst puncture needle is removed. A dilator is first applied over the guide wire and then a drainage catheter (6,3 French) which has 10 side holes close to the end of the catheter is passed over the guide wire which is removed (Fig. 2). When the catheter passes through an obstructing lesion, a further 5 - 6 side holes approximately 10 cm from the distal holes would need to be fashioned before its introduction (Figs 3 and 4). The catheter is then carefully immobilized on the skin and connected to a drainage bag.

**RESULTS**

External catheter drainage was performed in 10 cases, (Table I). The technique was used on patients who had severe and progressive jaundice resulting from neoplastic obstruction of the biliary tree. All of them had total serum bilirubin levels exceeding 20 mg/dl before drainage.

With catheter drainage for 7 days or longer, the total bilirubin level dropped below 10 mg/dl. The catheter was dislodged in 4 cases, and in 2 of these after only 1 - 2 days of drainage.

Patients 1 - 4 were considered suitable for continuous drainage because of their poor clinical state, but the catheter was dislodged in cases 1 - 3 and could not be reintroduced. This complication was attributed to ascites which caused the catheter to kink between the liver and the abdominal wall. The clinical condition appeared aggravated after unsuccessful repeat attempts at catheterization. In patient 4 (Figs 5 and 6) successful continuous drainage was achieved. Patients 5 - 10 had temporary catheter drainage to relieve the jaundice before surgery. Jaundice was reduced in all these cases and patients had marked symptomatic relief before surgery. Although bile leakage was prominent in 2 cases at surgery, this did not appear to have any deleterious effect. The postoperative course was generally uneventful.

**DISCUSSION**

Sheathed needles were used for percutaneous cholangiography by a number of investigators before the development of the Chiba method. Some of these investigators

<table>
<thead>
<tr>
<th>Patient</th>
<th>Age</th>
<th>Sex</th>
<th>Diagnosis</th>
<th>Duration of drainage</th>
<th>Subsequent course</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>62</td>
<td>F</td>
<td>Ca. of pancreas with spread to porta hepatis</td>
<td>1 day (catheter dislodged)</td>
<td>Repeat attempts to introduce the catheter failed. The patient had a cholecystojejunostomy but was a poor surgical risk and died a few days after operation</td>
</tr>
<tr>
<td>2</td>
<td>74</td>
<td>F</td>
<td>Ca. of common bile duct</td>
<td>7 days (catheter dislodged)</td>
<td>Catheter could not be reintroduced. Cholecysto-enterostomy was performed. Patient died 4 weeks later</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
<td>F</td>
<td>Ca. of pancreas</td>
<td>2 days (catheter dislodged)</td>
<td>Reintroduction of catheter was unsuccessful. Patient developed ileus, was in congestive cardiac failure. General decline in condition with death 2 weeks later</td>
</tr>
<tr>
<td>4</td>
<td>85</td>
<td>M</td>
<td>Ca. of stomach with spread to porta hepatis</td>
<td>Since 6 March 1979</td>
<td>Excellent relief of pruritus</td>
</tr>
<tr>
<td>5</td>
<td>44</td>
<td>M</td>
<td>Ca. of pancreas</td>
<td>21 days</td>
<td>Jaundice reduced. Choledochoduodenostomy performed. Carcinoma was widespread. Subsequent course uneventful</td>
</tr>
<tr>
<td>6</td>
<td>60</td>
<td>M</td>
<td>Ca. of pancreas</td>
<td>9 days</td>
<td>Whipple’s operation performed. Subsequent course uneventful</td>
</tr>
<tr>
<td>7</td>
<td>41</td>
<td>M</td>
<td>Peri-ampullary Ca.</td>
<td>10 days</td>
<td>Whipple’s operation performed. Initial stormy postoperative period. Subsequent course uneventful</td>
</tr>
<tr>
<td>8</td>
<td>66</td>
<td>M</td>
<td>Peri-ampullary Ca.</td>
<td>7 days (catheter dislodged)</td>
<td>Jaundice level had been reduced and repositioning of catheter was not attempted. Whipple’s operation was performed</td>
</tr>
<tr>
<td>9</td>
<td>66</td>
<td>F</td>
<td>Metastases to head of pancreas from Ca. breast</td>
<td>10 days</td>
<td>Jaundice markedly reduced and Whipple’s operation performed</td>
</tr>
<tr>
<td>10</td>
<td>53</td>
<td>M</td>
<td>Stricture of common bile duct after surgery</td>
<td>10 days</td>
<td>Jaundice reduced. Choledocho-enterostomy performed. Subsequent course uneventful</td>
</tr>
</tbody>
</table>
Fig. 2. A catheter introduced over the guide wire is now positioned in the left hepatic duct. The guide wire has been removed.

Fig. 3. Adenocarcinoma of the common bile duct with obstruction of the duct above the cystic duct. A guide wire has been introduced through the tumour into the distal common bile duct.

Fig. 4. A catheter has been introduced over the guide wire and the normal distal common bile duct and duodenum are outlined.

Fig. 5. Mass in porta hepatis from carcinoma of the stomach with short stricture noted just proximal to the cystic duct (arrowed).
suggested the use of the catheter for drainage purposes, but it was Glenn et al. who first suggested catheterization for drainage as a separate procedure after cholangiography.

The two-step procedure for percutaneous transhepatic drainage has been successfully used in the management of patients with obstructive jaundice. The value of external decompression of the biliary system obstructed by a malignant tumour is emphasized by many authors, operative mortality, which used to be high in jaundiced patients with serum bilirubin levels above 10 mg/dl, has been significantly reduced. Continuous drainage may be used in inoperable cases, and a further extension of the procedure has been the successful balloon dilatation of benign bile duct strictures and stenotic anastomoses.

Introduction of the catheter into the outlined biliary tree is relatively easy under fluoroscopic control. The major problem that we have encountered has been catheter dislodgement, often in spite of meticulous immobilization of the catheter on the skin. Another less frequently encountered problem was the actual insertion of the catheter over the guide wire in the presence of ascites, as the catheter would advance to the point of entry in the biliary tree and then buckle between the liver and the abdominal wall.

When catheter drainage had continued for at least a week, the bilirubin level was reduced from over 20 mg/dl to under 10 mg/dl in all our cases. Surgery, which was often major, could be planned and carried out with relatively little postoperative morbidity. Continuous catheter drainage with relief of symptoms was achieved in patient 4 who was considered to be inoperable. Patients 1, 2 and 3 were considered candidates for continuous drainage, but the catheter became dislodged in these patients and could not be reintroduced. The procedure in these patients appeared to compound their already serious clinical situation.

An application that emerged from the procedure was that in patient 2 the malignant nature of the stricture could be confirmed by microscopic study of the aspirated bile. A further application was in patient 10 whose drainage catheter was left in situ during the operation and served as a valuable guide to the site where the reconstructive anastomosis was performed. The catheter was also useful for operative and postoperative cholangiography.

**CONCLUSION**

Transhepatic catheter drainage can play an important role in the management of patients with obstructive jaundice. The drainage may be temporary and designed chiefly for reduction of pre-operative jaundice or may be continuous in inoperable and poor-risk cases. Relief of symptoms such as pruritus may be dramatic. Despite the risk of early catheter dislodgement and bile leakage with attendant morbidity, it would seem that the advantages that may be gained make the procedure a logical next step after fine-needle cholangiography.

**REFERENCES**