East meets West
Historical investigation
of non-operative biliary interventions

Takao Itoi¹, Hiroaki Shimizu², Todd H Baron³

¹ Dept. of Surgery, Gastroenterology and Hepatology, Tokyo Medical University, Japan
² Department of Surgery, Teikyo University Chiba Medical Center, Chiba, Japan
³ Division of Gastroenterology and Hepatology, University of North Carolina,
Biliary interventions

PTBD

EBD

When, Who, Where?
Historical Review:

Percutaneous Transhepatic Cholangiography (PTC) &
Percutaneous transhepatic Biliary Drainage (PTBD)
Percutaneous Transhepatic Cholangiography (PTC)

- Puncture of the Gallbladder (cholecysto-cholangiography)

1920 Burckhardt, Muller (Dtsch Z Chir 162, 1921): German surgeon
  → Anticipating relief of colic attack and suppression of GB inflammation

- Puncture of the Intrahepatic bile duct (PTC)

  → Two cases with obstructive jaundice

* Serious complications (biliary peritonitis and hemorrhage)
* Requirement of laparotomy after PTC
1952 Carter RF, Saypol GM (JAMA, 148:253, 1952)

PTC in a patient with obstructive jaundice due to carcinoma at the hilum of the liver

Usefulness for Diagnosis of the Biliary Tract in Practice

Introduction of Roentgen Television Monitoring

1962 Arner O (Surgery 52:561, 1962)

Puncture approach:
Safer and more accurate procedure

Tokyo Medical University
Improvement of the Procedure and Equipment

- Puncture site and direction
  a. Anterior approach
  b. Lateral approach

- Puncture needle
  **Chiba needle:**

Manufactured thin, flexible “skinny” needle

- 15 cm in length needle with a stylet
- 0.7 mm in outer diameter, 0.5 mm in inner diameter
- Bevel angle of 30 degrees


1970 Okuda K (Digest Dis 19:21, 1974)
Percutaneous Transhepatic Biliary Drainage (PTBD)

PTC with a drainage catheter for prevention of bile leak and hemorrhage (modified PTC)


1962 Shaldon S (Gastroenterology 42:371,1962)
: The catheter was left for 14 days

1962 Arner O (Surgery 52:561,1962)

PTC needle sheathed with a polyethylene catheter


Bile drainage for the relief of the obstructive jaundice after PTC
: Catheterization of bile duct

Two step-procedure
PTBD for the treatment of obstructive jaundice after PTC

1969  Kaude JV (Radiology 93:69,1969) : The catheter was left for more than 2 months


“Relief of obstructive jaundice through percutaneous transhepatic catheter
-A new therapeutic method-”

1978  Nakayama T (Gastroenterology 74:554,1978)

**Two step-procedure**

Adequate positioning of the catheter

*using type J-guide wire*
Direct percutaneous transhepatic cholangial drainage under fluoroscopic control

Two-step method: Intrahepatic biliary trees projected to 2-D plane under fluoroscopy

1972  Takada T (Biologie et Gastro-Enterologie Tome 5,528, 1972)

Fig. 2. Procedure. I. First stage: percutaneous transhepatic cholangiography. II. Second stage: puncture for drainage under visual control by proceeding PTC.

Puncture of a dilated bile duct in the perpendicular ventrodorsal direction under fluoroscopic control

Percutaneous non-operative Cholangioscopy

1972  Takada T (Excerpta Medica, 18th International Congress Series 257:81,1972)

PTCS and forceps biopsy after expanding the fistula of PTBD
Ultrasound-guided PTC and PTBD

**US-guided PTC**

1977  Makuuchi M (Kanzo 57:435, 1977)


**US-guided PTBD**

Single-step procedure without cholangiography


Post-UG-PTBD Cholangiogram
Historical Review:

Endoscopic retrograde cholangiopancreatography (ERCP)
Retrograde cholangiopancreatography using peroral cannula

1965  Ravinov et al (Radiology 1965;85:693-7): American radiologist

→ Anticipating endoscopic retrograde cholangiopancreatography
Endoscopic retrograde pancreatography

Endoscopic cannulation of the Ampulla of Vater


Only pancreatography
Endoscopic pancreatocholangiography (EPCG)


1972  Cotton PB (Gut. 1972;13:1014-25).: British gastroenterologist

Gut, 1972, 13, 1014-1025

Progress report
Cannulation of the papilla of Vater by endoscopy and retrograde cholangiopancreatography (ERCP)

Preliminary Report on Endoscopical Papillotomy

Kawai, K., Y. Akasaka, Y. Hashimoto and M. Nakajima

In this paper, we want to report the preliminary results of endoscopic papillotomy, concerning the utility of this method and complications using experimental animals.

MATERIAL

Using five adult dogs, weighing 7 kg on the average, first, we confirmed the orifice of pancreatic and common bile ducts after laparotomy followed by duodenotomy under Fluothane or ketalar anesthesia. Secondly, pancreato- and cholangiography were performed using 65% of angiograffine through a venous catheter 3 Fr (atom), inserted through these two orifices (Fig. 1). Thirdly, we performed papillotomy using specially designed forceps (Fig. 2, 3), connected with ACOMA-II type (A.C. 100v, 1.5 kw) diathermy apparatus. Having confirmed no bleeding after papillotomy, we checked the pancreato-cholangiogram of these dogs 2 or 4
Endoscopic sphincterotomy of the ampulla of Vater

K. Kawai, M.D.
Y. Akasaka, M.D.
K. Murakami, M.D.
M. Tada, M.D.
Y. Kohli, M.D.
M. Nakajima, M.D.

Kyoto, Japan

Back to the future: the first papillotomy at Erlangen

Classen M. Gastrointest Endosc 2000;51:637

In the beginning

Kawai K. Gastrointest Endosc 2000;51:637-8
Back to the future: the first papillotomy at Erlangen

In medicine, nothing is more difficult than to determine the proper approach to a specific situation and then to plot out successful therapy. This was the case on June 6, 1973, in Erlangen. A 59-year-old nurse was admitted to our department with jaundice and right upper abdominal pain. She had a cholecystectomy in the past. Clinical and laboratory results made extrahepatic obstruction likely. The course seemed clear: an ERCP with confirmation and localization of the site followed by laparotomy. However, this situation developed in a different manner. Since 1968, Ludwig Demling and I had repeatedly tried to reach the papilla of Vater through the pylorus by using various endoscopes. Finally, in 1970 we were able to inspect the papilla on a regular basis, which represented an “almost erotic fascination for endoscopists” (Ludwig Demling), using the instruments of Olympus and Machida. In November 1970 we received the first JF duodenoscope from Olympus, and of the first 20 attempted cannulations, I was able to visualize either one or both duct systems 16 times. In one patient we had modestly dilated the orifice of the papilla with a regular polypectomy loop and considered the possibility of replacing surgical papillotomy with a less invasive approach. The papillotomy of Erlangen—mainly invented by Ludwig Demling—is based on the polypectomy loop.

Now back to June 6th. The nurse’s papilla had a large diverticulum next to it. The ERCP clearly demonstrated a stenosis of the papilla and a stenosis in the liver hilum. The papillotomy of Erlangen was inserted into the bile duct and electric current was applied, cutting in small increments until the yellowish biliary mucous membrane was visible. One stone was extracted with the Dormia basket.

Sadly enough, the patient’s jaundice persisted—probably due to the second stenosis. After negative forceps biopsies, we tried to endoscopically dilate the bile duct stricture using a balloon probe developed by our endoscopy nurse Rita Hohner. This procedure proved not to be completely satisfying, and the patient underwent successful surgery. This patient made it possible for us to perform the first endoscopic papillotomy as well as a gallstone extraction, a forceps-biopsy, and a balloon dilation. I performed regular checkups for many years and found no recurrence of stenosis. In March 1974 I left to continue my work in Hamburg. I will remember June 1973 in Erlangen because of its beautiful summer weather but mainly because of the first endoscopic papillotomy, which was associated with a massive response of my autonomic nervous system.

Dr. Meinhard Classen
Munich, Germany

REFERENCES

Classen M. Gastrointest Endose 2000;51:637

Tokyo Medical University
In the beginning

After the successful introduction of colonic polypectomy, we became interested in combining ERCP and electrosurgical techniques to incise the papilla of Vater. I searched the literature on surgical sphincterotomy or sphincteroplasty and found that a triangular papillotome was used successfully. Our design was a copy of this surgical knife, which was shaped like an arrowhead. After the point of the triangle was introduced into the papillary orifice, deeper insertion resulted in mechanical dilation of the opening. One edge of the triangle was electrically active and was used for experimental papillotomy in laboratory animals.

At the beginning of 1972, a push papillotome was designed by the Olympus technical group and enabled successful papillotomy without stenosis. We reported our experimental work in our university journal as “Report of endoscopical papillotomy” in 1973. We waited to apply this technique on a patient. The first case was a 48-year-old man with right hypochondrial pain after cholecysto-choledocholithotomy. ERCP confirmed a small residual stone at the end of the common bile duct. The patient refused a second laparotomy and the surgeon asked us to try endoscopic papillotomy (EPT), which was accomplished. One day later, August 10, 1973, ERCP showed the absence of a gallstone. The second case was a 29-year-old man, post choledocholithotomy, whose ERCP showed a residual round gallstone in the middle of the biliary tree. After EPT, we found a 5 x 5 mm cholesterol stone in the collected feces. Even after these two experiences, we were reluctant to ascribe the stone passage to the endoscopic treatment because of the possibility of spontaneous stone delivery.

However, the third case was very impressive and the effect of EPT was definite. In a 68-year-old woman, ERCP disclosed a dilated common bile duct and a giant stone. We asked the surgeon to permit EPT before laparotomy. Endoscopy showed swelling and hyperemia at the orifice of the papilla of Vater. After successful EPT, we awaited natural stone delivery. Two days later, the patient had colicky pain, and the next day we found a giant stone in the feces. The surgeon did not believe in our success, but at exploratory laparotomy, no stone was present. After this case we were convinced of the usefulness of endoscopic papillotomy.

Two years later we reported our experiences in “Endoscopic sphincterotomy” in the American Journal of Gastroenterology. The outline of my and Professor Demling’s presentation was introduced in OMGE News, World Gastroenterology, in May of 1995. Johann Wolfgang Goethe has said, “Science and art belong to the world as a whole and the barriers of nationality vanish before them.”

Dr. Keiichi Kawai
Osaka, Japan

REFERENCES


Kawai K. Gastrointest Endosc 2000;51:637-8
## Summary

<table>
<thead>
<tr>
<th>Procedures</th>
<th>West</th>
<th>East</th>
</tr>
</thead>
<tbody>
<tr>
<td>PTC</td>
<td>1937 Huard P</td>
<td></td>
</tr>
<tr>
<td>PTBD</td>
<td>1962 Glenn F</td>
<td></td>
</tr>
<tr>
<td>PTCS(Bx)</td>
<td></td>
<td>1972 Takada T</td>
</tr>
<tr>
<td>ERCP</td>
<td>1968 MaCune WS</td>
<td></td>
</tr>
<tr>
<td>EST</td>
<td>1973 Classen M</td>
<td>1973 Kawai K</td>
</tr>
</tbody>
</table>