FIBERDUODENOSCOPY AND ENDOSCOPIC PANCREATOCHOLANGIOGRAPHY

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Direct examination and biopsy of the esophagus and stomach using fiberoptic instruments has become a routine procedure throughout the world. In May 1968, we began to pass through the pyloric ring using the Machida Fibergastroscope. We then tested a number of experimental instruments with both forward and lateral viewing lens systems. We found the lateral viewing system superior, and since February 1969, have been using such an instrument, the Machida Fiberduodenoscope Model FDS-Lb.

This instrument was designed to rapidly enter the duodenum, to visualize and biopsy the entire duodenum to the ligament of Treitz, and finally to permit visualization and cannulization of the papilla of Vater. A number of lesions, including duodenal diverticula, ulcer and cancer, have been visualized and biopsied. X-rays of the pancreatic duct and biliary tract have been obtained by injection of contrast material through the cannula inserted into the papilla under direct vision.

MATERIALS AND METHODS

With the original Fiberduodenoscope (FDS-Lb) the papilla was observed in only 50% of cases. Since July 1969, duodenoscopes have permitted visualization of the papilla in 94% of cases. The latest instrument is 150 cm in length, has an external light source with two fiber bundles, air and biopsy channels. The rigid distal tip is only 2.8 cm in length and may be flexed 120° and extended 90° and rotated 60° in each direction. The lens has a 52° angle, with manual focus from 3.5 mm to infinity (Table 1). The biopsy forceps and the cannula are each 1.8 mm in diameter.

Duodenoscopy is performed in the same manner as gastroscopy, using only oropharyngeal topical anesthesia and intramuscular injections of Atropine and Buscopan. The patient is examined in the left lateral position. The scope is passed along the greater curvature of the stomach into the antrum.

The pylorus is then brought into the center of the field. The tip is maximally extended and we see the pyloric ring. The tip is then flexed and advanced gently through the pyloric ring. The bulb is then distended by air insufflation. The tip is extended and the scope is turned slightly to the right to see the superior duodenal angulus. The superior duodenal angulus marks the junction between the bulb and first portion. The angulus also marks the lesser curvature of the bulb as the gastric angulus marks the lesser curvature of the stomach.

The scope is then rotated to the right to see the lesser curvature toward the posterior wall and to the left to see the anterior wall. The proximal greater curvature cannot be seen with this instrument. The posterior wall is also usually a blind spot. Occasionally in a deformed bulb the anterior wall balloons out and ulcers on the posterior wall may be seen.

After the bulb has been examined, the scope is advanced and again turned to the right to see the superior duodenal angulus. As the angulus is approached the circular folds of the first portion are seen beyond. The tip is then flexed and the scope is turned to the right as it is advanced through the first portion. This is the most difficult maneuver in duodenoscopy.

Next we begin looking for the papilla of Vater. The papilla is usually seen in a prominent fold to the left side. The inferior duodenal angulus - the landmark between the second and third portions - is usually seen beyond the papilla. There is often a covering fold above the papilla. The orifice of the papilla often appears like a sea flower.

Sometimes spontaneous bile excretion is seen. If not, then pancreozymin (1 unit/kg body wt.) is injected intravenously and excretion of "B" bile is seen within three minutes.

The papilla may present a variety of appearances, including a flat reddish color or white orifice. Occasionally the accessory papilla of Santorini may be seen above the papilla of Vater. The accessory papilla of Santorini is usually seen above and to the right of the prominent fold in which the papilla of Vater is found. It has not been possible to cannulate the accessory papilla of Santorini but the pancreatic ducts are visualized in these cases by injecting through the papilla of Vater.

The third portion is identified by visualizing the inferior duodenal angulus. Occasionally the

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scope may be passed beyond the ligament of Treitz into the jejunum. (Figure 1)

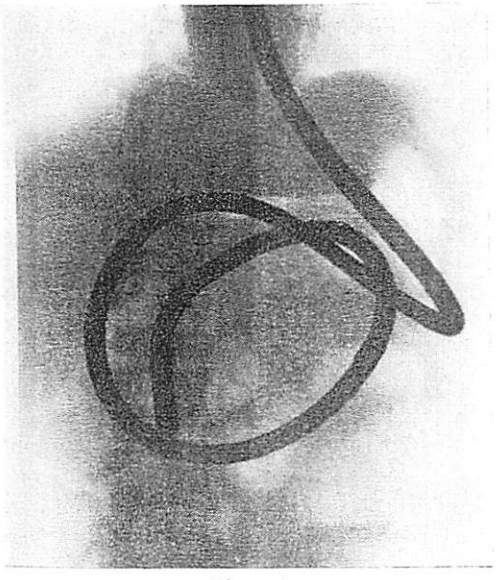

Figure 1

Cannulation also requires some experience. After an individual endoscopist successfully cannulates one case, he then has little difficulty. The cannulation tube is made of teflon with a metal bulbar tip. The cannula is filled with 60% urographin connected to a 20 cc syringe. First the papilla is brought into the center of the field. The cannula is inserted directly in the plane of the longitudinal fold and slightly upwards. The tube is advanced until resistance is felt (5 mm- 3 cm).

Dye is injected under continuous fluoroscopic control. Only enough dye is used to visualize the main pancreatic duct from head to tail. Usually only 2-4 cc are required. X-rays are then obtained of the pancreatic system. (Figure 2)

The cannula is then directed upwards using the cannula flexing mechanism and sometimes also by flexing the whole tip of the instrument. A small amount of dye is then injected and the common duct is seen. (Figure 3) Again injection is carried out under continuous fluoroscopic control. Only as much dye is used as is needed to fill the entire biliary system (5 - 30 cc, average 10 cc). Finally, X-rays are taken before and after the scope is withdrawn. If the dye has been cleared from the pancreatic system during filling of the biliary system, more dye may be injected before the scope is withdrawn from the patient.

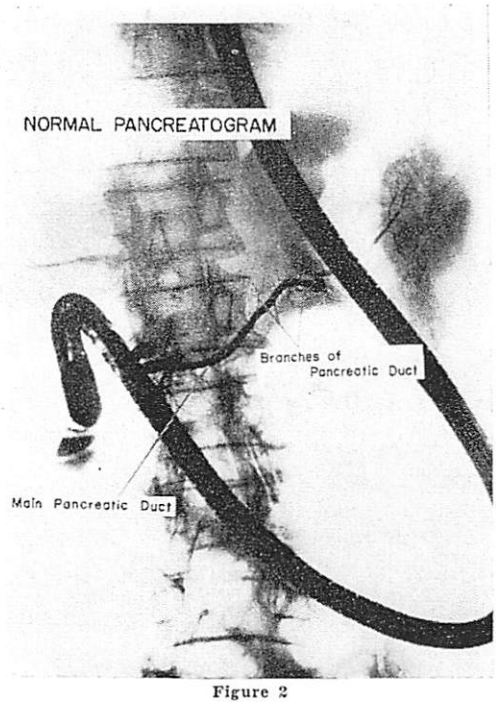

Figure 2

RESULTS AND DISCUSSION

To date we have performed more than 400 duodenoscopies. The later duodenoscopes have been used 261 times in 211 patients. Since July 1969 we have seen and biopsied a variety

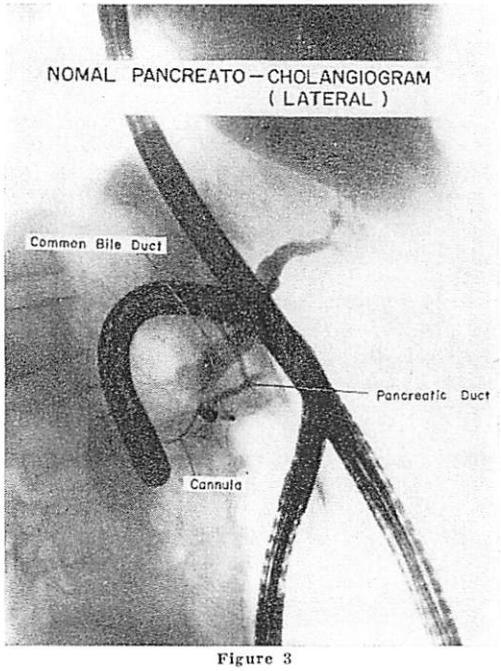

Figure 3

of duodenal, pancreatic and biliary lesions. In 150 cases of suspected duodenal ulcer, 120 ulcers were visualized by the duodenoscope. The other 30 patients had deformity suspicious for ulcer. Only 25 ulcers were seen with the gastroscope. All 31 patients who were operated upon had duodenal ulcer. We have seen not only single ulcers but also linear ulcers and multiple ulcers, including kissing ulcers.

We have visualized 12 duodenal diverticula and 14 benign duodenal tumors. Eleven of the tumors were located in the bulb, two in the second portion, and one in the third portion. One leiomyoma in the first portion was diagnosed by biopsy.

We have examined 24 patients with cancer. These were in the duodenum, pancreas or biliary system. All 24 went on to surgery. We made a positive diagnosis in 16 of these cases. Primary tumors of the duodenum and tumors involving the papilla of Vater, either primary or extension from the pancreatic head, were seen directly and biopsied. In addition, tumor-like protrusion of the papilla, compression of the duodenal wall, and eroded mucosa are suspicious for tumors beyond the papilla. We believe blood coming from the papilla is diagnostic of biliary cancer in itself.

Thus, we can see and biopsy tumors of the pancreas and biliary system which involve the papilla. In addition, cannulation of the papilla with injection of radiocontrast material may diagnose lesions beyond the papilla.

We first succeeded in filling the pancreatic duct in March 1969. This work has been verified by doctors Kobayashi, Takagi, Ogoshi, and others. Since September 1969 we have cannulated the papilla in 41 of 53 patients examined (77%). Both pancreatic and biliary systems were seen in 20 cases (38%). Only the pancreatic duct was seen in 19 cases and only the common duct in 2 cases. The biliary system is more difficult as the tip of the catheter must be turned precisely in the proper direction. This maneuver is not only necessary to fill the biliary systems but also must be done to keep from injecting too much dye into the pancreas which might produce pancreatitis.

We have had no significant complications directly attributed to this procedure. We have seen mild, transient elevation in serum amylase 3 - 6 hours after injection in a few cases. In the one case in which the amylase rose above 2000 units, 7 cc had been injected into the pancreatic duct. The injections should be monitored with continuous fluoroscopy to be sure only the minimum amount of dye needed is injected. The common bile duct should be injected directly instead of using overflow from the pancreatic injection.

The main pancreatic duct is seen from head to tail unless it is obstructed by a space occupying lesion. (Figure 4) The tumor caused

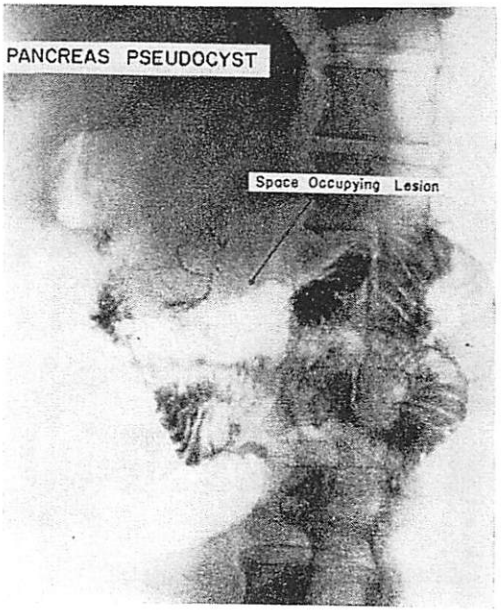

Figure 4

obstruction in this case in the mid body. The duct of Santorini is seen to the left.

Secondary branches are frequently seen, depending upon the amount of dye injected. The diameter of the normal main pancreatic duct measures 1 - 6 mm in the head, 1 - 4 mm in the body, and 1 - 3 mm in the tail. Some cases showed a dilated pancreatic duct when there was cancer of the head. The injected contrast material is cleared in a few minutes in normal cases.

In the normal biliary system, the common duct, the cystic duct, the gall bladder and the intrahepatic bile ducts are seen with a single injection. Figure 5 shows a dilated common duct with one stone in the duct and a number in the gall bladder. The dye in the pancreatic duct is gone. Spot films were available to show stones in the common duct.

One case showed complete block of the common hepatic duct by cancer. In one case of hepatoma, the gall bladder was compressed from above and the hepatic duct showed obstruction. There was irregular filling of the intrahepatic ducts.

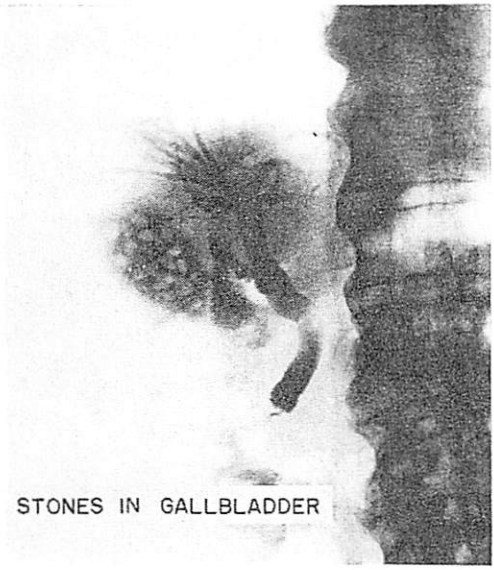

Figure 5

All of these cases of stone or cancer had negative oral and intravenous cholangiography. We have obtained cholangiograms by duodenoscopy in patients with bilirubin greater than 20 mgm/100 ml.

Abnormal findings included obstruction, stenosis, dilatation, dislocation, irregular duct wall and defect. Using these criteria, we have diagnosed 4 tumors of the head of the pancreas, 2 in the body, 3 in common duct, 1 hepatoma, and 1 retropancreatic tumor. There were 8 cases of gall stones, 4 in the gall bladder, and 4 in the common duct. Seven cases of possible chronic pancreatitis failed to show abnormal pancreatogram.

Large lesions of the pancreatic and biliary systems may be diagnosed by this technique. Small pancreatic tumors, pancreatitis, and cholangitis are as yet not diagnosed.

We conclude that duodenoscopy with endoscopic pancreatocholangiography is a new diagnostic procedure which has already demonstrated a variety of previously difficult diagnoses and promises even more in the future.

Fiber-Duodenoscope FDS

SPECIFICATIONS

Length:	Whole Length	1,465 mm
	Effective Length	1,300
Diameter:	Apical Rigid Part	12.0
	Flexible Part	11.0
Apical Rigid Part, Length		28.5
Angle Deflexion Part, Length		55
High Flexible Part, Length		175
Spiral Ribbon Construction		Fourfold
Visual Direction		Lateral
Focusing Dial		+
Depth of Focus		3.5 - Inf.
Field of Vision		52°
Angle Deflector:	Up	120°
	Down	90°
Panning (Apical Rotation), Left and Right		60°
Position of Forceps Out-Let		Right Side
Forceps Channel, Inside Diameter		2.0
Forceps Direction Control		+(40-90°)

ENDOSCOPIC EPONYM

Compton's pouches: temporarily inflated submandibular branchial pouch remnants, producing bilaterally symmetrical swelling below the mandibular angles, developing during peroral endoscopy. (E.D.P.)