

Retrospective Study of Juxtapapillary Duodenal Diverticula

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Juxta papillary duodenal diverticulas were identified in 24 (5.8%) of 412 patients undergoing endoscopic retrograde cholangiopancreatography and in 113 (2.0%) of 5573 patients undergoing barium meal X-ray. The incidence of cholelithiasis in patients with diverticula was 58.3% in the ERCP study and 29.2% in barium meal X-ray study. Hepatobiliary scintigram using $^{99m}\text{TcPI}$ revealed the bile stasis in some cases with JPDD.

Introduction

Though duodenal diverticulas are not uncommon being first described by Chomel in 1710, the relationship of these diverticulas to biliary disease has remained an interesting but unsolved, question. Although generally asymptomatic, duodenal diverticula, particularly juxtapapillary duodenal diverticula (JPDD), may cause the mechanical compression and inflammation of the pancreaticobiliary system. An inflammatory process at the openings of both biliary and pancreatic ducts may impede the flow of bile and pancreatic secretions.

The aim of this study was to determine the incidence of JPDD using barium meal X-ray and endoscopic retrograde cholangiopancreatography (ERCP) and to evaluate the influence of JPDD on the biliary tract by using hepatobiliary scintigram.

Subjects or Material

This study included all of the 5573 patients undergoing barium meal X-ray, 412 patients undergoing endoscopic retrograde cholangiopancreatography and 367 patients undergoing hepatobiliary scintigram using $^{99m}\text{TcPI}$ at Tsushimi surgical hospital during the 3 years period from 1980 to 1982.

The patients with JPDD were compared to those without diverticula to determine the relationship between the presence of diverticula and biliary disease. The radiological findings by ERCP were required to visualize JPDD with biliary figure. Among 367 patients undergoing hepatobiliary scintigram using $^{99m}\text{TcPI}$, 24 patients with JPDD were compared with ten patients having no biliary disease from the clinical investigation and or clinical course. ERCP was performed as previously described²⁸⁾. Hepatobiliary scintigram was performed in the fasting state after administering an intravenous injection of 5 mci of $^{99m}\text{TcPI}$. Serial scintigrams were

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obtained by scintillation camera equipped with a high resolution parallel collimeter (Toshiba GCA101) for 60 minutes after the injection of the tracer, and the biliary figure were collected every 5 minutes after the injection.

Result

Among 5573 patients examined using barium meal X-ray, duodenal diverticulas were identified in 125 (2.2%). If all JPDD are included in second portion, the incidence would be 2.0%. Ninety-four patients (75%) were over 50 years old and 60 (48%) were over 60 years old (Table 1). The number of simple duodenal diverticula was 112 (89%); the remaining 11% were multiple, the size could not be accurately measured because it was influenced by the volume of barium and air. Disease associated with duodenal diverticula are shown in table 2. Cholelithiasis was seen in 33 (29.2%) among 113 patients and 44 patients (38.9%) had associated hepatobiliary disease in second portion. Abdominal ultrasound was performed in all patients examined using barium meal X-ray and 387 cases of cholecystolithiasis were found. Choledocholithiasis were confirmed in 24 cases by ERCP and PTC, therefore 411 cholelithiasis were found in this hospital, thirty three of the 411 patients with cholelithiasis had duodenal diverticula (8.0%), while 378 of 5460 patients without JPDD had cholelithiasis (6.9%) (Table 3).

Among 412 patients examined using ERCP, 24 biliary figure with JPDD were visualized (5.8%), 17 patients were over 60 years old (71%), (Table4). Disease associated with JPDD are shown in Table 5. Fourteen of 24 patients had cholelithiasis (58.4%). Seventy four of the remaining 388 patients with cholelithiasis had JPDD (15.9%) (Table6). Nine of 14 patients with cholelithiasis had bilirubinate stone (66%). Seven of 53 patients with cholecystolithiasis had JPDD (13.2%) and 7 of 35 choledocholithiasis had JPDD (20%) (Table 7). The site of JPDD was classified into 2 types according to roentgenographic findings of ERCP. Namely, the

Table 1. No. of duodenal diverticula. Age and sex by barium meal X-ray

Age*	II nd portion	III	IV	Total
10 - 20	1			1
20 - 30	4			4
30 - 40	8	2		10
40 - 50	14	1	1	16
50 - 60	31	5	1	37
60 - 70	26	2	1	29
70 - 80	25	2		27
80 - 90	4			4
Total	113 (90%)	9 (7.2%)	3 (2.8%)	125
Sex				
Male	40	6	1	47
Female	73	3	2	78

* Age range 14-87 yr., average 63 yr.

Table 2. Associated disease with duodenal diverticula

gastric cancer	9
gastroduodenal ulcer	28
gastric polyp	4
colon cancer	2
hiatal hernia	2
colon diverticula	3
hepatoma	2
cancer of gallbladder	1
cancer of pancreas	1
cholelithiasis	33
pancreatitis	4
hepatitis	3
only duodenal diverticula	33
Total	125

Table 3. The presence of cholelithiasis and duodenal diverticula in patients examined with barium meal X-ray.

	Cholelithiasis	Barium meal X-ray
Patients with diverticula	33	113*
Patients without diverticula	378	5460
Total	411	5573

* diverticulas in second portion.

common bile duct enters the ampulla within the JPDD, or close to the neck of the JPDD. Biliary figure was visualized in the former site in one case in the latter site in 22; the remaining one patient was of the combined type. Fourteen patients having associated cholelithiasis were

Table 4. Age and sex in JPDD by ERCP

Age*			Sex	
			Male	Female
50	60	7	4	3
60	70	7	4	3
70	80	7	2	5
80	90	3	1	2
Total			24	13

* Age range 54-83 yr., average 67.4 yr.

Table 5. Disease associated with JPDD by ERCP

cholelithiasis	14
gastroduodenal ulcer	3
hepatitis	1
pancreatitis	3
only JPDD	3
Total	24

Table 6. The presence of cholelithiasis and duodenal diverticula in patients examined with ERCP

	Cholelithiasis	ERCP
patients with diverticula	14	24
patients without diverticula	74	388
Total	88	412

Table 7. The incidence of JPDD in cholelithiasis

	Patients with JPDD	ERCP
cholecystolithiasis	7	53
choledocholithiasis	3	21
cholecysto-choledocholithiasis	4	14
Total	14	88

Table 8. Hepatobiliary scintigram using $^{99m}\text{TcPI}$ in JPDD

$^{99m}\text{TcPI}$	Cholelithiasis		Without cholelithiasis	Total
	cholecystolithiasis	choledocholithiasis*		
normal excretion	7	3	7	17
prolonged excretion		4	3	7

* cholecystocholedocholithiasis are included.

operated, 7 patients with cholecystolithiasis underwent cholecystectomy and 7 choledocholithiasis underwent choledochotomy and sphincteroplasty; 2 patients underwent the treatment for JPDD with sphincteroplasty. As operative method for JPDD, excision and two-layer closure, and inversion were performed, these surgical treatments were required because of disturbance of sphincteroplasty. The postoperative course was uneventful.

Each of 10 normal patients showed good liver concentration of the tracer at the end of the first 10 minutes, within 25 minutes common bile duct and duodenum were visualized and gallbladder and intestinal tract were visualized within 60 minutes, but the gallbladder was not seen in one patient because of advanced age (74 years). In 3 of 10 JPDD patients without cholelithiasis, $^{99m}\text{TcPI}$ was only slightly excreted to the intestine but the concentration was high in the bile duct and duodenum (Fig. 2), identical findings were seen after 120 minutes. The remaining 7 patients showed normal excretion. In 7 JPDD patients with choledocholithiasis, serial images showed the dilated choledochus but no visualization of the gallbladder. Three patients showed normal excretion but in 4 patients, duodenum was not visualized after 60 minutes. In 7 JPDD patients with cholecystolithiasis, all of them showed the normal excretion but gallbladder was not visualized in 6 patients (Table 8).

Cases

Case 1.

A 58-year-old male visited our hospital complaining of epigastric pain. Abnormal findings were not seen by abdominal US. Duodenal diverticulas were found in the second portion by barium meal X-ray but gastric lesion was not seen. Laboratory test showed high serum alkaline phosphatase and hyperamylasemia. JPDD with the biliary tree and pancreatic duct were visualized in ERCP (Fig. 1). In hepatobiliary scintigram, the common bile duct was visualized within 25 minutes but $^{99m}\text{TcPI}$ was only slightly excreted into intestine; the concent-

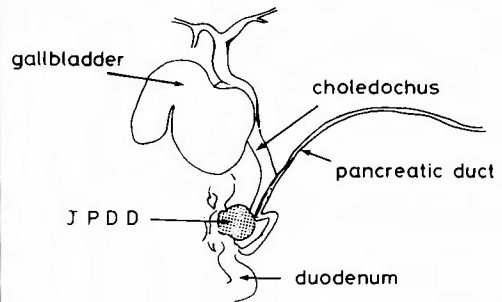
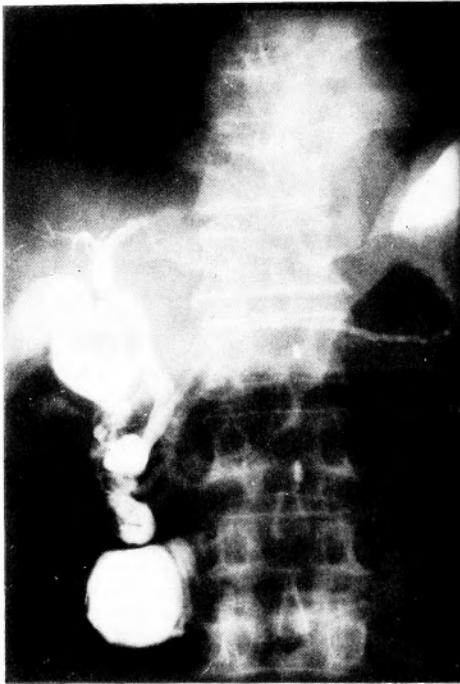


Fig. 1. ERCP shows single JPDD and choledochal dilatation. Cholelithiasis is not seen.

ration in duodenum increased after 60 minutes. (Fig. 2).

Case 2.

A 62-year-old male was admitted to our hospital complaining of right hypochondrial pain. Ultrasound demonstrated a gallstone in the gallbladder but gallbladder was not visualized by drip infusion cholangiography. ERCP showed no visualizing gallbladder and multiple JPDD; the common bile duct opening was located with sac (Fig. 3). Gallbladder also was not visualized by hepatobiliary scintigram but $^{99m}\text{TcPI}$ was excreted into intestinal tract within 60 minutes (Fig. 4). He underwent only cholecystectomy.

Case 3.

A 77-year-old male visited our hospital complaining of hypochondrial pain. Ultrasound demonstrated a stone at the common bile duct and choledochal dilatation (Fig. 5). ERCP showed JPDD at the near narrow distal segment and a gallstone at the common bile duct (Fig. 6). Hepatobiliary scintigram showed a dilated choledochus, no visualizing gallbladder or stenosis at the distal common bile duct was suspected (Fig. 7). He underwent cholecystectomy, choledochotomy, and sphincteroplasty but treatment for JPDD was not performed.

Discussion

The incidence of juxtapapillary duodenal diverticula (JPDD) in the group of patients undergoing barium meal X-ray was 2.0%, but in the group of patients undergoing endoscopic

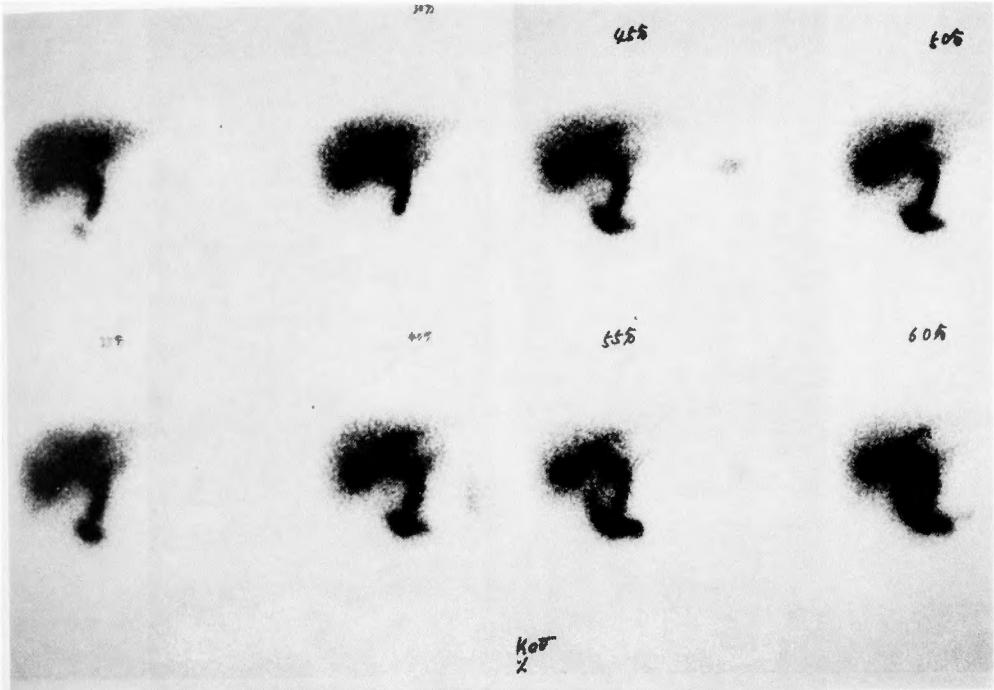


Fig. 2. Hepatobiliary scintigram using $^{99m}\text{TcPI}$ suggests bile stasis

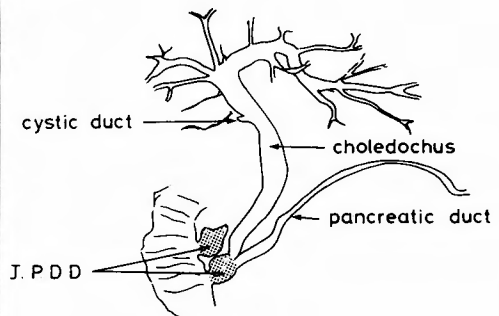
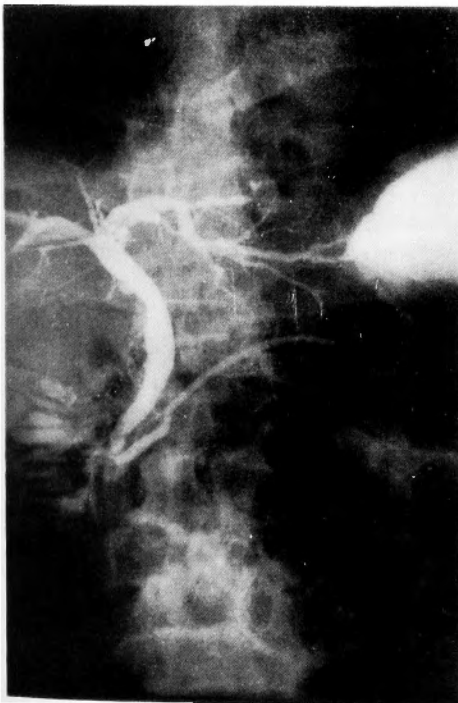


Fig. 3. ERCP shows no visualizing gallbladder or multiple JPDD. Common bile duct opening lies with diverticula.



Fig. 4. Hepatobiliary Scintigram shows no visualizing gallbladder, ^{99m}TcPI was excreted within 60 min.

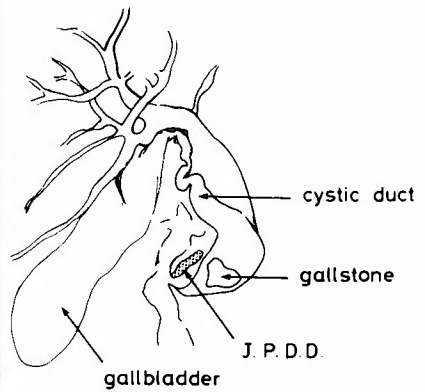
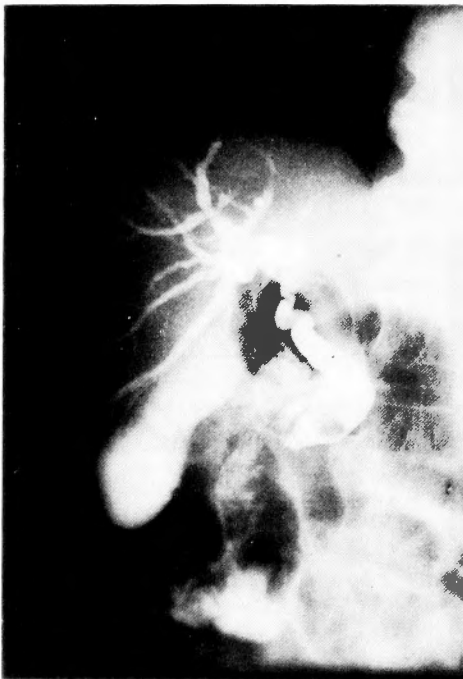


Fig. 5. ERCP shows choledocholithiasis with JPDD

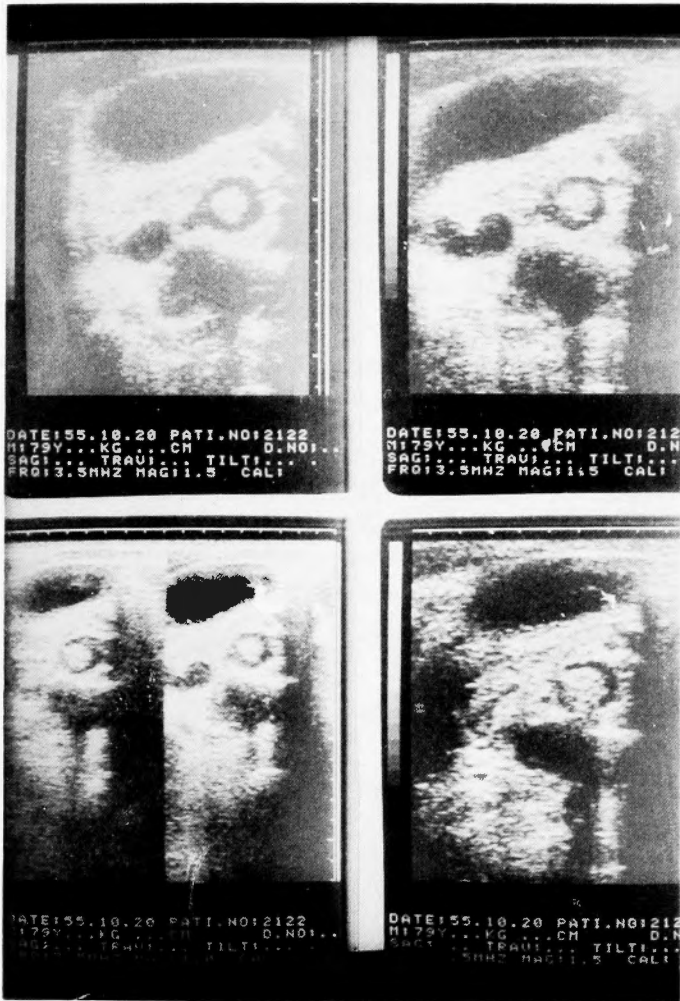


Fig. 6. Ultrasound demonstrates the dilatation of gallbladder and choledochus. Choledocholithiasis was noted.

retrograde cholangiopancreatography (ERCP) it was 5.8%. Previous studies have shown that the incidence of JPDD varies depending on the method of examination such as: barium meal X-ray (0.06% and 5.8%)^{3,8,15}, endoscopic examination (5% and 23%)^{9,11,16,21}, and postmortem examinations, 2.2-22%.⁸ In our series, the incidence of JPDD observed by ERCP was higher than by barium meal X-ray. In the ERCP study the sex ratio was approximately equal but female predominance was seen in the barium meal X-ray study. A review of the literature of both barium meal X-ray and autopsy studies reveal no significant difference in sex distribution. Duodenal diverticula are comparatively rare in patients under the 40 and the peak incidence usually occurs between 50 and 70 years of age^{2,8,16,17}, average age was sixties in both studies but none of our patients was less than the age of 54 years in ERCP study. Single diverticula was seen in most cases, the ratio of single to multiple was about 9 to 1, similar to that of previous reports^{9,17}. The high frequency of cholelithiasis and gastroduodenal disease with JPDD

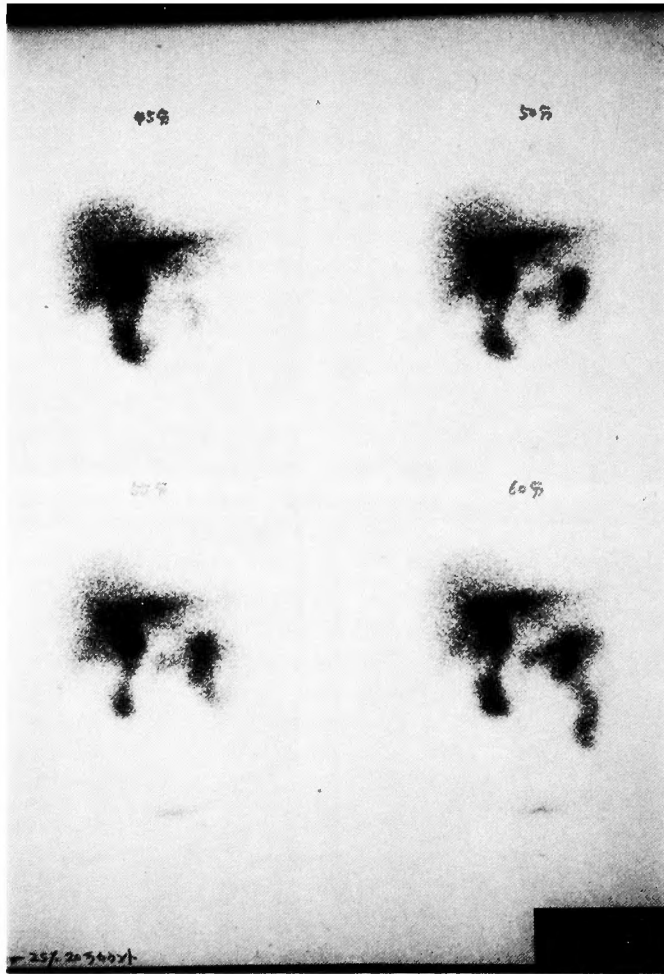


Fig. 7. Hepatobiliary scintigram shows the dilatation of choledochus, $^{99m}\text{TcPI}$ was excreted to intestine within 60 min.

was noted. Although the relationship of gastroduodenal disease and JPDD is an important one, there does not seem to be any cause and effect relationship. The presence of JPDD has been associated with an increased incidence of biliary and pancreatic disease,²¹ the incidence of cholelithiasis in patients with diverticula was 29.2% in barium meal X-ray study, slightly higher than that described by MIYAGI¹⁷ (18.8%), ANAZAWA¹³ (24.1%), NAKANO¹⁸ (18.5%), CHITAMBER³ (13.3%), JONES⁸ (22%), and LANDOR and FULKERSON¹⁰ (31%); and 58.3% in the ERCP study, it was 58.3% also higher than that described by KIRK⁹ (48%), ITOH¹⁷ (35%), MATSUKAWA¹⁶ (49%) with the exception of OSNES²⁰ (86.1%). The incidence of cholelithiasis without JPDD was 6.9% in barium meal X-ray study and 19% in ERCP study. These studies showed that incidence of cholelithiasis was significantly higher in patients with JPDD than those without, suggesting that JPDD plays an important role in cholelithiasis. On the other hand, the incidence of JPDD in patients with cholelithiasis was lower than that described by

OSNES²¹⁾ 40.7%, VAN DER SPUY²⁷⁾ (20.1%) and SAITO²⁴⁾ (32.8%). A high incidence of cholelithiasis in patient with the common bile duct and pancreatic duct entering ampulla within the diverticula was reported⁵⁾, in our series, only two patients showed the common bile duct entering ampuller within sac; these patients did not have gallstone but did show hyperamylasemia and high serum alkaline phosphatase. The present study revealed that patients with diverticula and gallstones have predominant bilirubinate stone and an insufficient choledochoduodenal sphincter^{2,25)}, bile stasis and bacteriocholia^{6,13)} and recurrence of biliopancreatic symptoms^{14,22)}.

Serial scintigraphic image using ^{99m}TcPI are available for evaluating liver cellular functions and abnormalities of the biliary system.^{19,26)} We found no significant difference between cholelithiasis with JPDD and without using ^{99m}TcPI. However bile stasis was suspected in 3 JPDD patients without cholelithiasis, that is, it was suspected that the common bile duct was influenced by JPDD.

PINOTTI,²³⁾ and OHNISHI⁴⁾ recommend the resection and sphincteroplasty in cases of JPDD with cholelithiasis. It is generally agreed the surgical treatment is indicated when any of the complications, such as perforation and inflammatory changes lead to duodenal obstruction, bleeding, fistula formation, abscess or peritonitis. Two patients underwent the surgical treatment for JPDD and 12 patients underwent only the surgical treatment for cholelithiasis in our hospital. Although the duration of post operative follow-up was short, recurrent gallstone and severe complaints were not seen and 10 patients without cholelithiasis were controlled by medical treatment.

Summary

When barium meal X-ray demonstrates duodenal diverticula in second portion, it is necessary to perform ERCP in order to elucidate the relationship between diverticula and common bile duct. The presence of JPDD showed an increased association with cholelithiasis and it may play an important role in gallstone formation. Hepatobiliary scintigram using ^{99m}TcPI revealed the bile stasis in some cases with JPDD. When symptomatic JPDD is suspected after excluding the associated disease or other causative diseases, medical treatment is advocated. Cholecystectomy and sphincteroplasty should be performed for JPDD with cholelithiasis as a first choice. It is important to carry out post operative follow-up using ultrasound, ERCP and laboratory test, and when recurrence of gallstone is found or symptomatic JPDD continues for a long time, surgical treatment may be necessary.

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傍乳頭憩室症に関する検討

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1980年より1982年迄の3年間に都志見病院で施行された412例の ERCP, 5573例の上部消化管透視, 及び367例の胆道シンチを検討した。上部消化管透視にて, 十二指腸憩室が下行部に認められれば憩室と総胆管の関係を知るうえで ERCP を施行する必要がある。傍乳頭憩室の頻度は ERCP で5.8%, 上部消化管透視で2.0%であった。胆石症の合併頻度は高く, ERCP で58.3%, 上部消化管透視で29.2%であり, 又傍乳頭憩室を伴わない症例における胆石症の合併頻度より有意に高く, 胆石症において重要な役割を担っていると

思われた。ERCP で認められた24例の傍乳頭憩室に^{99m}TcPI による胆道シンチを行い, 一部の症例で胆汁うっ滞を認めた。24例中2例に外科処置が加えられたが, 胆石症を伴わない症例は内科的に充分コントロールできた。胆石症を伴う症例に対し, 胆嚢摘出術及び乳頭形成術が最初に選択されるべき方法であるが, 術後, 超音波検査, ERCP, 臨床検査で経過観察を行うことが重要であり, 胆石の再発や傍乳頭憩室による症状が持続するようであれば, 憩室に対する外科的処置を行う必要がある。