Biliary Cysts

D. PRESTON FLANIGAN, M.D.*

This review brings the total number of biliary cysts reported in the world literature to 955. Eighty-one per cent of patients are females and 61% were discovered before age ten. The classical triad of right upper quadrant pain, right upper quadrant mass, and jaundice is present in 38% of cases. The duration of symptoms prior to diagnosis ranged from less than one week to more than 40 years. The etiology is multifaceted and evidence of the existence of both acquired and congenital cysts is presented. The most useful diagnostic tool is fiberoptic endoscopy with retrograde contrast injection of the common bile duct and pancreatic duct. The incidence of biliary carcinoma in patients with biliary cysts is found to be 2.5%; 24 cases have been reported. Considerable controversy has existed concerning the best operative procedure for biliary cysts; no treatment or medical treatment yielding a 97% mortality rate. In an analysis of 235 patients presented since 1968 with an average followup of 5.2 years, the best procedure appears to be excision with either choledochocholedocostomy or Roux-en-Y hepaticojejunostomy. The operative mortality for all procedures is now 3 to 4%.

CYSTIC DILATATIONS of the biliary tree have been reported in many forms and by far the most common location is the common bile duct, or choledochus, hence the term choledochal cyst. Although Vater[1] is often cited as reporting the first case in 1723, the first well documented case was reported by Douglas[2] in 1852 in which he presented a biliary cyst in a 17-year-old girl. By 1909, Laverson[3] had collected 28 cases and Waller[4] presented 35 cases in 1917. Following these reports were series by McWorter (1924),[5] Seneque and Tailhefer (1929),[6] Zinninger and Cash (1932),[7] Clarke (1932),[8] Gross (1933),[9] Yotsuyanagi (1936),[10] Walton (1939),[11] Bangerter (1941),[12] and Poate and Wade (1941).[13] In 1943, Shallow, Eger, and Wagner[14] collected from the World's Literature 182 cases of which they felt 175 cases were authentic enough to be included in their report. In 1956, Tsardakas and Robnett[15] added 67 cases to bring the total to 242. By 1959, another 161 cases were presented by Alonso-Lej[16] for a total of 403 cases. Lee[17] brought the total number of cases in the World's Literature to 500 by adding an additional 97 cases in 1969. Since Lee's report, no complete reviews have been published. Between 1969 and February 1975, 451 new cases have been reported[18–37,39–46,48–139] and an additional four cases are briefly presented in this review. Since the publication of Lee's study in 1969, new theories of etiology have been proposed, new types of biliary cysts or dilatations have been described, new diagnostic methods have been developed, and additional information regarding operative management is now available and are discussed in this report.

From the Department of Surgery, St. Joseph Mercy Hospital and the Department of Surgery, University of Michigan Medical Center, Ann Arbor, Michigan.

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*Resident, Department of Surgery, St. Joseph Mercy Hospital, 326 North Ingalls Street, Ann Arbor, Michigan 48104.

Reprint requests: Richard O. Kraft, M.D., St. Joseph Mercy Hospital, 326 North Ingalls Street, Ann Arbor, Michigan 48104.

Case Report

R. J., a 33-year-old Caucasian man, underwent cholecystectomy for right upper quadrant pain in 1965. At the time of operation, no abnormalities of the common bile duct were noted. His post-operative course was unremarkable.

In 1966 he had intermittent pain similar to that he had experienced one year previously. No masses were palpated on physical exam. Serum alkaline phosphatase was normal and serum bilirubin was 2.6 mg%. An upper gastrointestinal series was normal, but two separate

TABLE 1. *Tabular review of the four new cases presented in this report:*

Patient	Age, Sex, Race	P†, M†, J†	Duration of Symptoms	Type of Cyst	Operation and date	Complications	Date Last Followup
M. R.*	41 yr, M, C‡	+ − −	?	I	1.CCD April, 1956	Cholangitis	
					2. RYCCJ Feb. 1971	Intermittent Cholangitis	Feb., 1975
T. R.	4 mo, F, N	− + +	1 mo	I	1. CCD Feb. 1973	Doing Well	Feb., 1975
J. M.	9 yr, F, C	− + +	1 mo	I	1.CCD July 1969	Doing Well	Feb., 1975
R. J.	33 yr, M, C	+ − −	1 day	None	1. Cholecystectomy March 1965	RUQ Pain	
				I	2. CCD Aug. 1966	Jaundice RUQ Mass	
					3. RYCCJ April 1973	Jaundice RUQ Mass	
					4. Revision RYCCJ May 1974	Adenocarcinoma, Cholangitis Gastric Outlet Obstruction	
					5. Gastrojejunostomy July, 1974	Died, July, 1974 Cholangitis and Sepsis	
R. S.	47 yr, M, C	+ − +	6 yr	I	1. Excision with RYHS Feb. 1975	Doing Well	Feb., 1975

*Previously Reported[18]
†PMJ = Pain, Mass, Jaundice.
‡Caucasian, Negro

CCD = Choledochocystduodenostomy
RYCCJ = Roux-en-y choledochocystjejunostomy
RYHJ = Roux-en-y Hepaticojejunostomy

intravenous cholangiograms failed to visualize the biliary tree. The diagnosis of common bile duct stone was entertained and the patient was taken to surgery. At the operating table, a 6 cm by 6 cm Type I biliary cyst was found which involved the extrahepatic biliary tree. The lack of involvement of intrahepatic biliary radicles was shown on an operative cholangiogram. The second portion of the duodenum was opened and explored and no Type III lesion was found. Clear fluid (probably pancreatic juice) was seen coming from the ampulla of Vater, but no bile could be seen coming from the ampulla. Green bile, however, was present in the nasogastric aspirate, but no gastrobiliary fistula could be demonstrated by contrast roentgenology at the operating table. Three small stones were removed from the common bile duct cyst and a standard choledochocystduodenostomy (CCD) was performed. Postoperatively the patient did well.

When seen in 1973 the patient had clinical signs of jaundice and a right upper quadrant mass. The diagnosis of obstructive jaundice was made and at operation a firm mass was found in the porta hepatis. A Roux-en-Y choledochocystjejunostomy (RYCCJ) was fashioned. No biopsy was taken.

In 1974 the patient again had obstructive jaundice and underwent revision of the RYCCJ with Y-tube drainage. The same firm mass was palpated and biopsy revealed well differentiated infiltrating adenocarcinoma of the common bile duct. The patient did well postoperatively but returned in June 1974 with a gastric outlet obstruction secondary to an extrinsic mass-lesion. This was felt to be secondary to the biliary carcinoma and a palliative gastrojejunostomy was performed. With the exception of a bout of cholangitis, he did well postoperatively only to return one month later with recurrent gastric outlet obstruction, obstructive jaundice, dehydration, cholangitis, and septic shock which resulted in his demise.

Three additional new cases and the above case are presented in Table 1. They have only been included for their statistical value since they contain no unique findings. Additional followup on a previously reported case M. R.)[18] is also included in Table 1.

Pathology

Originally three types of biliary cysts were described. Tsardakas[15] termed Type I "congenital cystic dilatation of the common bile duct." In Type I, there is usually a distal narrowing of the common bile duct with the cyst proximal to the point of narrowing. Occasionally the common bile duct distal to the cyst is found to be normal. The remainder of the biliary tree is usually normal, however, this is not always so. The cystic dilatation may extend into the hepatic ducts and into the intrahepatic biliary radicles. The cystic duct may enter the cyst or may enter a normal common bile duct proximal or distal to the cyst. A Type I cyst may on occasion extend distal to the junction with the pancreatic duct.[20] For the sake of comparison, the format used by Saito[19] is followed here, and thus, all cases in which there is diffuse dilatation of both intrahepatic and extrahepatic ducts are included in Type I cysts.

Type II is actually a common bile duct diverticulum usually arising laterally. Type II, or choledochocele, is a dilatation of the intraduodenal portion of the common bile duct and is often associated with duodenal obstruction.

In 1939, McWorter[149] described the association of

TABLE 2. *Age of Patients at time of diagnosis (820 Cases).*

< 1 yr	1-10 yrs	11-20 yrs	21-30 yrs	> 40 years
25%	35%	16%	15%	8%

multiple intrahepatic biliary cysts with multiple Type II cysts. Since that time, a total of 32 cases have been reported[20] in which there is an association of intrahepatic with extrahepatic biliary cysts. Also intrahepatic biliary cysts have been described in the absence of extrahepatic cysts. These intrahepatic cysts can occur as an isloated lesion or associated with polycystic disease or congenital hepatic fibrosis. In 1958, Caroli[151] reported the association of intrahepatic and extrahepatic biliary cysts and often this type is called Type IV, or Caroli's disease. In this report, all cases of multiple cysts, regardless of shape and location, are classified as Type IV cysts. In addition, the small number of solitary intrahepatic cysts are also included in this category. In 1973, Klotz[20] presented 4 patients and included an additional 5 patients previously reported in whom there were biliary cysts associated with some form of biliary atresia, and Kasai[21] in 1970, reported 8 more patients with this association. The histopathology of the cysts consists of a fibrotic wall which may or may not be lined with epithelium. An attempt was made in this review to correlate the presence or absence of an epithelial lining with congenital versus acquired types of cysts. No correlation could be found. When present, the epithelium is cylindrical or cuboidal and irregularly stained with bile pigments. The remainder of the cyst wall consists of dense, collagenous connective tissue with occasional elastic fibers and smooth muscle. Often an inflammatory reaction is present. The thickness of the wall has been reported from 2 mm to 10 mm.[14] The cysts are filled with bile, the character of which depends on the presence or absence of the gallbladder, and the degree of obstruction. Various sized cysts have been reported ranging from 1 cm and containing only a small amount of bile to cysts containing over 5000 cc of fluid.[14] The fluid may be sterile or may contain practically any combination of bacteria including staphylococci and streptococci, but with gram negative rods predominating. Seventeen cases of cystlithiasis have been reported;[16,21-27,148] two additional cases are R.J. and R.S. presented above.

Statistical Analysis of Cases

The incidence of biliary cysts can still be considered rare. During the 6-year period 1968 to 1974, only 4 new cases could be found at both the University of Michigan Hospital and St. Joseph Mercy Hospital in Ann Arbor. It is generally accepted that there is a predominance in the Japanese (over one-third of the cases are from Japanese literature). In an analysis of 820 cases, 81% of the patients were females. The age of patients at the time of diagnosis was quite variable (Table 2). Over one-fourth of the patients were less than one year of age (many were neonates), and over one-half were less than ten years of age. The fact that there are so many young patients is often used to support the congenital theories of etiology, however, it should be noted that 23% of patients seen are over 40 years of age. Whether this latter group has a congenital predisposition or their cysts were acquired secondary to some other disease of the biliary tree, is an area of great controversy.

The classical clinical presentation of biliary cysts is said to be a triad of right upper quadrant mass, abdominal pain and jaundice. Of 740 cases, only 38% presented with a classical triad. Jaundice was present at some time in 64%, a mass was found in 58%, and pain was part of the presenting symptomatology in 55% of cases (Table 3). The duration of the symptoms could be ascertained in 422 patients. It can be seen from Table 4 that most patients have symptomatology for a substantial amount of time prior to diagnosis. It is not at all unusual to elicit a history of many years of intermittent right upper quadrant pain and jaundice in the elderly patient with a biliary cyst.

In the 760 cases in which the type of cysts were mentioned, 86.7% were Type I, 3.1% Type II, 5.6% Type III, 2.6% Type IV and 2% were associated with biliary atresia (Table 5).

Etiology

The multiple theories of the etiology of biliary cysts have been described very well in Shallow's[14] and Saito's[19] reviews of the subject. The major controversy concerns congenital versus acquired origin of the cysts. Multiple theories concerning the mechanisms of formation of acquired cysts as well as mechanisms of formation of congenital cysts were presented in those reports. At the time of his publication, Shallow suggested that Yotsuyanagi's theory[10] was the most sound and accounted for the greatest number of cases. Other authors including Saito have since agreed.[15-17,19,20] Yotsuyanagi suggested that there is an inequality of proliferation of epithelial cells at the stage when the primitive biliary ducts are still

TABLE 3. *Presenting Symptoms (740 Cases).*

Jaundice	Mass	Pain	Triad
64%	58%	55%	38%

TABLE 4. *Duration of symptoms prior to diagnosis (422 Cases).*

< one wk	1-4 wks	1-5 mon	0.5-4 yrs	5-19 yrs	> 20 yrs
10%	9%	33%	26%	18%	4%

solid. If the cellular proliferation is more active at the proximal end than at the distal portion during the stage of epithelial occlusion, then at the time of canalization, the proximal portion will be abnormally dilated and the distal portion will be normal or somewhat stenotic. The Type IV lesions found in neonates obviously support the congenital cyst theory.

Most recently Babbitt, et al.[29] have proposed a new concept of etiology based on 7 cases in which they found a persistent anatomic aberration. In all 7 cases, the common duct inserted at right angles into the pancreatic duct at an abnormally long distance from the ampulla of Vater. This abnormal condition resulted in a loss of the normal sphincteric mechanism at the pancreaticobiliary junction. Babbitt and co-workers hypothesized that since the secretory pressure in the pancreas is greater than that in the liver, pancreatic juice would freely reflux into the common bile duct. They further support this by a high amylase content in the biliary cyst aspirate.

As mentioned above, 23% of cases present after the age of 20. Those who support the congenital theory will explain this fact by concluding that for some unknown reason the cyst or defect remained asymptomatic until that time. Kozloff et al.[30] however, have recently presented 5 cases of biliary cysts in adults which they believe were acquired rather than congenital. Some of the patients had previously negative common bile duct explorations only to have a cyst found at subsequent reoperation. This is certainly supportive of an acquired origin of the cyst, but obviously it does not negate the possibility of an undetectable congenital abnormality such as a point of localized weakness in the wall of the biliary duct. A similar situation is that of multiple biliary cysts. These would seemingly be congenital in origin, but there is no evidence to prove that they cannot be secondary to obstruction in a biliary system with multiple points of congenital weakness. Kato[156] has recently produced biliary cysts in puppies by scraping the mucosa of the bile ducts and following this with distal common bile duct ligation. The same effect was not reproducible in adult dogs.

It is generally accepted that biliary cysts may be congenital in origin, however, in view of cases such as Kozloff's and patient R.J. above which are beginning to accumulate, it would seem only reasonable to assume that in some cases the cysts may be acquired. Whether they are secondary to a congenital weakness has not yet been determined. Until further research is done in this area, the etiology will continue to be based on logically derived but unfortunately, unproven theories.

Diagnosis

It is the exception rather than the rule to make the diagnosis of biliary cysts preoperatively. In the earlier series it was actually a rarity to make the diagnosis preoperatively. In recent reported collected series by Alonso-Lej[16] and Lee,[17] however, the preoperative diagnosis was made in 35% and 27% respectively. More recently, Saito[19] reported a correct preoperative diagnosis in 80% of 39 cases. The importance of a correct preoperative diagnosis was shown to affect operative mortality in an early series by Tsardakas et al.[15] in which they showed a 56.6% mortality rate if the cyst was undiagnosed preoperatively versus a 30.5% mortality if it was diagnosed preoperatively. At the present, the overall operative mortality is about 4%.

There are multiple reasons why the diagnosis is usually missed, the most common one being that it is not usually included in the differential diagnosis.[16] Jaundice, right upper quadrant pain, and right upper quadrant mass are most common and the intermittent nature of these signs and symptoms, occasionally extending over a period of years, deserves emphasis.

Standard contrast roentgenography of the abdomen is not always sufficient to establish a diagnosis. Upper GI will usually show displacement of the antrum and duodenal bulb anteriorly, inferiorly and to the left. In Type III lesions, only a polypod structure may be seen intralumenally near the ampulla of Vater. Barium enema may show downward and sometimes anterior displacement of the hepatic flexure. Intravenous pyelography may show an inferiorly displaced right kidney, occasionally with a distorted collecting system. Although visualization of the gallbladder has been reported with oral cholecystography,[31] it usually does not visualize because patients with biliary cysts present in a jaundiced state in the majority of cases. The same reasoning holds for the frequent failure to visualize the bile ducts on intravenous cholangiography. Rose Bengal scans have been shown to be of benefit in the past but have not been used to a great extent.[21,32–35] Ultrasonography is very accurate in diagnosing the presence and location of a cyst, but cannot prove the biliary origin.[36] Success with total body opacification and the use of the rim sign to delineate the cyst has also been reported.[37]

In most cases prior to this decade, the diagnosis of biliary cyst was not made prior to operation. However, with the new technique of endoscopic retrograde cannulation and contrast injection of the common bile duct, the situation is changing. This procedure need not be the first

TABLE 5. *Classification of cysts by type (760 Cases).*

Type I	Type II	Type III	Type IV	Those associated with biliary atresia
86.7%	3.1%	5.6%	2.6%	2.0%

diagnostic procedure performed but is of utmost importance when there is failure to visualize the biliary tree on intravenous cholangiography. Retrograde injection is not always a benign procedure. About 50% of subjects will have a rise in serum amylase levels[155] and occasional cases of fatal pancreatitis have occurred.[154] Overdistention of the biliary tree with too large a bolus of Hypaque can precipitate gram negative sepsis since most of these patients have some element of bile stasis and infected bile. In Japan and some centers in the United States, it is current practice to inject antibiotics into the duct along with the Hypaque.[38] Current reports indicate a success rate for cannulation of the duct in excess of 80%.[153–155]

Complications

It is generally accepted that no treatment or medical treatment of biliary cysts are both almost uniformly fatal. In Tsardakas' report,[15] 29 of 30 patients treated medically died from the disease, and in a series reported by Attar,[152] 21 of 22 died, with one lost to followup, thus giving a 97% mortality rate for nonsurgical treatment of biliary cysts.

Traumatic spontaneous rupture of these cysts has been reported on many occasions.[15,21,24,41] Chen[42] recently reported 16 patients, three of whom presented with rupture and bile peritonitis. These cysts have also been reported to rupture during labor[150] and 23 cases have been reported to have ruptured during pregnancy.[24,30,40,44]

The presence of long standing, intermittent or partial obstruction leading to biliary cirrhosis has been recognized for a long time and is referred to in most reports. Kirwan[45] has recently reported 8 cases in children. Five of the children underwent liver biopsy and all 5 showed some degree of biliary cirrhosis. In addition to cirrhosis, severe bouts of cholangitis secondary to obstructive jaundice are common and are a leading cause of death in both unoperated and operated patients. Liver abscess has also been reported in association with biliary cysts.[46] Other complications include portal vein thrombosis with massive gastrointestinal hemorrhage, pancreatitis, and cancer.[46]

R.J., presented above, is the 24th reported case of cancer associated with biliary cysts,[19,23,130–148] thus establishing a 2.5% incidence.[47] Detailed analysis of these 24 cases is the subject of a separate report,[47] however, a few important differences between the biliary carcinomas associated with biliary cysts and other biliary carcinomas should be pointed out.

The incidence of biliary carcinoma has been reported from 0.0007% to 0.041% of all hospital admissions.[157] The 2.5% incidence of biliary carcinoma associated with biliary cysts is then clearly significant ($P < 0.001$). In a recent report by Longmire[158] concerning 63 patients with biliary carcinoma, 57% were males and 43% were females; the peak incidence was in the seventh decade.

Analysis of the 24 cases of biliary carcinoma associated with biliary cysts revealed a sex distribution of 33% males and 67% females. The average age at the time of diagnosis was 32 years with a range of 17 to 70 years. Only 4 patients were older than 36 years. The diagnosis of cancer was never made preoperatively and in 5 patients the diagnosis was made at autopsy. In only 6 patients were biliary calculi found. The most common cell type was adenocarcinoma, but cases of undifferentiated and squamous cell carcinoma were also reported. The most frequent site of origin was the posterior cyst wall, however, cases in which the tumor originated in both the proximal and/or distal biliary systems were also common. The average survival after diagnosis was only 8.5 months. The short survival was likely due to a delay in diagnosis accounted for by the fact that biliary obstruction did not occur as early as it would have in a normal biliary system. Once the obstruction did occur, the symptoms were not unlike the patient's previous symptoms which were atrributed to biliary cystic disease.

Treatment

The best operation for biliary cysts is still controversial. In this country, RYCCJ is presently being advocated for Type I cysts whereas in other countries excision is in vogue. Trout and Longmire,[48] Duckett,[49] and O'Neill[50] have presented papers in this country which have the longest followup periods. Only one case of excision is included in these studies.[48] This patient died 13 years after excision due to unrelated disease. Twenty-four of these patients collected by Trout and Longmire had undergone RYCCJ. Eleven developed morbidity and 5 required reoperation; none died. Forty-eight patients underwent CCD with 39 having significant morbidity and 22 requiring reoperation; two died. Only 9 cases of choledochocystjejunostomy (CCJ) were performed. Five had significant morbidity and five required reoperation. None of the patients undergoing CCJ died. Duckett presented 14 children. Twelve had CCD with no morbidity, or mortality. Two underwent RYCCJ and one of these died. O'Neill presented 11 patients. Ten underwent CCD. Six had significant morbidity, four required reoperation,

TABLE 6. *Results of operative treatment (235 Cases, 282 Procedures).*

Operation	# Of cases	Morbidity	Re-operation	Mortality
Excision	83	7 (8%)	0	6 (7%)
RYCCJ	53	18 (34%)	7 (13%)	9 (17%)
CCJ	12	6 (50%)	5 (42%)	1 (3%)
CCD	93	55 (58%)	35 (38%)	6 (5%)

and one died. One patient underwent RYCCJ and did well. The reports of Trout and Longmire, Duckett, and O'Neill are included in the analysis below. Other operations such as sphincteroplasty,[51] choledochocystgastrostomy[18] and external drainage[17] have been performed but are generally condemned. In addition, not enough of these latter procedures have been performed to make a statistical analysis significant. Tsardakas[15] originally showed a 65% mortality with external drainage alone as therapy. External drainage is still a valid initial procedure in a poor risk patient, but should be followed with a definitive procedure when the condition of the patient permits. Little controversy exists over the treatment of Type II and Type III lesions. Excision of a Type II cyst with ligation of the base of the stalk of the diverticulum is usually easily performed. Transduodenal resection of choledochoceles with choledochoduodenostomy is the procedure of choice for Type III lesions.[48] Type II and III cysts are admittedly rare lesions, however, and good followup data are not available. In some cases of multiple biliary cysts and those associated with atresia, no procedure can be recommended. The operation must depend on the individual anatomy.

The primary controversy then involves Type I cysts. The accepted operations under consideration are excision, RYCCJ, CCJ, and CCD. Excision is not often performed in this country primarily because of the reportedly high mortality rate. This mortality was reported in 1959 by Alonso-Lej to be 15%.[16] Lee has shown a steady decrease in the overall operative mortality (all procedures) from 1943 (51%) to 1969 (5.2%).[17] This can no doubt be attributed to new methods of diagnosis and new expertise which has evolved in the operative and perioperative care. For this reason, only cases reported in recent series with good followup are included in the following analysis.

A statistical analysis of 235 cases reported from 1968 to 1972 with an average followup of 5.2 years is shown in Table 6.[18–21,26,48–50,52–56] Only Type I cysts were included. Mortality rates include operative deaths plus late deaths which were related to the biliary disease or to the operation performed. Thus, they are generally higher than recent reports showing only operative mortality.[20] Morbidity in this report consisted of anyone or of any combination of recurrent pain, jaundice, stricture formation or obvious cholangitis. The mortality rates show no significant difference between RYCCJ and excision, 17% and 7% respectively ($P < 0.1$). A morbidity of 34% for RYCCJ versus 8% for excision is more impressive, however, ($P < 0.01$). Also, no patient undergoing excision required reoperation whereas 13% with RYCCJ required reoperation ($P < 0.01$). The morbidity (50%) and reoperation rate (42%) for CCJ does not seem to make this a desirable operation although the number of cases presented is low. CCD had only a 6% mortality rate, but a 58% morbidity rate and a 38% reoperation rate would tend to make this a less effective procedure. The difference between mortality in CCD versus excision is not significant. The large mortality recorded here for RYCCJ is obviously due to the definition of mortality in this report. In Klotz's study, 144 cases reported after 1968,[20] he presented operative mortalities for CCD, RYCCJ plus CCJ, and excision as 2%, 5% and 4% respectively. There is clearly a significantly higher morbidity for internal drainage procedure than with excision. This is probably secondary to reflux of small bowel contents into the cysts with stasis[49] or to stricture formation.[48] There is less cholangitis with RYCCJ than CCD as would be expected. No instances of peptic ulceration have been reported in cases of biliary cysts treated with RYCCJ.

Another factor to be considered in making the choice of operation is the 2.5% incidence of biliary cancer which is associated with biliary cysts. In a separate analysis,[47] 50% of the reported cases of carcinoma in association with biliary cysts occurred a mean of 4 years after an initial internal drainage procedure.

These findings indicate that the procedure of choice for Type I biliary cysts should be excision when the anatomy, the condition of the patient, and the skill of the surgeon permit. The technique has been nicely described by Saito[19] (in English). If excision is to be performed, it is probably advisable that cholangiography and pancreatography be carried out either intraoperatively or preoperatively because cases of the pancreatic duct draining into the biliary cyst have been reported.[28,57] The usual reconstruction following excision is Roux-en-Y hepaticojejunostomy (RYHJ), however, Scarli,[54] Cahlin,[26] and Longmire[58] each reported a case in which sufficient common hepatic duct and common bile duct remnants remained after excision so that a primary anastomosis of common hepatic duct to common bile duct could be performed. RYCCJ is less successful than excision, but is a good alternative operation. CCD is the least successful of the three procedures. Concomitant

cholecystectomy and appendectomy have been recommended.[18,21,48] As stated above, most of the cases undergoing excisional therapy are from Japan. Considering the data which are now available, it would seem warranted that excisional therapy be more widely used in this country. Saito[19] has reported no operative mortality in his last 20 patients treated by excision.

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References

1. Vatero, A.:Dissertation in Auguralis Medica Proes. Diss qua scirrhris viscerum disseret c.s. exlerus. 70:19, 1723. (University Library, Edinburg).
2. Douglas, A. H.: Case of Dilatation of the Common Bile Duct. Monthly J. Med. Sc., (London) 14:97, 1852.
3. Laverson, R. S.: Cysts of the Common Bile Duct. Am. J. Med. Sci., 137:563, 1909.
4. Waller, E.: Idiopathic Choledochus Cyst. Ann. Surg. 66:446, 1917.
5. McWorter, G. L.: Congenital Cystic Dilatation of the Common Bile Duct. Arch. Surg., 8:604, 1924.
6. Senequie, J. and Tailhefer, A.: Les Dilatations Congenitales due Choledoque. J. Chir., 33:154, 1929.
7. Zinninger, C. and Cash, R.: Congenital Cystic Dilatation of the Common Bile Duct. Arch. Surg., 24:77, 1932.
8. Clark, J. H.: So-called Idiopathic Choledochus Cyst; Pathogenesis and Pathology: Report of a Case with Review of the Literature. Internat. Clin., 1:78, 1932.
9. Gross, R. E.: Idiopathic Dilatation of the Common Bile Duct in Children. J. Ped. 3:730, 1933.
10. Yotsuyanagi, S.: Contribution to Etiology and Pathology of Idiopathic Cystic Dilatation of the Common Bile Duct, With Report of Three Cases, Gann 30:601, 1936.
11. Walton, J.: Congenital Diverticulum of the Common Duct. Br. J. Surg. 27:295, 1939.
12. Bangerter, J.: So-called Idiopathic Cysts. Sch. Med. Wschr. 71:677, 1941.
13. Poate, H. R. G. and Wade, D.: Congenital Cystic Dilatation of the Common Bile Duct. Aust. N. Z. J. Surg., 11:32, 1941.
14. Shallow, T. A., Eger, S. A. and Wagner, F. B.: Congenital Cystic Dilatation of the Common Bile Duct, Ann. Surg., 117:355, 1943.
15. Tsardakas, E., and Robnett, A. H.: Congenital Cystic Dilatation of the Common Bile Duct, Arch. Surg., 72:311, 1956.
16. Alonso-Lej, F., Rever, W. B., Jr. and Pessagno, D. J.: Congenital Choledochal Cyst, With a Report of Two and an Analysis of 94 Cases, International Abstracts of Surgery, Surg. Gynecol. Obstet., 108:1-30, 1959.
17. Lee, S. S., Min, P. C., Kim, G. W. and Hong, P. W.: Choledochal Cyst, Arch. Surg., 99:19, 1969.
18. Lindenauer, S. M. and Lavanway, J. M.: Surgical Management of Choledochal Cyst, Surgery, 65:972, 1969.
19. Saito, S.: Congenital Choledochal Cyst. Prog. Pediatr., Surg., 6:63, 1974.
20. Klotz, D., Cohn, B. D. and Kottmeier, P. K.: Choledochal Cysts: Diagnostic and Therapeutic Problems, J. Ped. Surg., 8:271, 1973.
21. Kasai, M., Asakura, Y., and Taira, Y.: Surgical Treatment of Choledochal Cyst, Ann. Surg. 172:844, 1970.
22. Jones, C. A. and Olborne, N. A.: Choledochal Cyst with Associated Cholelithiasis Diagnosed by Infusion Cholangiography and Tomography, Br. J. Radiol., 46:711, 1973.
23. Macfarlane, J. R. and Glenn, F.: Carcinoma in Choledochal Cyst, JAMA, 202:91, 1967.
24. Shah, R. C., Mehta, A. B. and Haribhakti, J. B.: Choledochal Cyst, Am. J. Gastroenterol. 51:227, 1969.
25. Sapounou, S.: A Case of Choledochal Diverticulum with Secondary Calculus Formation. Fortschr. Geb. Roentgenstr. Nuklearmed. 116:719, 1972.
26. Cahlin, E. et al.: Choledochal Cyst: A Case Operated with Excision and Anatomical Reconstruction. Acta Clin. Scand., 140:161, 1974.
27. Suzuki, K. et al.: Parapapillary Diverticulum and Dilatation of the Common Bile Duct with Choledocholithiasis. Jap. J. Gastroenterol. 71:108, 1974.
28. Kasai, Y. et al.: Evaluation of Surgical Procedures for Congenital Choledochal Cyst. Syujutu, 23:57, 1969.
29. Babbitt, D. P., Starshak, R. J. and Clemett, A. R.: Cholodochal Cyst: A Concept of Etiology, Am. J. Roentgenol. Radium Ther. Nucl. Med., 119:57, 1973.
30. Kozloff, L. and Joseph W. L.: Cystic Dilatation of the Common Bile Duct in Adults, Med. Ann. D. C. 42:595, 1973.
31. Hoffer, P. B.: Choledochal Cysts Demonstrated by Oral Cholecystography. Radiology, 93:871, 1969.
32. DiMase, J. D. et al.: Choledochal Cyst, Use of Rose Bengal Scan in Diagnosis. R. I. Med. J. 56:21, 1973.
33. Park, C. H. et al.: Preoperative Diagnosis of Asympatomatic Choledochal Cyst by Rose Bengal Liver Scan. J. Nucl. Med., 15:310, 1974.
34. Williams, L. E. et al.: Pre-operative Diagnosis of Choledochal Cyst by Hepatoscintography. N. Engl. J. Med., 283:85, 1970.
35. Tada, S. et al.: Choledochal Cyst Demonstrated by ^{131}I Rose Bengal Scanning: report of a case. Am. J. Roentgenol. Radium Ther. Nucl. Med., 116:587, 1972.
36. Gilday, D. L. et al.: Choledochal Cyst: A case Diagnosed by Radiographic and Ultrasonic Collaboration. J. Can. Assoc. Radiol., 20:59, 1969.
37. Rabinowitz, J. G., Kinkhabwala, M. and Rose, J. S.: Rim Sign in Choledochal Cyst: Additional Diagnostic Feature, J. Can. Assoc. Radiol., 24:226, 1973.
38. Dent, T.: Personnal communication.
39. Lago, T. F. et al.: Cystic Dilatation of Choledochus: Report of a Case with Total Dilation of the Common Bile Duct. Minerva Chir., 29:267, 1974.
40. Konvolinka, C.W.: Congenital Cystic Dilatation of the Common Bile Duct. A Review. Am. Surg., 36:575, 1970.
41. Jackson, B.T. et al.: Perforated Choledochus Cyst. Br. J. Surg., 58:38, 1971.
42. Chen, W., Chang, C. and Hung, W.: Congenital Choledochal Cyst: With Observations on Rupture of the Cyst and Intrahepatic Ductal Dilatation, J. Ped. Surg., 8:529, 1973.
43. Saunders, P. et al.: Rupture of Choledochal Cyst in Pregnancy. Br. Med. J., 3:573, 1969.
44. Elgar, D.E. et al.: Choledochus Cyst Complicating Pregnancy. Br. J. Surg., 56:868, 1969.
45. Kirwan, W.O.: Choledochal cyst, Br. J. Surg., 61:147, 1974.
46. Karjoo, M., Bishop, H., Borns, P. and Holtzapple, P.G.: Choledochal Cyst Presenting as Recurrent Pancreatitis, Pediatrics, 51:289, 1973.
47. Flanigan, D.P.: Unpublished data.
48. Trout, H.H., III and Longmire, W.P. Jr.: Long-term Follow-up Study of Patients with Congenital Cystic Dilations of the Common Bile Duct, Am. J. Surg., 121:68, 1971.
49. Duckett, J., Eraklis, A.J. and Longino, L.: Surgical Treatment of Idiopathic Dilation of the Common Bile Duct (Choledochal Cyst) in 14 Children, J. Ped. Surg., 6:421, 1971.
50. O'Neill, J.A. and Clatworthy, H.W., Jr.: Management of Choledochal Cysts: A Fourteen-year Follow-up, Am. Surg., 37:230, 1971.

51. Andrews, C.E. and Ande, W.F.: Choledochal Cyst Treated by Sphincterotomy, Arch. Surg., 79:158, 1959.
52. Ishida, M., Tsuchida, Y., Saito, S. and Hori, T.: Primary Excision of Choledochal Cysts, Surgery, 68:884, 1970.
53. Jones, P.G., Smith, E.D., Clarke, A.M. and Kent, M: Choledochal cysts: Experience with Radical Excision, J. Ped. Surg., 6:112, 1971.
54. Scharli, A. and Bettex, M.: Congenital Cyst: Reconstruction of the Normal Anatomy, J. Ped. Surg., 3:604, 1968.
55. Wooldridge, B.F. et al.: Choledochal Cysts. Case Reports. Mo. Med., 68:687, 1971.
56. Yue, P.C.K.: Choledochal Cyst: A Review of 18 Cases. Br. J. Surg., 61:896, 1974.
57. Shields, A.B.: Congenital Cystic Dilatation of the Common Bile Ducts, Follow-up in Three Cases and Discussion of Pertinent Features, Am. J. Surg., 108:142, 1964.
58. Longmire, W.P., Jr. et al.: Congenital Cystic Disease of the Liver and Biliary System. Ann. Surg., 174:711, 1971.
59. Schiewe, R. et al.: On the Management of Common Bile Duct Cysts in Childhood. Chirurg, 39:350, 1968.
60. Bairov, G.A.: Diagnosis and Treatment of Congenital Cystic Dilatation in Children. Vestn. Khir. Grekov, 99:91, 1967.
61. Calderon, A. et al.: Congenital Cystic Dilatation of the Common Bile Duct. Rev. Esp. Enferm. Apar. Dig., 26:1120, 1967.
62. Akita, H. et al.: Congenital Choledochectasia: Diagnosis of Jaundice from the Surgical View Point. Surg. Ther. (Osaka), 14:463, 1966.
63. Kasai, Y. et al.: Evaluation of Surgical Techniques for Congenital Cyst of the Common Bile Duct. Shujutsu, 25:67, 1969.
64. Kadowaki, H. et al.: Therapeutic Experience in Choledochocele. Surg. Ther. (Osaka), 14:113, 1966.
65. Van Damme, O. et al.: Obstructive Jaundice in Adults Due to Congenital Cystic Dilation of the External Bile Ducts. Acta Gastroenterol. Belg., 32:501, 1969.
66. Morosini, S.: Cystic Dilatation of the Common Bile Duct. Minerva Chir., 24:1317, 1969.
67. Saito, S.: Benign Stricture of the Common Bile Duct: Relationship to Congenital Cystic Dilatation of the Common Bile Duct and Pathognomonic Analysis. Shujutsu, 24:1177, 1970.
68. Baila, A.E.: Cyst of the Bile Duct. Prensa Med. Argent., 56:452, 1969.
69. Gradauskas, I.K.: Congenital Cystic Dilatation of the Common Bile Duct. Vestn. Khir. Grekov, 102:112, 1969.
70. Bakran, I.: Congenital Cystic Dilatation of the Choledochus. Lijecn. Vjesn, 91:757, 1969.
71. Firica T., et al.: Congenital Cystic Dilatation of the Common Bile Duct. Acta Gastroent. Belg., 33:657, 1970.
72. Todani, T. et al.: Congenital Dilatation of the Common Bile Duct with Special Reference to Multiple Biliary Cysts. Shujutsu, 24:1406, 1970.
73. Acuna, A.: Congenital Cystic Dilatation of the Common Bile Duct. Cir. Cir., 39:991, 1971.
74. Hepp, J. et al.: Treatment of Congenital Cystic Dilatation of the Common Bile Duct. Lyon Chir., 67:173, 1971.
75. Davis, N.P.: Choledochal Cyst. J. Kentucky Med. Asso., 69:925, 1972.
76. Radlowska, A.Z.: Common Bile Duct Cysts: Late Results of Surgical Treatment. Pediatr. Pol., 46:1025, 1971.
77. Borde, J.: Congenital Cystic Dilatation of the Common Bile Duct. Ann. Chir., 27:286, 1973.
78. Rendl, K. H.: Surgical Techniques in Congenital Cysts of the Common Bile Duct. Chirurg, 44:182, 1973.
79. Miki, H., et al.: Congenital Choledochal Cyst with Specific Reference to Diagnosis by Duodenal Fiberscope. Jap. J. Clin. Rad., 18:491, 1973.
80. Minich, R. et al.: Congenital Cyst of the Common Bile Duct. Wiad. Lek., 26:1053, 1973.
81. Kraemer, M.: Idiopathic Dilatation of Efferent Bile Ducts. Rozhl. Chir., 51:730, 1972.
82. Garbsch, H. et al.: Congenital Dilatation of the Ductus Hepatocholedochus. Wein. Z. Inn. Med., 54:40, 1973.
83. Hohle, K.D.: Surgical Management of Congenital Choledochal Cyst. Chirurg, 43:369, 1972.
84. Kolb, H. et al.: Choledochal Cyst and Idiopathic Dilatation of the Common Bile duct. Langenbecks Arch. Chir., 332:723, 1972.
85. Heyder, H. et al.: Congenital Choledochal Cyst. Paediatr. Indones., 13:31, 1973.
86. Nuescsh, H. J. et al.: Endoscopic Retrograde Cholangiography: Method of Choice for Diagnosis of Choledochal Cyst. Dtsch. Med. Wochenschr, 98:2069, 1974.
87. Hung. W.Y. et al.: Congenital Choledochal Cysts in Infants and Childhood. J. Formosan Med., Asso. 70:335, 1971.
88. Galloway, J.P. et al.: Intrahepatic Choledochal Cyst. J. Roy. Coll. Surg. Edinb., 14:288, 1969.
89. Gautier-Benoit, C. et al.: Cystic Dilatation and Disseminated Papillomatosis of the Hepatocholedochus. Chirurg, 99:359, 1970.
90. Tajima, Y., et al.: Congenital Dilatation of the Common Bile Duct. Surg. Ther. (Osaka), 19:347, 1968.
91. Duberman, L.B., et al.: Cysts of the Common Bile Duct. Khirurgiia (Moskva), 45:63, 1969.
92. Gaurier-Benoit, C., et al.: Cyst of the Common Bile Duct. Sem. Hop. Paris, 46:2630, 1970.
93. Horntrich, J.: Congenital Cystic Bile Duct Dilatation. Zentralbl Chir., 98:865, 1971.
94. Poltorak, J. et al.: Congenital Cyst of the Choledochus. Pol. Prezgl. Chir., 44:575, 1972.
95. Quandelle, P. et al.: Congenital Cystic Dilatation of the Common Bile Duct, Treatment by Resection. Lille Med., 17:1446, 1972.
96. Davis, R.: Choledochal Cyst. S. Afr. Med. J., 47:2234, 1973.
97. Wladzinski, J., et al.: Cyst of the Common Bile Duct. Wiad. Lek., 27:373, 1974.
98. Paris, J., et al.: Congenital Cystic Dilatation of Vater's Ampulla or Choledochocele. J. Radiol. Electrol. Med. Nucl., 55:70, 1974.
99. Moyson, F.: The Choledochal Cyst: Result of an Abdominal Drauma? Acta Paediatr. Belg., 27:369, 1973.
100. Markoff, N.: Idiopathic Cyst of Choledochus. Hippokrates, 45:248, 1974.
101. Begie-Janeu, A., et al.: Congenital Dilatation of the Choledochus Duct. Srp. Arch. Celok. Lek., 102:69, 1974.
102. Duberman, L.B., et al.: Dilatation of the Common Bile Duct in a Ten Year Old Child. Vestn. Khir. Grekow, 99:103, 1967.
103. Lauschke, H. et al.: Congenital Common Bile Duct Cyst. Zbl. Allg. Path., 110:490, 1967.
104. Guigiaro, A., et al.: Illustration of a Case of Segmental Idiopathic Dilatation of the Common Bile Duct in a One Month Old Infant. Minerva Pediat., 21:1299, 1969.
105. Han, S.Y., et al.: Choledochal Cyst: Report of Five Cases. Clin. Radiol., 20:332, 1969.
106. Atra, E., et al.: Choledochocele: Case Report. Rev. Assoc. Med. Bra., 12:373, 1966.
107. Yao, J.K., et al.: Idiopathic Cystic Dilatation of the Common Bile Duct: Report of a Case in an Adult. Canad. J. Surg., 13:62, 1970.
108. Beltrame, A., et al.: Jaundice Caused by Idiopathic Dilatation of the Common Bile Duct. Arch. Ital. Chir., 93:535, 1967.
109. Kato, M., et al.: Two Cases of Idiopathic Dilatation of the Common Bile Duct. IRYO 24:257, 1970.
110. Bryc, S., et al.: A Case of Abnormal Dilatation of the Common Bile Duct. Wiad. Lek., 22:1981, 1969.
111. Stefanini, M., et al.: Choledochal Cyst with Associated Anomaly of the Head of the Pancreas. Am. J. Gastroenterol., 54:496, 1970.
112. Iuchtman, M., et al.: Congenital Diverticulum of the Choledochus: Report of a Case. Int. Surg., 55:280, 1971.
113. Moulin, D. de, et al.: Congenital Dilatation of the Common Bile Duct: A Case Report. Arch. Chir. Neerl., 23:1, 1971.
114. Longmire, W.P., Jr., et al.: Nonobstructive Dilatation of the Common Bile Duct. Surg. Clin. North Am., 50:1099, 1970.
115. Kelly, M.J.: Case of Caroli's Disease. Br. Med. J., 4:407, 1971.
116. Martin, C., et al.: An Anatamo-clinical Case of Congenital Cyst of the Common Bile Duct. Arch. Fr. Pediatr., 29:450, 1972.
117. Saubier, E., et al.: Hepatocholedochal Cyst With Congenital Segmental Dilatation of the Intrahepatic Bile Ducts (Caroli's disease) and Portal Hypertension. Lyon Chir., 67:299, 1971.
118. Meeker, W.R., Jr., et al.: Association of Cystic Dilatation of

Intrahepatic and Common Bile Ducts with Laurence-Moon-Bridl-Badet Syndrome. Am. J. Surg., 122:822, 1972.
119. Brunton, F.J., et al.: Intraluminal Diverticulum of the Duodenum and Choledochocele. Gut., 12:207, 1972.
120. Priust, J., et al.: Cystic Dilatation of the Common Bile Duct Causing Obstructive Jaundice in Infants (apropos of two cases). Ann. Chir. Infant, 12:323, 1971.
121. Nakasaki, H., et al.: Cases of Congenital Dilatation of the Common Bile Duct and Review of the Literature. IRYO 25:769, 1971.
122. Torres, A., et al.: Case of Congenital Cyst of the Choledochus. Acta Gastroent. Latinoam, 3:139, 1971.
123. Marek, S.: Choledochal Cyst in a Nine Year Old Girl. Cesk. Pediatr., 26:403, 1971.
124. Perquis, P., et al.: On a Case of Congenital Cystic Dilatation of the Common Bile Duct. Bull. Soc. Med. Afr. Noire Lang Fr., 17:113, 1972.
125. Paraf, A., et al.: Report of Two Cases of Choledochal Cyst. J. Radiol. Electrol. Med. Nucl., 53:667, 1972.
126. Monichev, V.M.: A common bile duct cyst. Vestn. Khir., 108:124, 1972.
127. Blery, M., et al.: Congenital Cystic Dilatation of the Choledochus. Ann. Radiol. (Paris), 15:831, 1972.
128. Bode, A.: Common Bile Duct Cyst in an Infant. Klin. Paediatr., 185:415, 1973.
129. Deyhle, P., et al.: Electrosurgical Removal of a Choledochocele Through an Endoscope Introduced by Mouth. Dtsch. Med. Wschr., 99:71, 1974.
130. Spitz,L.: The Surgical Treatment of Choledochal Cysts. S. Afr. J. Surg., 10:161, 1972.
131. Weber, B.B., Soler, F.J., Font, R.G. and Nance, F.C.: Carcinoma Arising in a Choledochal Cyst, Dig. Dis., 16:1019, 1971.
132. Todani, T.: Congenital Choledochal Cyst: Incidence of Cancer and Re-evaluation of Therapeutic Approach. Shujutsu, 24:763, 1970.
133. Fukuuti, T.: Carcinoma Occurred in a Choledochal Cyst Seven Years After Bilioduodenal Anastomosis. Gekasinryo, 9:124, 1967.
134. Tanaka, S., et al.: Malignant Degeneration of Idiopathic Dilatation of the Common Bile Duct. Rinsyogeka, 23:99, 1968.
135. Schiewe, R., et al.: Angeborene Intrahepatische Gallengangszyste mit Steinbildung und Maligner Enterung. Bruns Beitr. Klin. Chir., 216:264, 1968.
136. Nakajima, S., et al.: A Case of Congenital Diseases of Biliary Tract with Associated Carcinoma. Kotuigaku, 16:593, 1963.
137. Jones, A.W., et al.: Congenital Dilatation of Intrahepatic Biliary Ducts with Cholangiocarcinoma. Br. Med. J., 2:277, 1970.
138. McKenzie, A.D., et al.: Choledochus Cyst with Associated Carcinoma. Can. J. Surg., 2:88, 1958.
139. Hizawa, K., et al.: Carcinoma Associated with Idiopathic Choledochus Cyst. Acta. Path. Jap., 17:101, 1967.
140. Thistlethwaite, J.R., et al.: Choledochal Cyst Followed by Carcinoma of the Hepatic Duct. South. Med. J., 60:872, 1967.
141. Ashby, B.S., et al.: Carcinoma in a Choledochal Cyst. Br. J. Surg., 51:493, 1964.
142. George, P.A. and Maingot, R.: Choledochal Cyst Associated with Carcinoma of the Liver. Br. J. Surg., 48:339, 1962.
143. Ferraris, L.V., et al.: Congenital Dilatation of the Common Bile Duct with Adenocarcinoma. Bol. Soc. Cir., Cordoba, 5:21, 1944.
144. Fischer, L.F.: Primary Carcinoma in the Wall of a Congenital Cystic Dilatation of the Common Bile Duct. Zbl. Chir., 83:1234, 1958.
145. Wilson, E.D.: Bile Duct Cyst with Malignant Degeneration. J. Iowa Med. Soc., 46:72, 1956.
146. Dexter, D.: Choledochal Cyst with Carcinoma of the Intrahepatic Bile Ducts and Pancreatic Ducts. Br. J. Cancer, 11:18, 1957.
147. Armanio, L.P.: Idiopathic Dilatation of the Common Bile Duct with Coexistant Primary Hepatic Carcinoma. Ann. Intern. Med., 24:714, 1946.
148. Irwin, T.S., and Morison, J.E.: Congenital Cyst of the Common Bile Duct Containing Stones and Undergoing Cancerous Change. Br. J. Surg. 32:319, 1944.
149. McWhorter, G.L.: Congenital Cystic Dilatation of the Bile and Pancreatic Ducts. Arch. Surg., 38:397, 1939.
150. Friend, W.D.: Rupture of Choledochal Cyst During Confinement, Br. J. Surg., 46:155, 1958.
151. Caroli, J., Gouinanad, C., Soupault, R., Porchner, P. and Eteve, J.: Une Affection Nouvelle sans Doubte Congenital des Voies Biliares. La Dilatation Kystique Unilobaire des Canaux Hepatique, Semaine des Hopitaux de Paris 34:496, 1958. (Cited by Jones, C.A., et al.)
152. Attar, S. and Obeid, S.: Congenital Cyst of the Common Bile Duct: A Review of the Literature and a Report of Two Cases, Ann. Surg., 142:289, 1955.
153. Block, M.A., Schuman, B.M. and Weckstein, M.L.: Interpretative Problems in Endoscopic Retrograde Cholangiopancreatography, Am. J. Surg., 129:29, 1975.
154. Ammann, R.N., Deyhle, P., and Butikofer, E.: Fatal Necrotizing Pancreatitis after Peroral Cholangiopancreatography, Gastroenterology, 64:320, 1973.
155. Cooperman, A.M., Sivak, M.V., Sullivan, B.H., Jr. and Hermann, R.E.: Encoscopic Pancreatography, Am. J. Surg., 129:38, 1975.
156. Kato, T., Asakura, Y. and Kasai, M.: An Attempt to Produce Choledochal Cyst in Puppies, J. Ped. Surg., 4:509, 1974.
157. Sako, K., et al.: Carcinoma of the Extrahepatic Bile Ducts. Surgery, 41:416, 1957.
158. Longmire, W.P., Jr., et al.: Carcinoma of the Extrahepatic Biliary Tree. Ann. Surg., 178:333, 1973.