

Biliopancreatic Ascariasis: Presentation and Management

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Summary:

*Biliopancreatic ascariasis is one of the most common and well-described entities caused by *Ascaris lumbricoides*. Diagnosis can be made by ultrasonography and/or ERCP. ERCP, in addition, has therapeutic potential. A prospective study was done on 'Biliopancreatic ascariasis' to find out different presentations of biliopancreatic ascariasis and to assess the roles of ultrasonography and ERCP for the diagnosis and management of the hepatobiliary and pancreatic complications of ascariasis. All consecutive patients presenting with the evidence of round worm in the biliary tree and/or in the pancreatic duct were included in this study. Total 51 patients were included. Male to female ratio was 1: 2.4 with mean age 38.9 (± 17.7) years. Most of the cases were from rural areas (86.30%). Majority of the cases were from the southern part of Bangladesh (88.20%) and recorded during the month of October to March (76.40%). Ultrasonography could correctly diagnose the biliopancreatic ascariasis in 85.70% of cases. All the patients complained of abdominal pain at presentation. Presentations of biliopancreatic ascariasis cases were:*

biliary colic (45.10%), cholangitis (39.20%), ascaris induced acute pancreatitis (9.80%), acute acalculous cholecystitis (3.90%) and liver abscess (2.0%). Associated findings were choledocholithiasis (19.60%), recurrent pyogenic cholangitis (7.80%) and papillary stenosis (11.80%). Removal of worms was done mostly endoscopically (90.20%). Endoscopic success rate was 93.90%. Papillotomy was done in 86.70% of cases where ERCP had been done. Mean duration of hospital stay after endoscopic treatment was 2.6+1.6 days. Endoscopic removal with papillotomy in most of the cases was safe. During the average follow-up period of 12.4 months, recurrence of biliopancreatic ascariasis occurred in 7.80% of cases.

This study concludes that ultrasonography is a highly sensitive and specific noninvasive method for diagnosis and follow-up of the patients with biliopancreatic ascariasis. Emergency endoscopic removal of round worm is the treatment of choice for biliopancreatic ascariasis.

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Introduction:

Ascaris lumbricoides is the most common helminth in the human gastrointestinal tract. The infection largely occurs in tropical and subtropical countries, related in part to the warm and humid soil that is conducive to the development of the *Ascaris* larva, and in part to the poor sanitary and hygienic conditions that maintain the infection.¹ Bangladesh is an area where ascariasis is endemic. Ascariasis is an important cause of hepatobiliary and pancreatic diseases in this area.

Biliopancreatic ascariasis (BPA) is one of the most common and well-described entities caused by *Ascaris*.² BPA can cause different hepatobiliary and pancreatic complications in addition to biliary colic.³

Diagnosis of BPA can be made by ultrasonography and ERCP. Ultrasonography is a highly specific and sensitive method for detection of worms in the biliary tree.⁴ ERCP, in addition, has therapeutic potential, allowing removal of worms from the ducts or the duodenum.² Early diagnosis and treatment is important to prevent the ascariasis related complications.⁵

Immediate endoscopic treatment results in rapid resolution of the problem.¹ But if treatment is delayed, serious complications such as ascending cholangitis, haemorrhagic pancreatitis, and death may occur.¹ Since no significant complications are found, endoscopic treatment has become the treatment of choice in many centres with surgery reserved for the failed cases. Urgent surgery is mandatory when there is biliary perforation due to worms^{6, 7}.

This study on 'Biliopancreatic ascariasis- presentation and management' was done to find out different presentations of BPA and to assess the roles of ultrasonography and ERCP for the diagnosis and management of the hepatobiliary and pancreatic complications of ascariasis.

Materials and method:

This study was a prospective observational study and was conducted during September 2001 to April 2003 in the Department of Gastrointestinal, Hepatobiliary and Pancreatic Disorders, Bangladesh Institute of Research and Rehabilitation on Diabetic, Endocrine and Metabolic Disorders (BIRDEM) Hospital and Gastro-Liver Hospital and Research institute, Dhaka.

All consecutive patients presented with upper abdominal pain for at least one day were screened for the study. The cases were selected on the basis of following criteria:

Group I: Patients presented with upper abdominal pain were evaluated initially by ultrasonography. Patients with sonographic evidence of round worm in the biliary tree and/or in the pancreatic duct were included in this study. They were evaluated further by ERCP and findings were compared.

Group II: In cases where ultrasonography was negative for BPA, ERCP was done in some of these cases suspecting other biliary and pancreatic pathology. If round worms were found in the biliary tree and/or in the pancreatic duct on ERCP, they were also included in the study.

Group III: In cases where there was ultrasonographic evidence of BPA but ERCP could not be done, round worm was found in the biliary tree and/or pancreatic duct at laparotomy were also included in the study.

Group IV: In some patients with upper abdominal pain, endoscopy of upper GIT was done to exclude peptic ulcer disease. Ultrasonography was normal in these cases. If round worm was seen protruding through the ampullary orifice at endoscopy, they were also included in this study.

Exclusion criteria: 1. Round worms in the duodenum away from the papilla and not seen invading the ampullary orifice;

2. Round worms in the biliary tree or pancreatic duct with any morbid illness that may mimic the presentation of BPA (especially chronic calculous pancreatitis).

Detailed history including signs/ symptoms, residence, season of occurrence, previous history of biliopancreatic ascariasis, previous surgery of the biliary tree, previous ERCP and papillotomy and clinical examination were recorded in the patients entry form. Blood for Hb%, total count, differential count of WBC, liver function tests like SGOT, SGPT, alkaline phosphatase, and bilirubin were done. Serum amylase was done in patients with clinical suspicion of ascaris induced acute pancreatitis. Ultrasonography of hepatobiliary system and pancreas was done by a real time scanner (Siemens Sonoline SL-1). The sonographic diagnosis of biliary and pancreatic ascariasis was made when non-shadowing long echogenic structures with a central sonolucent tube were visualized in the biliary tree or pancreatic duct (Fig.-1). Acute pancreatitis considered to be caused by *A. lumbricoides* infestation when adult worms were detected in the biliary tree and/or in the pancreatic duct. Diagnosis of recurrent pyogenic cholangitis (RPC) was done on the basis of ERCP evidence and clinical history.

All patients were kept nil per oral till the improvement of the condition (Fig.-2).

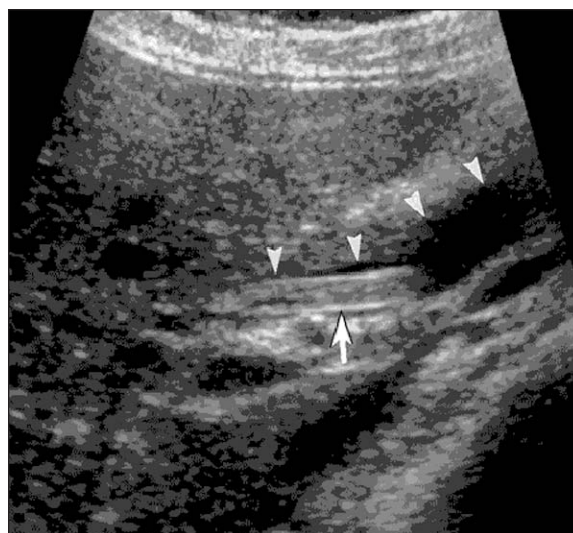


Figure-1 : Sagittal ultrasonographic image of the porta hepatis shows a tubular echogenic region (arrow) within dilated CBD (arrow head).

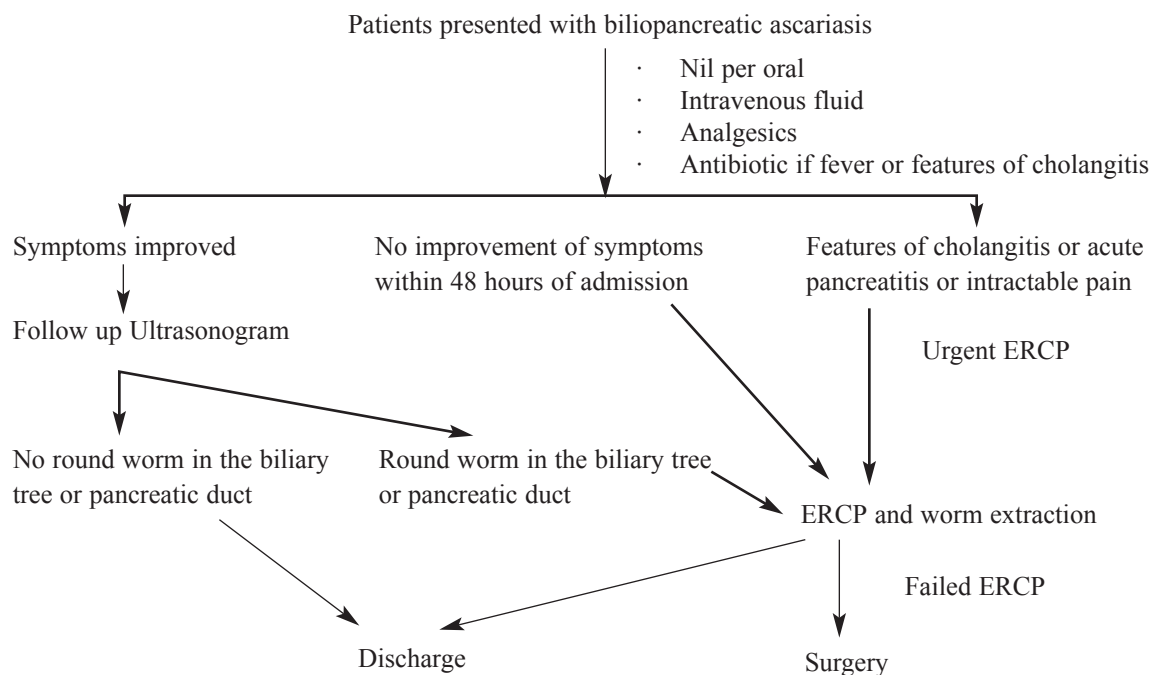


Figure-2 : Management of biliopancreatic ascariasis cases.

ERCP was done using a Fujinon video side viewing duodenoscope (Superimage EPX 310 scope). Worms were removed with an Olympus dormia basket with sphincterotomy or without sphincterotomy if papilla was wide opened (Fig.-3). If a part of the worm is



Figure-3 : Cholangiogram showing round worm (tubular filling defect) within common bile duct (Courtesy: Prof. A Q M Mohsen).

visible outside the papilla of Vater, it was caught in a dormia basket and extracted (Fig.-4).

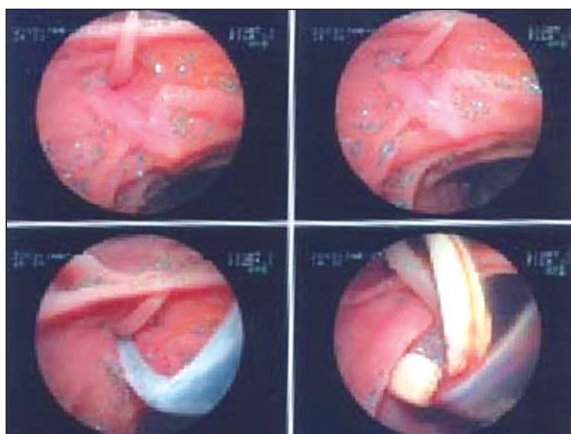


Figure-4 : ERCP (Video picture) showing the extraction of round worm with the dormia basket in situ (Courtesy: Prof. A Q M Mohsen).

Endoscopic accessories used for extraction of worms were an Olympus dormia basket catheter type FG-22 Q, an Olympus polypectomy snare type SD-7P, an Olympus papillotome type KD-7Q, Olympus biopsy forceps type FB-25K and electro coagulation equipments type bipolar coagulation.

All adult patients were given three tablets levamisole (in children 3-5 mg/kg) or syrup pyrental palmoate

500 mg (in children 10 mg/kg) stat after the extraction of worm or when symptoms subsided and after one week of the first dose. Thereafter each patient was advised to take regular anthelmintics each two months life long for prevention of re-infestation.

Patients were advised to report if symptoms recur. During follow-up collection of history, physical examination and ultrasonogram were done. ERCP was done if worms were seen within the biliary tree or pancreatic duct.

Statistical analyses were done using the computer based SPSS programme (Statistical Package for Social Science - SPSS Inc, Chicago. Version 10.0). Comparisons between two groups were done by student's t test, chi-square test as applicable; p value

of less than 0.05 was considered as significant.

Results:

A total of 51 cases were included in this study. Out of them 36 cases (70.60%) were female and 15 cases (29.40%) were male with age range of 2.5 to 72 years with [mean 38.9 ± 17.7]. Seventy two percent of the patients were in the age group of 20- 60 years. Most of the cases were from rural areas (86.30%) and they came from the southern part of Bangladesh (88.20%).

Thirty-nine (76.40%) cases were recorded during the month of October to March. In this study the presenting features of BPA were: pain (100%), nausea (92.20%), vomiting (76.50%), worms with vomitus (25.50%), fever (52.90%), jaundice (39.20 % cases) (Table-I). Duration of pain at presentation

Table-I

Presentation of biliopancreatic ascariasis: clinical features

Symptoms and signs	Number of patients	Percentage
Pain	51	100
Site of pain:		
Epigastric	09	17.60
Right hypochondriac region	31	60.80
Both	09	17.60
Diffuse	02	3.90
Radiation of the pain:	19	37.30
Site		
Scapula	11	21.60
Right shoulder	02	3.90
Back	05	9.80
All over the abdomen	01	2.00
Nature of pain:		
Colicky	50	98.00
Dull aching	01	02
Severity of pain:		
Severe	50	98.00
Moderate	01	2.00
Mean duration of symptoms	9.94 \pm 6.34 (mean \pm SD)	
Nausea	47	92.20
Vomiting	39	76.50
Vomiting of worms	13	25.50
Fever	27	52.90
Grading of fever:		
High grade (>100°F)	24	47.10
Jaundice	20	39.20
Per abdomen tenderness on palpation:	40	78.40
Right hypochondriac region	24	47.10
Epigastric region	06	11.80
Both	09	17.60
Diffuse	01	2.00

was ranged from 1- 25 days [(9.94 ± 8 mean±SD) days]. Clinically 39.20% of the patients were icteric and 48.0% of the patients were febrile (100°-103°F). Abdominal tenderness was present in 78.40% of the patients. Similar history of BPA in the past was present in 17.60% of cases. In eleven patients there was associated disease or condition (Table-II).

Table-II

<i>Associated conditions or diseases in patients with biliopancreatic ascariasis</i>		
Diseases or conditions	Number	Percentage
Diabetes mellitus	02	3.90
Diabetes mellitus with hypertension	01	2.00
Pregnancy	02	3.90
History of choledocholithiasis with ERCP and papillotomy and stone extraction	01	2.00
Past history of repeated ERCP with papillotomy	01	2.00
History of laparoscopic cholecystectomy	03	5.90
History of open cholecystectomy with choledocholithotomy	01	2.00

Laboratory data of this study revealed –leucocytosis in 71.30% of cases; eosinophilia (> 6%) in 21.40% of cases. Bilirubin, SGPT, SGOT, Alkaline phosphatase level was raised in 50%, 71.40%, 83.30% and 66.70% cases respectively (Table-III). Serum amylase was done in 21 cases and it was raised in seven cases (33.30%); in four cases it was raised more than three times of the upper level of normal.

Table-III

<i>Laboratory data of the biliopancreatic ascariasis cases</i>	
Parameter	Mean value
Total count of white blood cells	11992 + 5381
Serum bilirubin	2.78 + 2.51 mg/dl
SGPT	74.69 + 66.02 iu/l
SGOT	77.2 + 73.6 iu/l
Serum alkaline phosphatase	1.8 + 1.24 times the upper level of normal value

In this study, ultrasonography could correctly diagnose the BPA in 85.70% of cases. USG was false positive in 9.30% of cases. Most common sites of worm in the biliary tree were in the common bile duct (Table-IV).

Table-IV

<i>Sites of worm in biliopancreatic ascariasis cases</i>		
Site	Number	Percentage
Common bile duct (CBD)	30	62.50
CBD and common hepatic duct (CHD)	07	14.60
CBD, CHD and intrahepatic biliary tree	08	16.70
Intrahepatic biliary tree	01	2.10
Gall bladder	01	2.10
Pancreatic duct	01	2.10

Most of the patients of BPA presented with biliary colic (45.10%). Hepatobiliary and pancreatic complications were present in 54.90% of the patients (Table-V). Associated findings were choledo-cholelithiasis in 10 cases (19.60%), Recurrent pyogenic cholangitis in four cases (7.80%) and papillary stenosis (organic) in six cases (11.80%).

Table-V

<i>Presentations of biliopancreatic ascariasis cases</i>		
Presentation	Number	Percentage
Biliary colic	23	45.10
Cholangitis	20	39.20
Ascaris induced acute pancreatitis	05	9.80
Acute acalculous cholecystitis	02	3.90
Liver abscess	01	2.00

Management (Fig.-5): In forty-six cases (90.20%) removal of worms was done endoscopically. Spontaneous expulsion of worms occurred in two cases (3.90%). Surgery was needed in two cases (in one case there was associated intrahepatic stone in left hepatic duct, the other case was ascaris induced acute cholecystitis with empyema gall bladder). In one case complete extraction of worm could not be done (a case of RPC with demised worms within

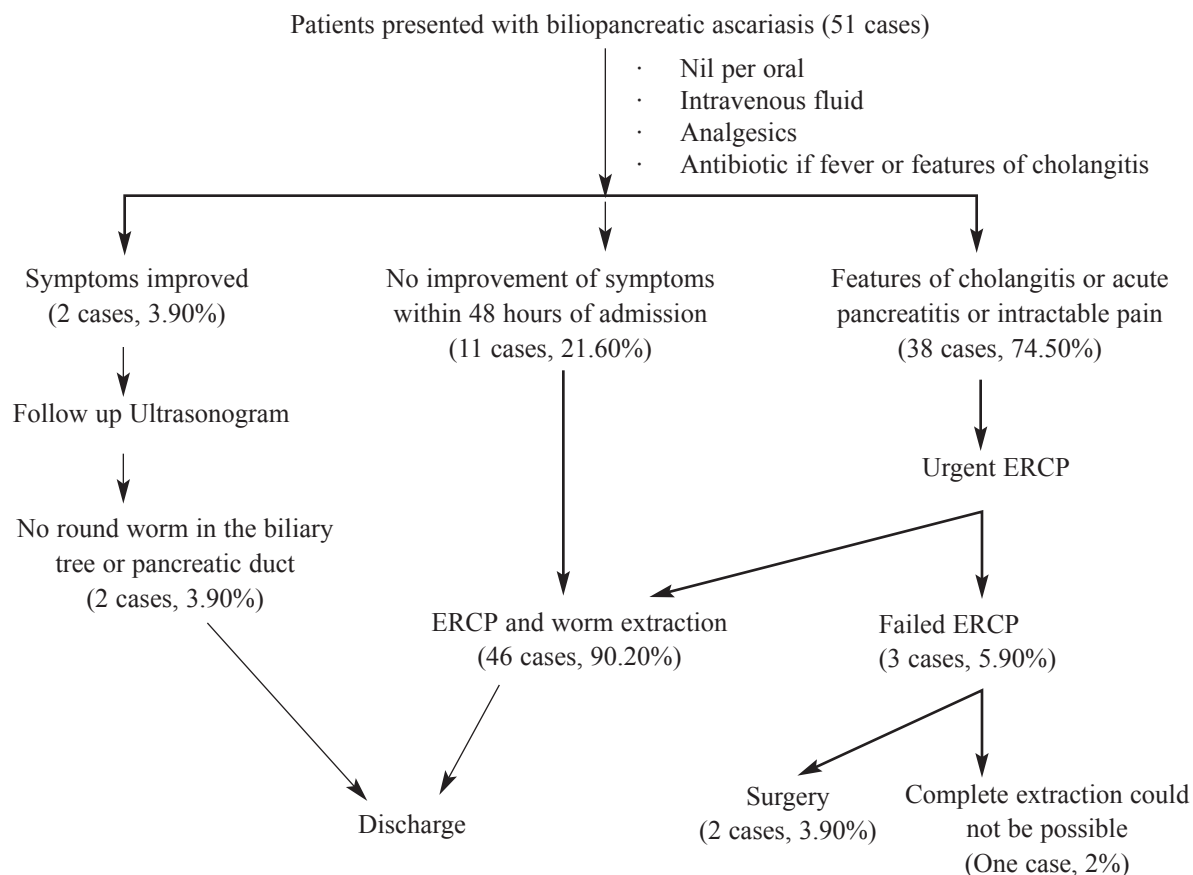


Figure-5 : Results of management of biliopancreatic ascariasis cases

intra- and extrahepatic ducts with extensive intra- and extrahepatic stone formation). Overall endoscopic success rate was 93.90%.

Papillotomy was done in 39 cases out of 45 where ERCP had been done. In three cases papillotomy was done previously. In three cases papillotomy was not done (in one case there was technical difficulty due to juxtra papillary diverticula, in other two cases the papilla was wide open).

Mean duration of hospital stay after endoscopic treatment was 2.6+1.6 days (maximum eight days). Majority (71.60%) of the patients could be discharged on the day after ERCP done. Improvement of symptoms of BPA occurred within a mean of 1.6+1.3 days.

Complications occurred in three cases (6.50%), in two cases there was biliary colic with normal amylase level and in one case there was mild cholangitis.

During the average follow-up period of 12.4 months recurrence of BPA occurred in four patients (7.80%).

Discussion:

The prevalence of ascaris varies in different parts of the world. In China and South-East Asia it is highly prevalent⁸.

Ascaris-related clinical disease is estimated to be 1.2 to 2 million of cases, with 20,000 deaths in a year.⁹ The dangers of migration of the round worm into the biliary tree was first emphasized by Cromwell¹⁰.

Endoscopic treatment of BPA started about twenty years back since 1984 in other parts of the world^{7, 10}. In Bangladesh, ERCP was done for the first time in May 1984 in the Gastroenterology Department of Institute of Post-graduate Medicine and Research (IPGMR)¹¹.

In this study BPA is more common in women (70.6%) than men that is similar to other studies^{1,4}. The exact reason for female preponderance is still not clear. It is possible that in young females, hormone progesterone leads to relaxation of smooth muscles of the sphincter of Oddi, allowing the round worms to gain easy entrance to bile duct⁸. The other reason may be greater contact of woman with children⁷. The mean age of patients of this series was 38.9 years which is very similar to an other study⁴.

In this study, only three patients (5.80%) of BPA at or below the age 10 years were found. Children do suffer from BPA but less often than adults¹² though the incidence of ascaris infection is more common and heavier in children¹³. Low rate of BPA among children despite high worm load is possibly due to the smaller size of the bile ductal system making it difficult for the worms to enter².

In this study, only two cases of pregnant women with BPA were found, though at pregnancy women are more prone to BPA because of smooth muscle relaxation effect of the progesterone on the bile ducts and hypocontractility of the gall bladder during pregnancy².

In this study, most of the cases were from the rural areas as recorded in other studies.^{4, 14} Poverty and over crowding, unhygienic living conditions and poor sanitation contribute to the spread of infection from person to person¹³. Most of the cases were from the southern part of Bangladesh. The soil of these parts the country is more humid than other parts of the country. Humid soil and temperate climate (the embryo develops in only three weeks in optimal temperature of 25⁰C, average temperature is 36⁰ to 40⁰C)⁸ are excellent conditions for the development of the larval stage of the organism^{10, 13}. Most of the cases were recorded during the month of October to March (76.40%). Seasonal variations of BPA was observed in a study conducted in Syria¹.

In this study the presenting features of BPA were pain, nausea, vomiting, fever and jaundice. Thirty nine percent of the patients were icteric at presentation and 48% of the patients were febrile (100⁰ -103⁰F). Abdominal tenderness was present in 78.40% of the patients. Similar result was also found in other studies^{4,12}. In this study 25.50% of the

patients gave history of worm emesis at the time of acute abdominal pain. Similar results have been reported in another study, they stated that such a history should always be sought in patients with suspected BPA¹.

In this study, history of previous biliary tract disease or surgery was found only in 11.70% cases though in other studies majority of the patients with BPA had history of surgery on the biliary tree, including cholecystectomy or sphincteroplasty^{1,4,12}. Cholecystectomy changes the dynamics of the bile duct, favoring the migration into the biliary tree¹.

The diagnosis of BPA requires a high degree of suspicion. The worm can be missed because they move freely in and out of the biliary tree. In this study, ultrasonography could correctly diagnose BPA in 85.70% of cases. Similar result was also found in other studies^{1,9}. Ultrasonography was false positive in 9.30% cases. However, no false-positive or false-negative cases were encountered in two studies^{15, 16}. But in another study false-positive diagnoses were made at ultrasonography in four out of 12 cases (33.3%)¹⁷.

In this study, most common site of round worm was common bile duct as recorded on other study, and it is seen that worms are rarely found in gall bladder or intrahepatic ducts or pancreatic ducts.⁶

Most common presentation was biliary colic, but good number of patients presented with cholangitis, ascaris induced acute pancreatitis, acute acalculous cholecystitis and liver abscess. In this study, 55% of the patient presented with different hepatobiliary and pancreatic complications of BPA. Similar rates of complications were also seen in other studies^{6, 7}. After invading the bile ducts round worms sometimes may cause biliary obstruction, biliary colic, pyogenic cholangitis and septicaemia^{13,19}. Worms may induce acute pancreatitis by blocking either bile or pancreatic ducts. Worms in the common bile duct usually block the cystic duct opening and cause distension of cystic duct and gall bladder, which lead to episodes of acute cholecystitis. However, worms in the bile and hepatic ducts may cause hepatic abscess^{1, 10, 12}.

A few cases of choledo-cholithiasis, RPC and papillary stenosis (organic) were found which were

associated with BPA. The association between ascariasis and intrahepatic stones has also been noted in other part of South-East Asia and South Africa, and ascaris debris and ova are found in stones from patients from these areas. Ascaris related biliary stones are usually of the pigment type and aided in their formation by factors such as bile stasis and ascending bacterial infection. It is estimated that in endemic countries ascaris ova or an immature worm is the cause of stone formation in 10 to 60% of patients¹. RPC is found almost exclusively in South-East Asia. Parasitic infestation and malnutrition play a role. Parasitic infestation of the biliary tree, mostly by liver flukes and round worms, may initiate epithelial damage and biliary obstruction that ultimately lead to RPC. Analysis of the pigment stones in the RPC has also shown the presence of parasite debris and ova, which may act as a nidus for stone formation¹⁹. It has been reported that more than 5% of the patients with BPA develop the syndrome of RPC over two years of follow up⁶. Recurrent passage of worms through the papilla can cause papillitis that may lead to papillary stenosis.

Removal of worms was done mostly endoscopically. Spontaneous expulsions of worms occurred in 3.90% of cases. Overall endoscopic success rate was 93.90% which is similar to other studies^{6, 20, 21}. Failure was due to presence of worms in the gall bladder or presence of intrahepatic calculi with stricture. Endoscopic extraction of the worms from the papilla leads to rapid relief of symptoms. Rapid relief of symptoms also occurs in patients with ascaris induced acute pancreatitis after extraction of worm from the papillary orifice¹³. As the complications of BPA may be quite high (94.70%), early intervention is necessary⁶.

The patients who had endoscopic sphincterotomy had frequent and recurrent invasion of the biliary tree by worms; the wide opening facilitated the entry of worms into the biliary tree¹³. In this study, endoscopic sphincterotomy was done in 87.50% of cases among the patients who were treated with endoscopic removal. In case of BPA whether the worms are dead or alive, whole or fragmented, endoscopic sphincterotomy is necessary not only to remove stones, worms or parts of the worms but also to clean

the bile duct with saline solution in case of purulent cholangitis⁶.

Endoscopic removal after papillotomy in most of the cases was safe. Complications occurred in three cases (6.50%) which is similar to other studies and this technique is recommended as the preferred treatment of this pathology^{6, 22}.

Mean duration of hospital stay after endoscopic treatment was 2.6 days. Similar result was also seen in another study where mean duration of hospital stay was 3.1 days in endoscopically treated patients with BPA.²⁰ The mean duration of hospital stay in patients treated with conservative treatment was 5.1 days⁴. Endoscopic management greatly shortened hospital stay of BPA cases²⁰.

During the average follow-up period of 12.4 months recurrence of BPA occurred in four patients (7.80%). Recurrence rate in a study conducted in India was 18% over two year's followup.¹³ But in another study conducted in a non-endemic area of India similar recurrent rate was found²³. Less recurrence rate in this study may be due to routine prescription of anthelmintics after every two months and shorter follow-up period.

BPA may cause different hepatobiliary and pancreatic complications. In this part of the world, recurrent attacks may lead to RPC, choledocholithiasis and organic papillary stenosis. Ultrasonography is a simple, rapid, and noninvasive method for diagnosis and follow-up of the patients with BPA. As complications from the BPA are quite high, an urgent ERCP should be performed if BPA is suspected. ERCP and endoscopic extraction of worms are safe with a very low morbidity, shorter duration of hospital stay and a high rate of success. In addition, all patients should receive anthelmintic treatment regularly at least every two months to ensure a worm free intestinal tract specially those from rural areas of the country.

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