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# Gallbladder ascariasis: a successful conservative treatment in a rarely found case


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## ABSTRACT

**Background:** Gallbladder ascariasis diagnosis is complicated because it depends on the location of ascaris in the biliary system, causing differences in clinical symptoms. Ascaris invasion into the ampulla of the duodenum causes a biliary colic. Meanwhile, cholangitis symptoms, such as fever, chills, and light jaundice may be present occasionally. The disease may progress into an acute cholangitis, characterized by: very high fever, chills, icterus, and upper abdominal pain. A stool examination will find ascaris eggs. The diagnosis is made by an abdomen ultrasonography (USG) examination, where an ascaris is found in the form of a circular long tubular echogenic structure. The conservative treatment includes hospitalization and anthelmintic drug administration. We report a case of gallbladder ascariasis in a 28-year-old woman with a good recovery after receiving a conservative treatment.

**Case:** A 28-year-old woman visited our Emergency Department with a colic felt in the upper right abdomen, accompanied by nausea and vomiting, general itching, and a 10-day fever. Physical examination was positive for tenderness on the right hypochondrium on palpation. The blood test showed hemoglobin 11.2 g/dL, total white blood count (WBC) 6,200/mm$^3$. An abdomen USG showed a picture of tubular structures engaged in the gallbladder lumen. There was no visible stone, sludge, or a fluid reflected echo in the surrounding. There was a wall dilatation, thickening, and a double (0.45 cm).

**Conclusions:** The patient was diagnosed with gallbladder ascariasis and acute cholecystitis and hospitalized. A broad-spectrum antibiotic, an antispasmodic, and an anthelminthic drug albendazole 400 mg/day were given for 10 days. The abdomen USG on the tenth days showed the gallbladder and the biliary duct lumen were cleared from the nematode, along with the patient physical recovery.

**Keywords:** Ascariasis, Gallbladder ascariasis, conservative treatment
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## INTRODUCTION

Ascariasis is a disease caused by *Ascaris lumbricoides*. The roundworm belongs to the phylum nematode. It is estimated 1.5 million people worldwide have *Ascaris lumbrocoides* in their digestive system.[1] The infection occurs mostly in tropical and subtropical countries, especially Asia. The transmission is through fecal oral route. Thus, ascariasis generally occurs in areas with low hygiene standard, malnutrition, high rainfall, and in areas where the practice of using human waste as a fertilizer is present.[1] Humans are infected from ingesting the roundworm egg-contaminated food, raw vegetables, or water. To complete its life cycle, the parasite leaves a human body as an egg, and re-infects in a form of larvae.[3]

Ascariasis is endemic in China and South East Asia, with a prevalence of approximately 41%-92%. The prevalence in Japan declined consistently after the end of World War II: 70% -80% in 1955, 13% in 1962, and 0.04% in 1992.[2]

Gallbladder ascariasis, although rarely happens compared to billiary duct ascariasis, is prevalent in endemic areas. Ascaris infestation in the gallbladder is very rare, about 2.1%.[4] The presence of *Ascaris lumbrocoides* in the gallbladder and biliary duct can cause an acute cholecystitis, an acute cholangitis, a biliary colic, an acute pancreatitis, and a hepatic abscess.[4] An abdominal ultrasonography (USG) is the main diagnostic tool, especially in endemic countries.[5] After invading the biliary duct, the roundworm may move out of the duct. But, if it is trapped within the duct, it will die and become a substance for a stone formation.[1] High activity of glucuronidase from the nematode and deconjugated bilirubin from Escherichia coli can form the pigmentation of stones.[1] A gallbladder-lodged-Ascaris responds poorly to any anti-parasitic drug because less than 1% of the drug is excreted in the gallbladder.

This study reports a rare case of gallbladder ascariasis treated conservatively. The management strategy was decided based on the principle of the worm's ability to wander, which spontaneously enables the nematode to leave the gallbladder.

## CASE REPORT

A 28-year-old woman visited Wangaya General Hospital Emergency Room because of an upper right abdominal pain, accompanied by nausea and vomiting. The pain was colicky, intermittent, and

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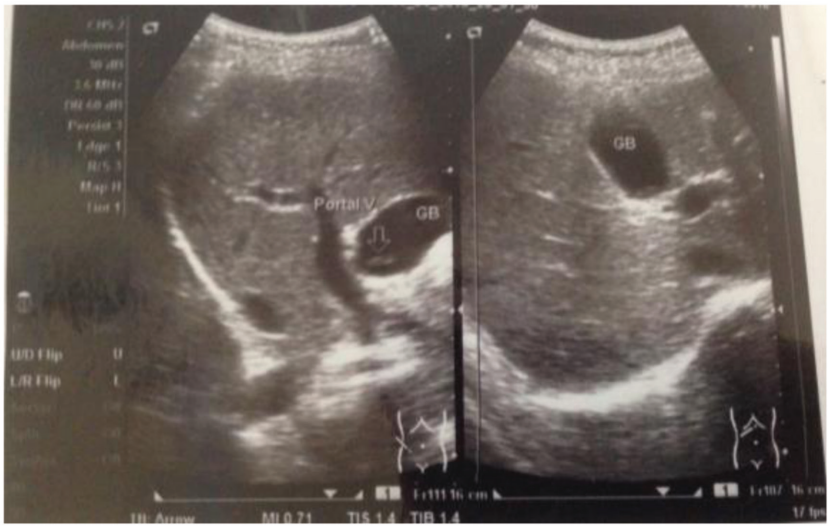


**Figure 1** A visible mobile tubular structure in the gallbladder

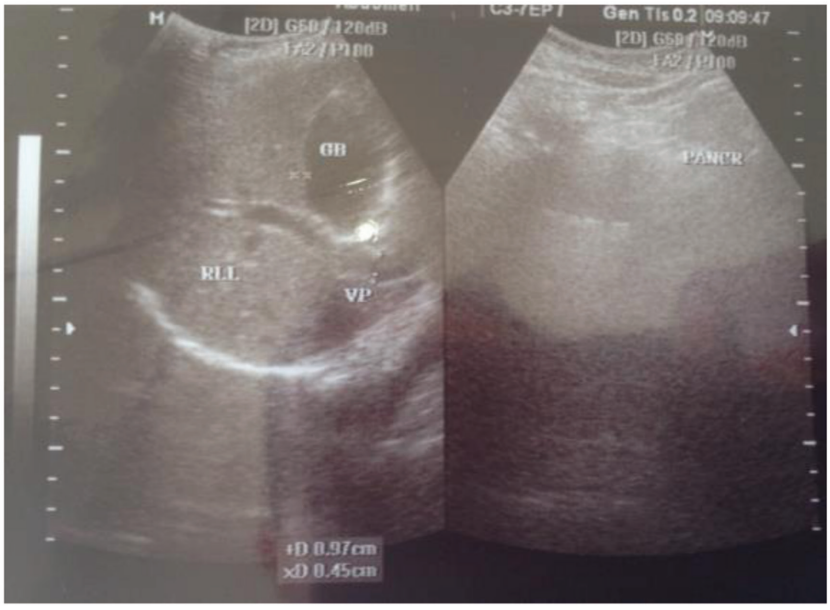


**Figure 2** The ultrasonography post treatment: no visible Ascariasis particle in the gallbladder

progressive. The patient also complained of itching and a 10-day fever. There was no history of any surgery, especially biliary surgery, nor medicine consumption of any kind.

We did not find any sign of jaundice, anemia, or lymphadenopathy on a physical examination. The blood pressure was 120/80mmHg, pulse 90 times/minute, axillary temperature 37°C. On palpation, an abdominal tenderness was present in the right hypochondrium, without any palpable mass.

The patient was negative for pregnancy. The blood test showed hemoglobin 11.2 g/dL, total white blood count (WBC) 6,200/mm$^3$. An abdomen USG showed a picture of tubular structures engaged in the gallbladder lumen. There was no visible stone, sludge, or a fluid reflected echo in the surrounding. There was a wall dilatation, thickening, and a double (0.45 cm). The next abdominal examination result is within normal limit. This patient diagnosed with gallbladder ascariasis and acute cholecystitis.

The patient received a broad-spectrum antibiotic and an antispasmodic. For treating the ascariasis, she was given an anthelminthic drug albendazole 400 mg/day for 10 days. On the tenth day of treatment, the patient had another USG. There was no visible Ascaris particles in the gallbladder. Another blood test showed the WBC 4,490/mm3, hemoglobin 11.8 g/dL. The liver function tests (LFTs) showed a higher level of serum bilirubin 0.73 mg/dL, alkaline phosphatase (ALP) 70 U/L, aspartate aminotransferase (AST) 15U/L, and alanine aminotransferase (ALT) 10U/L. A complete stool examination did not reveal any *Ascaris lumbricoides* egg. The patient was discharged with a significant physical recovery, cleared from the initial symptoms.

## DISCUSSION

*Ascaris lumbrocoides* has a tendency to move and look for a small hole. A dense colony of worms triggers the bowel movement, thus triggers a migration from jejunum to duodenum. The body reacted to the adult worms by altering the vasomotor and secretion reflexes. In consequence, affecting the tone and the motility of the gastrointestinal tract.[6] While in duodenum, the nematode may enter the ampulla of Vater into: (a) the ampulla itself, (b) the gallbladder, or (c) the hepatic duct, or anywhere on biliary system branches.[6] The roundworm can also enter the holes of the cystic duct while crossing the gallbladder, causing a blockage. However, they rarely enter the gallbladder because of the tortuous and narrowness of the cystic duct.[4]

Heister valve, which keeps the cystic duct open and closed, prevents an ascaris migration into the gallbladder. Because the cystic duct is usually short, narrow, winding, and has an obtuse angle, it limits ascariasis access to the gallbladder. In contrast, an acute angulation and a dilation of the cystic duct provide an easy access for the nematode. The ascaris intestinal development and size, and the gender and age of the patient is the determinant factors affecting the nematode migration to the gallbladder.[7]

Our patient was 28-year-old female. A study contended that female is more frequently have ascariasis. The female male ratio was 3:1.[8] Ascariasis is common in the 30s, ranging from 4 to 70 years.[8] A person is more susceptible to gallbladder ascariasis if: (1) there is a history of biliary surgery, such as cholecystectomy, choledocholithotomy, sphincteroplasty, endoscopic sphincterectomy, (2) being pregnant, because the pregnancy hormonal

effecting the ampulla of Vater, (3) had a disruption of ascaris surrounding environment, such as having a fever, anesthesia, and tetrachlorethylene.[5,7,9] But, our female patient was not pregnant, and negative for the medical history related to the increased risk of gallbladder ascariasis.

Our patient showed a biliary colic. A recurrent acute pain in the right hypocondriac region characterizes it, or the pain may be persistent for several days. This is due to the ascaris invasion into the ampulla of the duodenum, which was present in our patient. Meanwhile, cholangitis symptoms, such as fever, chills, and light jaundice may be present occasionally.[6] However, a practitioner should be aware of the symptoms of an acute cholangitis: a very high fever, chills, icterus, and upper abdominal pain. While on examination, there will be hypotension, hepatomegaly, leukocytosis, increased bilirubin (mostly the conjugated form), and increased liver enzymes, especially alanine aminotransferase, and alkaline phosphatase. These will be the signs and symptoms of a pyogenic cholangitis, which formation of the pus visible on the ampulla, or can be aspirated using endoscopic retrograde cholangiopancreatography (ERCP).[6]

An acute cholecystitis showed a right hypochondriac pain radiates to the interscapular area or the right shoulder, accompanied by vomiting and fever. On physical examination, there is a palpable mass in the right hypochondriac. However, the fever is not too high and there was no sign of shock. A thickening of the bladder wall and a biliary sludge can be found by USG.[6] Liver abscess may be solitary or multiple and contain pus. It is characterized by a hepatomegaly, high fever, edema, and right hypochondriac pain. An abscess may be derived from the unevolved nematode eggs released by the female ascaris migrating to the gallbladder, causing a granuloma inflammatory reaction with eosinophil infiltration. Hemobilia is very rare in cases of gallbladder ascariasis.[9]

The diagnosis depends on the location of ascaris in the biliary system. Moreover, it is based on the clinical symptoms. The diagnosis is complicated because usually ascaris enters and exits the duct in 7 days.[10] USG has 84% sensitivity and high specificity to visualize the ascaris in the biliary system, by monitoring the nematode movement towards and exits the duct.[10] If not changing its position after 10 days in the biliary system, the nematode will usually die and become macerated.[6] USG cannot detect ascaris in the duodenum or at the inlet of the ampulla, thus causing a 50% misdiagnosis of gallbladder ascariasis. ERCP is useful in this situation, both for diagnostic and therapeutic.[11] In USG, an ascaris is found in the form of linear, smooth filling defects with or without a distictive movement, but always without distal acoustic shadow.[12] It may also be found as a parallel filling defect (called a railway tract sign), a defect curve, or a transverse loop across the duct.[11] Ascaris in the gallbladder forms a circular long tubular echogenic structure. Therefore, it is easier to diagnose than other biliary ductal ascariasis. A CT scan showed an ascaris as a cylindrical structure. Sometimes a CT scan can detect the widening of the biliary system better.[12]

A stool examination will found ascaris eggs. Often, patients secrete adult worms through vomiting or in the feces.[6] Nonetheless, our patient only had a stool examination after the treatment, not before. Moreover, the examination revealed negative for the nematode egg.

Eosinophilia often occurs because of the larvae blood invasion. An aspiration of pus in the liver abscess can find eggs, because the larvae or eggs potentially cause an inflammation and necrotizing granuloma, more than the adult ascaris.[6] Although the anti-ascaris antibody may be found in an infected person, this examination is not useful due to the cross reaction with other helminthic antigens.[9]

In general, only the brown-pigmented stone is associated with a gallbladder infection. It is well-known that any obstruction of the gallbladder (complete, incomplete, or repeated) hinders the gallbladder drainage, and often accompanied with a secondary bacterial infection. Bacterial infections were reported in about 66% cases of gallbladder stones.[13] *Escherichia coli* are the most common bacteria causing the infection. The organism produces beta-glucoronidase and conjugates the bilirubin glucoronidase in the gallbladder. The unconjugated bilirubin will trigger a formation of calcium bilirubinate stones and serves as the nidus for cholesterol stone formation.[13] Gallbladder sludge is often found in gallbladder ascariasis. It also causes the clinical symptoms of acute acalculus cholecystitis. The sludge is composed of cholesterol crystalline, mucin, and calcium bilirubinate granules.[6] Ascaris adult, larvae, and egg can initiate the formation of gallbladder stones. When followed for several years, patients with gallbladder ascariasis had stones which nidus come from parts of dead ascaris, and the stones are usually composed of a layer of calcium bilirubinate.[13]

A patient with gallbladder sludge, intrahepatic gallbladder stones, and chronic secondary bacterial infections, is usually thin, young, and sometimes in a state of malnutrition. Recurrent upper abdominal pain, cholestatic jaundice, and fever with shivering are common clinical symptoms. A cholangiogram will show both intra- and extrahepatic biliary system filled with a soft biliary mud.[14] A recurrent pyogenic cholangitis and ascariasis showed an

inter-relation. More than 5% of gallbladder ascariasis has a repeated pyogenic cholangitis after 2 years or more. Gallbladder stones is common in about 90% of the cases, and 50% occurs in the common biliary duct or common hepatic duct, in which 15% had stones located in the gallbladder. About 10% of recurrent pyogenic cholangitis is associated with ascariasis.[14] The recurrent pyogenic cholangitis, making up 72% of the nidus of the gallbladder stones, comes from parts or whole dead ascaris.

Patients with gallbladder ascariasis should be hospitalized. The high number of worms may cause a mechanical gastrointestinal obstruction. But, it will improve after the anthelmintic therapy, when ascaris died. The excretion of ascaris product will cause an intestinal contraction.[15] Acute pancreatitis is a complication that can occur, and the mortality is increased in case of hemorrhagic pancreatitis.[15]

Gallbladder ascariasis has a mortality rate of less than 2%.[15] The principle of gallbladder ascariasis therapy are: (1) conservative therapy in cholangitis or cholecyctitis, (2) administration of anthelmintic per oral, which will cause the death of ascaris, so that the removal happens through the normal activity of the gastrointestinal tract, (3) endoscopic and surgical therapy. Obstruction jaundice and obstruction of the gastrointestinal tract is an indication for surgery.[6]

Conservative treatment includes broad-spectrum antibiotics, analgesics, and intravenous fluids.[16] Most cases of acute acalculus cholecystitis improved without complications. In acute pyogenic cholangitis, a highly specific antibiotic is indicated, depends on the culture of the gallbladder pus and the sensitivity test results. Pus can be taken out by duodenoscopy, or by ERCP of papillary meatus, or by aspiration.[6] When occurs, an endotoxin shock should be handled by correcting the metabolic acidosis. The ideal anthelmintic should be: (1) safe at a higher therapeutic dose, (2) cheap, readily available, and can be administered per oral, (3) stable and effective for long-term in different weather conditions.[6]

Oral anthelmintic kill the adult worms but does not affect the larvae. The medicine should only be administered if the patient can fart and defecate. The worm clearance is usually complete within 3 days, depending on the intestinal transit time, diarrhea, and the number of worm.[6] The medicine should be given in liquid form. Administering anthelmintic, such as piperazine citrate, directly on the biliary

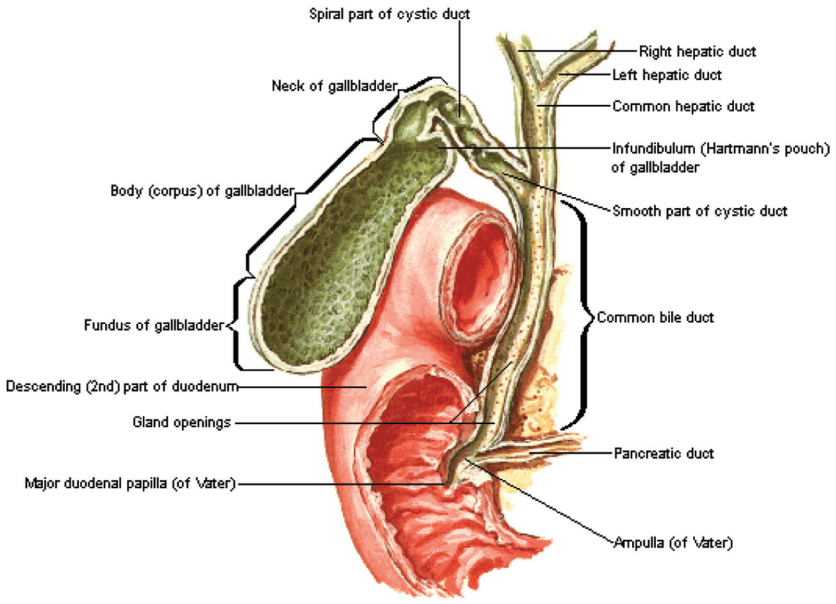


**Figure 3** Gallbladder dan Extrahepatic Biliary Duct Anatomy (Source: Lu, M. Liver, Pancreas, and Gallbladder Anatomy-Histology Correlate)

**Table 1** **Anti-ascaris Dose, Contra-indications, Efficacy and Mode of Action**

| Drug (dose) | Contra-indications | Efficacy against *Ascaris lumbricoides* % | Mode of action |
|---|---|---|---|
| **Single Dose** | | | |
| Pyrantel pamoate (11mg/kg, max 1g) | Pregnancy, age <2years | 90-100 | Spastic paralysis (depolarizing neuromuscular junction) |
| Albendazole (400mg, 200mg for <2 yeas age) | Pregnancy | 100 | Inhibits glucose uptake |
| Levamisole (2.5mg/kg) | Pregnancy, renal disorders | 90 | Spastic, followed flaccid paralysis |
| **Multiple dose** | | | |
| Mebendazole (100mg bd, 3 days) | Pregnancy, age <2years | 100 | Immobilization by inhibiting the glucoses uptake and acetylcholine esterase |
| Piperazine citrate (75mg/kg/dose, 2 days) | Convulsive disorders | 90-100 | Flaccid paralysis by blocking acetylcholine |
| Thiabendazole (25mg bd, 2 days) | Pregnancy, age <2years | - | Inhibits fumerae reductase |

(Source: Das AK. Hepatic and biliary ascariasis. *Journal of Global Infectious Diseases*. 2014)

system through a surgico-endoscopic procedure is not useful and not recommended.[10] A treatment failure can occur, and persistent eosinophilia is a flag sign of treatment failure.

Endoscopic and surgical intervention is chosen if the patient is not responding to a conservative therapy after a few days hospitalized, or when ascaris is not out of the gallbladder after 3 weeks of anthelmintic administration.[7] Most cases of an acute pyogenic cholangitis requires a biliary decompression or a drainage. An acute cholangitis with biliary strictures or the presence of ascaris in the gallbladder is also an indication for surgery.[7] Ascaris extraction with endoscopy throuh Vater ampulae will immediately reduce the biliary colic symptoms. Almost 100% of ascaris endoscopic extraction from the ampulla was successfully performed, and 90% for the gallbladder by using nets endoscopy. The complication of an endoscopic procedure is low (6%), including hypotension and cholangitis.[10] Thus, ascaris endoscopic extraction using a snare, Dormia net, or forceps biopsy, is the first modality in gallbladder ascariasis endoscopic treatment.[7]

Percutaneous drainage using a needle guided by an ultrasound or a surgery is required on a large hepatic abscess. Ascariasis gallbladder usually requires a cholecystectomy.[7] A laparotomy is indicated if ERCP cannot be used for transporting the extracted ascaris in patients who experience a worsening during hospitalization.[7] Doctors should be aware that acute pancreatitis, obstruction of gastrointestinal complications (volvulus, gangrene, or perforation) can occur in patients with gallbladder ascariasis. In recurrent pyogenic cholangitis with stone obstruction, a Roux-en-Y placement serves as a conduit to the jejunum for biliary access.[7]

## CONCLUSION

Ascariasis gallbladder is a rare case. Most patients can be treated conservatively. The treatment includes anthelminthic administration. Albendazole is an option, and in many cases, the patients responded well. Sometimes a surgical therapy, usually laparoscopic or endoscopic procedures such as endoscopic retrograde, is required. ERCP is preferred if the worms die and cause obstruction of the biliary system. Our patient responded well to the anthelmintic and did not require any surgical intervention. The follow up showed the nematode disappeared from the gallbladder and the lumen of the biliary duct.

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