

# Ascaris “Download” as a cause of acute recurrent pancreatitis in a child

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## ABSTRACT

**Introduction.** Infestation with the roundworm *Ascaris lumbricoides* is one of the most prevalent helminthic diseases belonging to the soil-transmitted helminths class. Infections are especially affecting children in tropical countries and low and middle-income countries but also may occur in developing countries where sanitation and hygiene are poor. We aim to present a case report to sound the alarm on this widespread pathology.

**Case presentation.** We report the case of a 9-year-old boy with Down syndrome and duodenal stenosis admitted to our hospital with recurrent bouts of pancreatitis secondary to ascariasis. Child is living in poor sanitation conditions. The first episode of pancreatitis was at the age of seven. The abdominal ultrasound shows enlargement and heterogeneity of the head and body of the pancreas, and multiple images of “the strip sign” in the duodenum, suggesting the presence of *Ascaris lumbricoides*. Live worms were expelled several times. During the next two years, this child was admitted for similar episodes suggesting re-infection with the soil-transmitted helminths, repeated courses of albendazole were administered to the patient and to his close relatives contact.

**Conclusions.** *Ascaris lumbricoides* infection is rarely a direct cause of mortality, but it contributes to overwhelming morbidity. Periodically repeated de-worming treatment and additional preventive measures such as improvements to water, sanitation and hygiene (WASH) could ensure high rates of eradication.

**Keywords:** pancreatitis, ascariasis, water, sanitation and hygiene

## INTRODUCTION

The roundworm *Ascaris lumbricoides* is one of the most prevalent parasites belonging to the class of the soil-transmitted helminths (STH) [1]. Ascariasis remains the leading helminthic infection worldwide, affecting around 738 million to 872 million people worldwide [2], disproportionately affecting children in tropical

countries and low-income and middle-income countries [3]. Other factors closely associated with this STH are immunodeficiency, malnutrition, overcrowding and poverty, using stools to make fertilizer, poor health education, especially of mothers, not washing hands before eating, pig ownership or livestock breeding and open defecation [4].

Infestation is produced frequently by the ingestion (especially by young children) while playing or by intentional ingestion of contaminated soil [5] of fertilized eggs expelled with human faeces on the ground. The infecting form develops within two weeks [6,7]. Transmission may also occur by ingestion of water and/or vegetables and fruits contaminated by fertilized eggs [5]. The ingested eggs hatch into larvae in the jejunum, penetrate the gut wall and migrate through the portal vessels to the liver and then in the lungs [5], where the larvae are expectorated and swallowed. In the small intestine, they turn into adult worms and produce new eggs which are eliminated with faeces contaminating the soil and water [8]. Since these parasites do not multiply in the human host, reinfection is possible only when fertilized eggs are ingested [9].

*A. lumbricoides* infection is seldom a direct cause of mortality, but it contributes to lifetime morbidity. For example, complications related to *Ascaris* infection may cause up to 60,000 deaths annually in school-age children [9].

Most complications of *A. lumbricoides* infection are associated with intestinal and/or biliary obstruction and may lead to pancreatitis, cholecystitis, cholangitis, appendicitis, perforation of an intestinal segment, intestinal volvulus and peritonitis [8]. We aim to present a case report to sound the alarm on this widespread pathology.

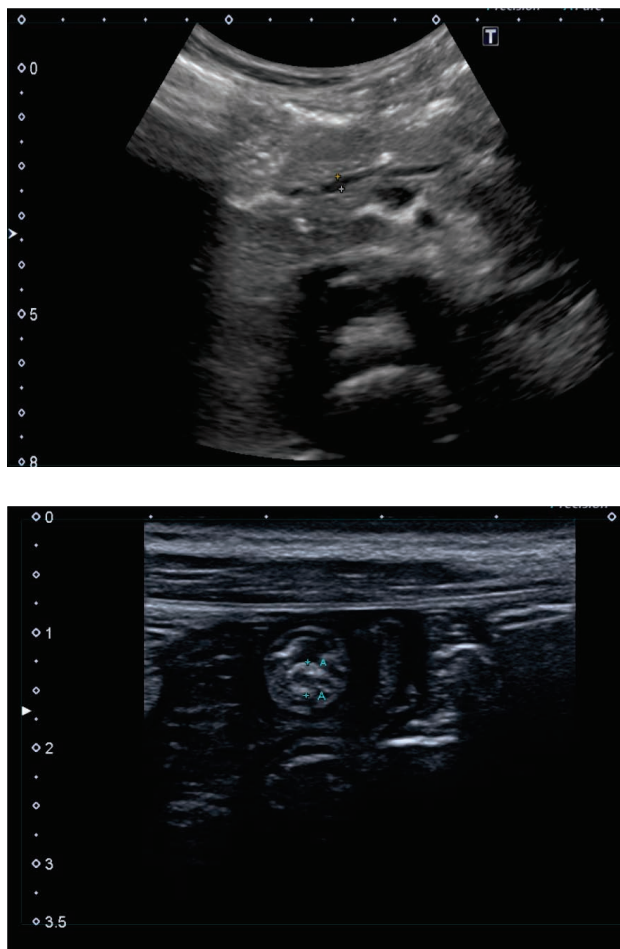
## CASE PRESENTATION

We report the case of a 9-year-old boy with a history of acute recurrent pancreatitis (ARP). He was diagnosed at birth with Down syndrome and duodenal stenosis, for which surgery was performed on the third day of life. He present aortic bicuspidy with no hemodynamic impact. The child comes from a Romani family, living in a rural community. He lives with his parents and younger sister in a single room house; the water source is from a fountain, and no indoor bathroom exists. His parents are illiterate, and they do not have stable jobs.

He was first admitted to our department at the age of seven for vomiting and intense abdominal pain. He was stunted (16.5 kg, <5<sup>th</sup> percentile weight-for-age for Down syndrome and his height was 105 cm, on the 5<sup>th</sup> percentile height-for-age for Down syndrome), pale and tachycardic, with signs of dehydration and prostration. His abdomen was distended, and guarding at abdominal palpation was observed. Cognitive delay and scarce language skills were noticed, making communication difficult. The serum lipase and amylase were highly raised (2,349 UI/ml, respectively 7,087 UI/ml), C-reactive protein was 2.23 mg/dl and ESR 35 mm/h, whereas his serum lipid and calcium profile were with-

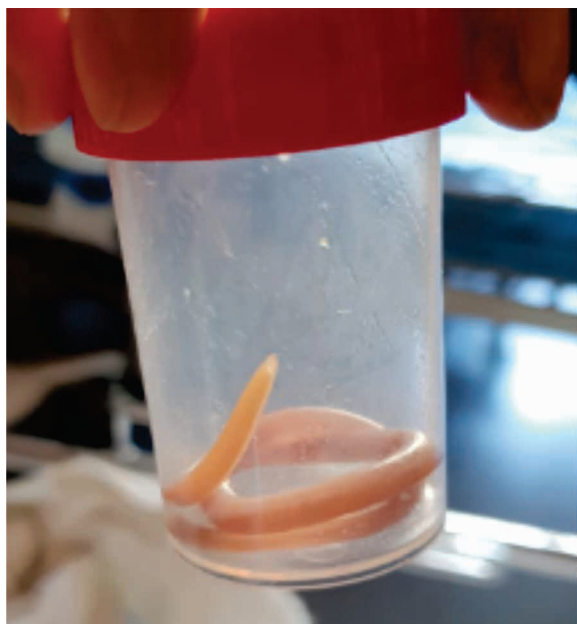
in normal ranges. The abdominal ultrasound and CT revealed enlargement and heterogeneity of the head and body of the pancreas with an area of necrosis at the cephalic level and peripancreatic fluid. The main pancreatic duct was dilated (3 mm), particularly echogenic, and the peripancreatic fat was heterogeneous. Also, the air in the pancreatic and biliary ductal systems was observed.

He was admitted to the Intensive Care Unit, and on abdominal ultrasound performed after 24 hours we note the presence of an echogenic material in the intrahepatic bile ducts, common bile duct and the right hepatic duct, without acoustic shadowing. In the second duodenal segment are described several mobile tubular structures with a mean caliber of 4 mm. These structures had two hyperechoic linear strips on either side of the longitudinal anechoic lumen. This was when intestinal ascariasis was taken into account (Figure 1). Meanwhile, the patient pulls his nasogastric tube accidentally, and with that, a live *Ascaris lumbricoides* worm is expelled (Figure 2).



**FIGURE 1.** Abdominal ultrasound. Up: dilated main pancreatic duct "unoccupied". Down: worms in the small intestine

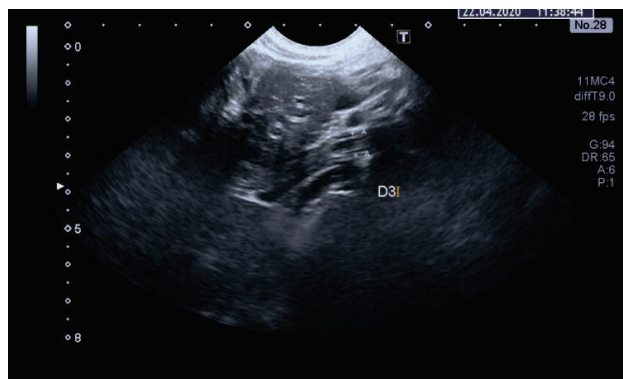
He received albendazole and this episode resolved within two weeks. During the last two years, he was



**FIGURE 2.** Live *Ascaris* expelled with the nasogastric tube

admitted for several milder episodes, and each time live roundworms were eliminated in his stool and vomit.

The last episode was in April 2020. He was admitted for similar complaints (abdominal pain and vomiting) with similar clinical picture. On admission, the serum lipase and amylase levels were increased (646 U/l respectively 1,054 U/l). The abdominal ultrasound revealed an enlarged pancreas with a visible main pancreatic duct of 3.5 mm (Figure 3) and multiple parasites in the small intestine. He received albendazole. During the first two days, we identified pinworms in his stools. After a slight improvement during the first 72 hours, his general condition worsens, and the pancreatic serum enzymes were increasing (amylase was 337 U/l and lipase was 2,251 U/l). The ultrasound showed a dilated Wirsung duct (6 mm) with a characteristic inside image of a parasite (“strip sign”) and multiple images of parasites in the duodenum.



**FIGURE 3.** Abdominal ultrasound. *Ascaris* in the main pancreatic duct

After a prolonged course of de-worming and osmotic laxatives, live round worms were expelled multi-

ple times, both by vomiting and stool. Endoscopic retrograde cholangiopancreatography (ERCP) was not performed because of the unavailability of this procedure. At follow-up ultrasound, the main pancreatic duct was slightly dilated (3 mm) but “unoccupied”. The patient went on to be well and discharged after three weeks.

## DISCUSSIONS

Hepatobiliary and pancreatic ascariasis was first described as a clinical entity in Kashmir in India in 1985 [10]. In a review by Khuroo et al., ascariasis was nearly as common as gall stones in causing biliary and pancreatic disease in endemic areas [8]. Few studies highlighted the pancreatic, hepatobiliary and duodenal complications of ascariasis [11-14].

Hepatobiliary ultrasonography is the gold standard for the aetiology of pancreatitis: stones and ascariasis [15]. A study on 300 patients diagnosed with pancreatic ascariasis demonstrated the important roles of ultrasonography when combined with clinical examination and history [16]. This is true also for biliary ascariasis [17].

Ultrasonography can detect the presence of *Ascaris* worms in the biliary tree in more than 80% of patients confirmed at ERCP, but had low sensitivity and may be false negative in up to 30% of cases due to increased mobility and migration features of the worm, the worm is thin or in the pancreatic duct, or the common bile duct is non-dilated [18]. This can explain why, in our case, first ultrasound were normal. Moreover, the patient’s liver enzymes levels were within the normal range on admission, further shading the possibility of an obstructive aetiology of pancreatitis.

A more invasive and expensive and not-so-ready available alternative is represented by endoscopic ultrasound, which is a highly accurate method to diagnose the aetiology of biliary and pancreatic ascariasis with a sensitivity of 85-91% and a specificity of 87-93%, which are equivalent to those of ERCP and highly superior to those of ultrasonography and CT [18].

The current indications for treating intestinal worms include albendazole, mebendazole, levamisole, ivermectin, niclosamide, praziquantel, and pyrantel. Benzimidazole derivatives (albendazole and mebendazole) are considered the mainstay drugs for roundworm and hookworm treatment [19]. Albendazole is relatively more effective but cannot remove the parasites completely. Single dosing regimens result in cure rates of 88% in roundworm infections [5]. However, the occurrence of resistance to anthelmintic drugs in nematode populations has been described in veterinary medicine [19]. Endotherapy is indicated if conservative treatment is not successful [20].

Water improvement (with piped enclosed sewerage systems), sanitation and hygiene interventions, espe-

cially hand-washing with soap (WASH) should not be underestimated. They have been reported as important additional interventions to deworming programs to improve STH control [21-23].

Another key aspect of this case report is the association of duodenal stenosis. A recurring complication following patients with duodenal obstruction is an atonic megaduodenum due to duodenal dysmotility [24]. Also, dysmotility may affect the biliary system due to the emergence of the muscle fibre in the biliary tree from the sphincter of Oddi, which in turn may be affected by the local structural and functional changes induced by the surgical correction for the duodenal stenosis. Potential but much less understood is the association of sphincter of Oddi dysfunction with idiopathic recurrent acute pancreatitis [25].

This case indicates that the diagnosis of pancreatic ascariasis should be considered even in non-endemic

countries, especially in low and impoverished socioeconomic settings, when poor hygiene practices are suspected. The characteristic appearance on ultrasonography of the “strip sign” and “inner tube sign” is the key feature in these cases.

## CONCLUSIONS

We conclude that WASH and repeated de-worming treatments are essential protective tools to control STH in children. For this case with duodenal stenosis, we can speculate that the re-occurrence of ascariasis may be favoured, on the one hand, by the re-infestation caused by the repeated ingestion of the eggs and, on the other hand, by the local anatomical and functional alterations produced by the surgical interventions for duodenal stenosis.

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