Case Report

The adventures of 'Ascaris lumbricoides' - An intrepid traveller

Gupta S[1], Mohi JK[2], Mathur M[3], Singh DP[4]

[1]Dr. Saryu Gupta, Assistant Professor, Department Of Radiodiagnosis, [2]Dr. Jaswinder Kaur Mohi, Associate Professor, Department Of Radiodiagnosis, [3]Dr. Manoj Mathur, Associate Professor, Department of Radiodiagnosis, [4]Dr. D. P. Singh, Professor & HOD, Department of Surgery; all authors Government Medical College & Rajindra Hospital, Patiala, Punjab, India.

Address for Correspondence: Dr Saryu Gupta, H. No 80, Lane 2a, New Majithia Enclave Phase 2, Near ITI, Nabha Road, Patiala (Punjab). Email: saryupuneet99@gmail.com

Abstract

Hepatobiliary ascariasis is an underestimated & unforeseen corollary of gastrointestinal ascariasis particularly common amongst the endemic populations. A high index of suspicion coupled with the increased use of ultrasonography & endoscopic procedures have unravelled this deviant sequel of helminth infestation. Conservative measures with meticulous sonographic surveillance remain the preferred first-line treatment for worms confined to the biliary ducts; with, endoscopic and surgical interventions being reserved for the persistently symptomatic or when complications ensue. Gall bladder ascariasis however mandates aggressive endoscopic/ surgical measures in most cases due to poor inherent response to pharmacotherapy alone. We hereby present the study of a 10 years old female child with the sonographic, MRCP, per-operative & histopathological correlates of hepatobiliary ascariasis. The bizarre eventuality of the worm migrating from the gastrointestinal tract and traversing across the intrahepatic ducts to ultimately lodge within the gall bladder (as demonstrated on consecutive scans & confirmed per-operatively), especially across narrow calibre childhood ducts is a singular affair and hence consigns exclusivity to our case.

Keywords: Ascaris lumbricoides, Hepatobiliary ascariasis, Ultrasonography, Magnetic resonance cholangio-pancreatography

Introduction

Even 70 years after the astral work of Stoll ---'This Wormy World' saw the light of the day, the global prevalence & dominance of soil-transmitted helminth infections remains sacrosanct & irrefutable. About 2 billion people amounting to 24% of the world's population are infected with these; mainly in the tropical and sub-tropical areas. Over 2 million pre-school and 6 million plus school-age children live in environs which are intense transmission zones of these parasites. The morbidity spectrum entails physical, nutritional & cognitive impairment - reverberations which are largely avertable [1].

Ascariasis being the major contributor to the global burden of disease has potentially devastating consequences due to its impact on the national socio-economic status by virtue of its sheer numbers.

In one-third cases it can migrate from the GIT into the biliary tree resulting in obstructive jaundice, acalculous cholecystitis, cholelithiasis, choledocholithiasis, biliary colic, recurrent pyogenic cholangitis, pancreatitis, hepatic abscesses and septicaemia [2]. However infestation of the gallbladder with ascaris worms is an oddity (accounting for 2.1% of biliary ascariasis cases only), and has mostly resulted from high intestinal parasite load in the host. As less than 1% of the volume of anthelmintic drugs is excreted in the bile, gallbladder ascariasis responds poorly to medical therapy [3].

Ultrasound is an excellent modality for the diagnosis and follow up of hepatobiliary ascariasis; with CT & MRCP conducive in their complementary role.

Manuscript received 24th July 2016
Reviewed: 5th August 2016
Author Corrected: 20th August 2016
Accepted for Publication 1st September 2016

Case Report

A 10 years old girl presented with the history of intermittent colicky pain right hypochondrium, diarrhoea, fever and anorexia for the past 6 months; not associated with any jaundice or vomiting. Routine investigations revealed leucocytosis, eosinophilia, mildly elevated serum alkaline phosphatase levels and sterile blood culture. Stool examination disclosed ova of Ascaris lumbricoides. Abdominal skiagrams were unremarkable. On the first visit ultrasonography there was visualised a well-defined, discretely tubular, non-shadowing, linear echogenic stripe of approximately 5.2cm (in the part seen), a nearly constant diameter & a curvilinear orientation as it lay in the hepatic duct along the right posterior

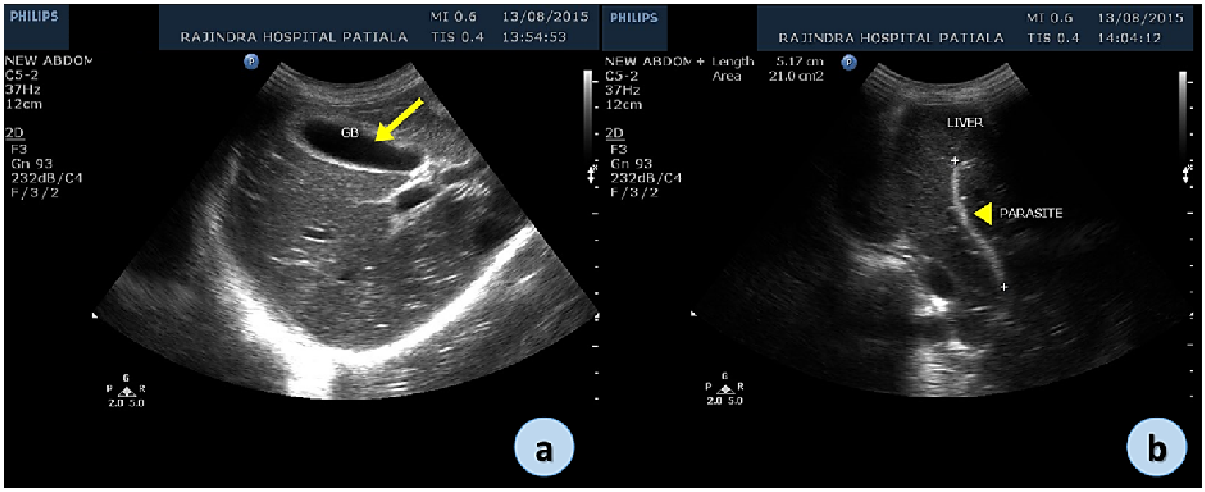

Figure 1: First Visit Ultrasound
(a) Gall bladder: No intraluminal echogenic mass seen (yellow arrow)
(b) Ascaris worm seen as a tubular & echogenic but non-shadowing curvilinear stripe within the hepatic duct (yellow arrow head)

branch of the portal vein. It was seen extending across the biliary confluence into the common bile duct. No active movement was exhibited by it during the scan. No such structure was visualised in the rest of the biliary tree. There was no associated peri-portal oedema or CBD wall thickening. Liver & gallbladder were normal. However, a subsequent MRCP done the next day exhibited the abovementioned structure to be lying coiled within the gall bladder. This was further corroborated on a repeat ultrasound done three days later & hence a diagnosis of Gall bladder Ascariasis was made. The patient underwent a laparoscopic cholecystectomy with retrieval of the parasite from within the gall bladder.

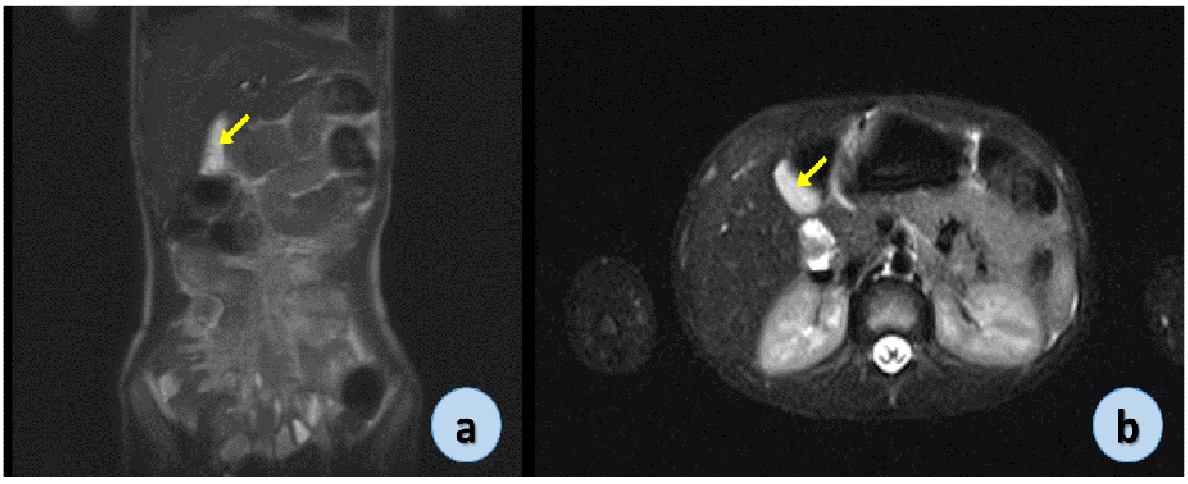

Figure 2: MRCP on day 2: T2 HASTE COR (a) & T2 HASTE IR Trans (b) single intraluminal curvilinear hypointense structure in GB suggestive of Gall bladder ascariasis (yellow arrows)

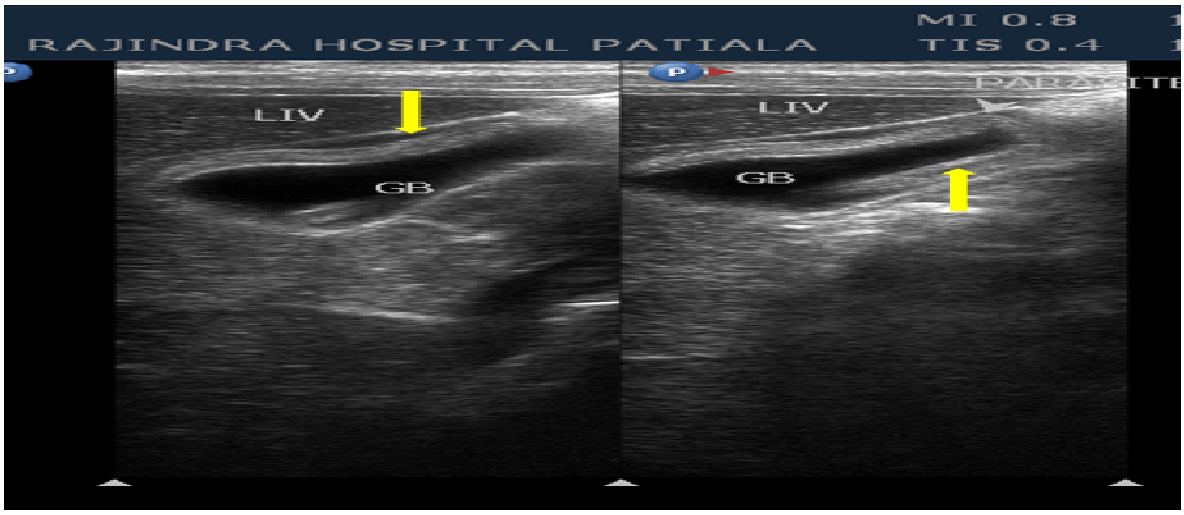

Figure-3: Ultrasound on Day 5: Single unfragmented parasite/ Ascaris worm lying coiled within the GB lumen (yellow arrows)

Discussion

Ascaris lumbricoides is the largest & most frequent human intestinal nematode especially prevalent in the moist tropical & subtropical regions. Ascariasis is transmitted through the faeco-oral route. Ingested eggs release larvae in the duodenum which penetrate the intestinal mucosa & are transported haematogeneously to the lungs. After infiltrating across the alveolar walls they reach the tracheobronchial tree only to be swallowed again. Mature worms develop in the small intestine, mate & produce eggs which are then excreted via the faeces thereby completing the cycle [4, 5].

Normal inhabitants of the jejunum, the mature worms reach the duodenum only in cases with high intestinal parasite load [3]. In the context of hepatobiliary & pancreatic ascariasis, the agility of the ascarids particularly the female worm accounts for their propensity to explore & penetrate all possible orifices and hence they can enter and exit the biliary / pancreatic tree via the ampulla with remarkable ease. This is further enhanced in pregnant females, fasting states & post-cholecystectomy / biliary exploration/ biliary surgery patients [5]. However, the narrow & tortuous cystic duct limits access to the gall bladder [3].

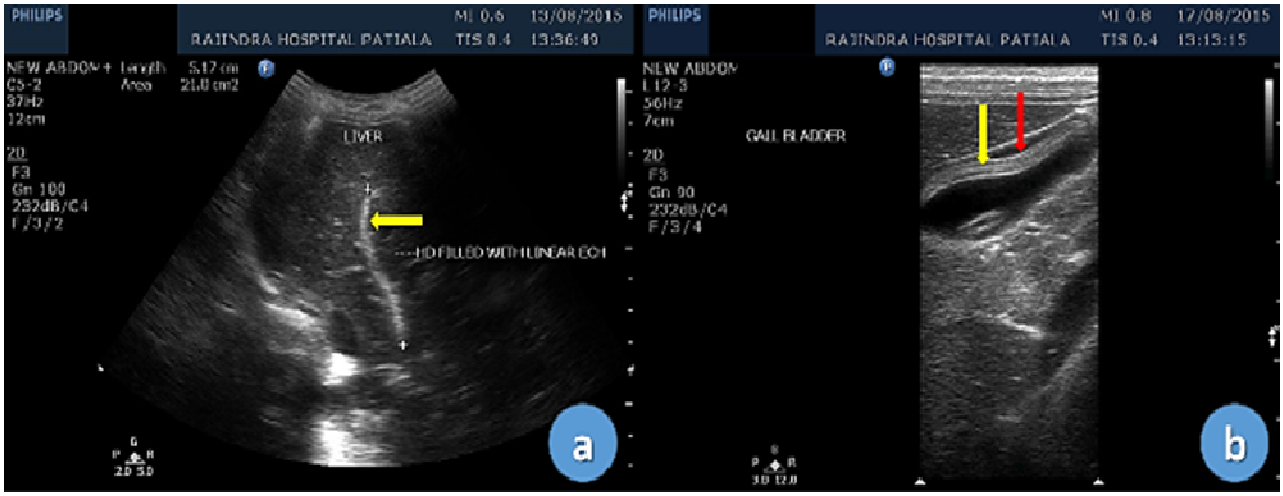

Figure 4: Sonographic Signs in Hepatobiliary Ascariasis
Stripe sign: thin non-shadowing stripe without an inner tube within hepatic ducts (yellow arrow)
Inner – tube sign: central anechoic tube (GIT of worm) (yellow arrow) within a thick echogenic stripe (worm itself) (red arrow)

In addition, secretions from the Ascaris induce sphincter of Oddi spasm and the resultant biliary stasis along with intestinal bacteria brought by the parasite can trigger biliary colic, pyogenic cholangitis or cholecystitis. Upon reaching the intrahepatic biliary tree, necrosis & hepatic abscesses may ensue. Besides the β-glucoronidase- rich parasitic secretions, eggs & dead parasites may all serve as nidi for stone formation (4).

Overall women are affected more than men (3:1) & adults more than children; the latter reflecting the relative inability of the worms to invade the small- calibre childhood ducts (5-7) though highest prevalence of infestation as such is among children between 4 – 14 years of age .

Sonographic features of hepatobiliary ascariasis are summarised as follows: (8-11)

- **Inner – tube sign** : central anechoic tube (GIT of worm) within a thick echogenic stripe (worm itself)
- **Stripe sign** :thin non-shadowing stripe without an inner tube within gall bladder / CBD
- **Spaghetti sign** : overlapping longitudinal interfaces in the main bile duct due to coiling of one or many worms
- **Bag of worms appearance** : multiple ring -like shadows some with target appearance on transverse sections
- **Pseudotumour** appearance
- **Coil of worm** in gall bladder lumen
- **Calcified linear structures** (dead & fragmented worms)
- **'Belly – dance'** of worms in motion on real-time scanning
- **Ancillary findings:** attributable to cholecystitis, cholangitis, pancreatitis, hepatic abscesses etc.
- **Demonstration of the GIT ascarids**

In sonographically indecisive scenarios MRI/ MRCP may reveal the parasites as intraluminal, curvilinear hypointense structures vis-à-vis gallstones which manifest as rounded areas of signal void. Furthermore, it also facilitates concurrent evaluation of the common hepatic & common bile ducts (12).

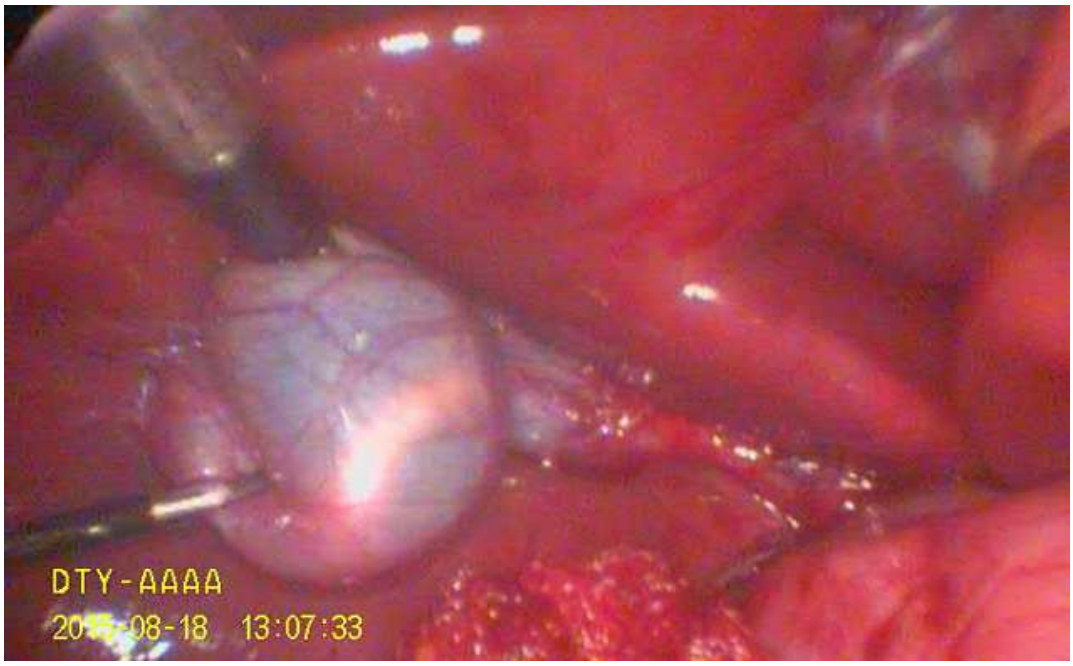

Figure-5: Intra Operative Laparoscopic cholecystectomy image: Intraluminal Ascaris worm seen through the wall of gall bladder

Conclusion

Ultrasound being an easily accessible, economical, non-invasive, rapid & accurate tool remains the sine qua non of the radiologist's armamentarium for the diagnosis and follow up of hepatobiliary ascariasis. Nevertheless MRCP which prevails over the operator dependence of sonography & offers a global view of the entire hepatobiliary system is an invaluable adjunct in imaging such cases.

Declarations

Funding: Nil, **Conflict of interest:** None initiated, **Permission from IRB:** Yes

Ethical Approval Not required

References

1. WHO. Soil transmitted helminth infections. Fact Sheet. 2016; fs366.

2. Mohammad A Hashmi Jevan K De. Biliary Ascariasis on Magnetic Resonance Cholangio-pancreatography. Journal of Global Infectitious Diseases 2009; 1(2):144-5.

3. Wani I. Gallbladder ascariasis. Turk J Gastroenterol. 2011; 22(2):178-82.

4. Catalano OA, Sahani DV, Forcione DG, Czermak B, Liu CH, Soricelli A, Arellano RS, Muller PR, Hahn PF. Biliary infections: spectrum of imaging findings and management. Radiographics. 2009 Nov; 29(7):2059-80. doi: 10.1148/rg.297095051.

5. Kenamond CA, Warshauer DM, Grimm IS. Best cases from the AFIP: Ascaris pancreatitis. Radiographics. 2006 Sep-Oct; 26(5):1567-70.

6. Khuroo MS. Ascariasis. Gastroenterol Clin North Am. 1996 Sep; 25(3):553-77.

7. Sandouk F, Haffar S, Zada MM, Graham DY, Anand BS. Pancreatic-biliary ascariasis: experience of 300 cases. Am J Gastroenterol. 1997 Dec;92(12):2264-7.

8. Kamal Oswal Ajay Aggarwal. Images: Hepato-billary Ascariasis. Indian J Radiol Imaging. May 2007; 17(2):77-8.

9. Donboklang Lynser Akash Handique, et. al. Sonographic images of hepato-pancreatico-biliary and intestinal ascariasis: A pictorial review. Insights Imaging. 2015; 6(6):641-6.

10. Schulman A, Loxton AJ, Heydenrych JJ, Abdurahman KE. Sonographic diagnosis of biliary ascariasis. AJR Am J Roentgenol. 1982 Sep; 139 (3): 485-9.

11. Khuroo MS, Zargar SA, Yattoo GN, Dar MY, Javid G, Khan BA, Boda MI, Mahajan R. Sonographic findings in gallbladder ascariasis. J Clin Ultrasound. 1992 Nov-Dec;20(9):587-91.

12. Arya PK, Kukreti R, Arya M, Gupta SN. Magnetic resonace appearance of gall bladder ascariasis. Indian J Med Sci. 2005 May;59(5):208-10.

…….....

How to cite this article?

Gupta S, Mohi JK, Mathur M, Singh DP. The adventures of 'Ascaris lumbricoides' - An intrepid traveller. *Int J Med Res Rev* 2016;4(9):1641-1645.doi:10.17511/ijmrr. 2016.i09.22.

…….