CASE REPORT

Incidental detection of ascariasis worms on USG in a protein energy malnourished (PEM) child with abdominal pain

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SUMMARY

A 10-year-old child presented with dull aching periumbilical abdominal pain for 15 days. The child was not gaining weight despite a good appetite. Physical examination of the child revealed grade-I protein energy malnourishment (PEM) according to IAP (Indian Academic of Paediatrics) classification. The rest of the systemic examination was normal. Routine blood investigation revealed anaemia with eosinophilia.

Abdominal ultrasonography did not show any abnormality with curvilinear transducer (3.5–5 MHz), however, linear ultrasound transducer (7.5–12 MHz) with harmonic tissue imaging showed worms in the lumen of the small intestine with curling movement on real time scanning. Stool examination for the eggs of ascariasis was positive. The patient was treated with antihelminthic drugs. Dietary modification for the PEM was advised. After 3 months of treatment, the patient improved and stool examination for *Ascaris* was negative on follow-up.

BACKGROUND

Ascaris lumbricoides infection leads to ascariasis. It is widely distributed in tropical and subtropical regions.¹ Ascariasis is the most common of helminthic infections, with an estimated worldwide prevalence of 25%.² Approximately 85% of obstruction occurs in children between the ages of 1–5 years.³ Humans are permanent hosts. Transmission occurs by faeco-oral route. Clinical presentations may vary according to the stage of life cycle of the worm. Diagnosis is usually possible with the use of a higher frequency ultrasound probe of 5–10 MHz. Treatment is with oral antihelminthic drugs.⁴ Ultrasonography (USG) to look for the underlying aetiology is advised in most cases presenting with abdominal pain. USG plays a role in the initial diagnosis of ascariasis before a stool examination is carried out.

CASE PRESENTATION

A 10-year-old child presented in the outdoor patient department of paediatrics with abdominal pain for 15 days. The pain was a dull ache located in the periumbilical region. It was not radiating or referred to the other site. The patient's mother reported that the child was not gaining weight despite having a good appetite. There was no preceding history of fever, anorexia or vomiting and no significant family or medical history relevant to the tuberculosis was found.

Vitals (temperature, pulse rate, respiratory rate and blood pressure) were normal. On physical

examination, mid upper arm circumference was 12.8 cm (normal >14 cm) indicating muscle wasting with loss of subcutaneous fat. The child had grade-I protein energy malnourishment (PEM) according to the IAP (Indian Academic of Paediatrics) classification with weight of 23 kg (76% of expected weight for age). No evidence of skin or hair changes was present. On per abdominal examination, the abdomen was soft and non-tender and with no organomegaly. The rest of the systemic examination was normal. On the clinical basis, the patient was diagnosed with a marasmic type of PEM.

INVESTIGATIONS

Routine blood investigations revealed: haemoglobin of 8 g % (anaemia), total white cell count of 8300 cells/mm³ (normal) and eosinophil count of 640 cells/mm³ (eosinophilia). Serum total protein was 7.2 g/dL (normal 6.4–8.3 g/dL) and serum albumin was 4.1 g/dL (normal 3.5–5.0 g/dL).

Chest X-ray was normal.

Abdominal sonography with curvilinear ultrasound probe (3.5–5 MHz) revealed no significant abnormality. But with a linear broadband phased array ultrasound transducer (7.5–12 MHz) with tissue harmonic imaging showed two hypoechoic linear tubular structures with echogenic outer wall and central canal of the worms seen in the lumen of the small intestine, with the curling movement of the worms visible on real time scanning. The axial scan gave a 'Bull's eye' appearance and the longitudinal scan had a 'Railway track' appearance (figures 1–3).

Stool examination for ova and parasites revealed large, brown 60 µm×50 µm tri-layered eggs of *A. lumbricoides* eggs. The patient was diagnosed with a case of marasmic type of PEM secondary to *A. lumbricoides* worm infestation.

TREATMENT

A single dose of 400 mg oral albendazole along with multivitamins and iron supplementation was prescribed to the patient. Dietary modification for the PEM was advised.

OUTCOME AND FOLLOW-UP

At 3-month follow-up, the patient did not have any symptoms. Weight gain of 2.7 kg was noted. Haemoglobin was 11.6 g % (normalised) and eosinophil count was 220 cells/mm³ (normalised). Stool examination for *Ascaris* was negative.

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Figure 1 Ultrasonographic image of abdomen with high frequency transducer showing hypoechoic linear tubular structures with echogenic outer walls and central canals of the worms seen in the lumen of the small intestine (open white arrow).

DISCUSSION

Ascariasis occurs due to infection with the *A. lumbricoides*, which is widely distributed in tropical and subtropical regions.¹

Adult *A. lumbricoides* worms are 15–30 cm in length and 3–6 mm in width. Humans are their permanent hosts. Their life cycle starts when embryonated eggs laid by the adult worm pass in the faeces of an infected individual. These eggs then contaminate the soil, water or even food. After ingesting contaminated products, humans get infected. Gastric secretions cause the eggs to hatch in the small bowel. Larvae then penetrate the intestinal mucosa, from where they are haematogenously transported to the lungs. Larvae mature in the alveoli and finally travel up the airway to the epiglottis, where they are swallowed. The larvae then mature into adult worms in the small intestine. The life span of an adult female worm is 6 months to 1 year. Between 2 and 3 months are required from the ingestion of the infective eggs by the host to oviposition by the adult female worm.

Clinical presentations vary according to the stage of life cycle of the worm. According to the Al-Mekhlafi *et al*⁵ study, prevalence of ascariasis in child with PEM is 61.9% of all helminthic infections. Gastrointestinal symptoms are due to adult worms. The most common complication of ascariasis is mechanical small bowel obstruction caused by a large number of worms. Other complications such as pancreatitis and acute cholecystitis may also occur.

Figure 2 Ultrasonographic image of abdomen with high frequency transducer showing worms in the lumen of the small intestine (open white arrow).

Figure 3 Axial ultrasonographic image of abdomen with high frequency transducer showing 'Bull's eye' appearances (open white arrow).

Ascaris pneumonia may develop due to localised intra-alveolar inflammatory reactions by migrated larvae. Pulmonary ascariasis is the most common cause of Loeffler syndrome. Peripheral eosinophilia may be found, particularly during the phase of larval migration through the lungs.⁶

On conventional abdominal radiographs, worms are seen as curvilinear soft-tissue-density cords. Air fluid levels are seen if bowel obstruction is present. On barium examination, *Ascaris* appears as longitudinal tubular structures. Worms are seen as a filling defect if their alimentary tract is empty. They appear as parallel bands if their alimentary tract is distended with barium. They appear as a target sign with body wall and a central dot representing the gut on transverse sections.⁷

Ultrasound scanning is the specific diagnostic tool in case of biliary infestation.⁸ Diagnosis is usually possible with an ultrasound probe of 3–3.5 MHz. However, as the bowel loops are directly under the abdominal wall, the detection of intestinal ascariasis is difficult using routine curvilinear probes. It demands the use of a higher frequency probe of 5–10 MHz. The adult worm is seen as a hypoechoic tubular structure with well-defined echogenic wall. Worms make curling movements on real time scanning. USG may show two pairs of echogenic tubular structures forming a 'railway track' appearance longitudinally and bull's eye appearance horizontally.^{9 10}

Treatment with oral administration of a single 400 mg dose of albendazole is usually successful.⁴ In the presence of bowel obstruction, surgery is generally indicated.

Learning points

- ▶ Prevalence of ascariasis in protein energy malnourished child is 61.9% of all helminthic infections.
- ▶ Ultrasonography (USG), with its advantage of rapid scanning time, lack of radiation exposure, cost-effectiveness and real time imaging, is the initial mode of investigation in cases presenting with abdominal pain, to look for the underlying aetiology. Thus USG plays a vital role in the initial diagnosis of ascariasis before the stool examination is carried out.
- ▶ A higher frequency probe of 5–10 MHz is required for the diagnosis.
- ▶ On USG, the adult worm is seen as a hypoechoic tubular structure with well-defined echogenic walls making curling movements on real time scanning. A 'Railway track' or bull's eye appearance is seen.

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Competing interests None.

Patient consent Obtained.

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