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CASE REPORT

Sudden death in a 2-year-old child: Role of Ascaris infestation and other possibilities

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Abstract
More than a billion people worldwide are infested with one or more parasite especially intestinal nematodes. Amongst the intestinal nematodes, Ascaris lumbricoides is the most common parasitic infestation. Ascariasis tends to occur more commonly in places where sanitation is minimal along with poor personal hygiene, and human faeces is used to fertilise crops, which is usually seen in underdeveloped or developing countries. Children are more likely to be infested and have higher worm load. Sudden death attributable to ascariasis per se is unusual; instead, it often leads to chronic malnutrition. A rare case is reported where death resulted from airway obstruction by a single ascaris worm in a two-year-old child.

Keywords
Forensic Pathology; Ascaris lumbricoides; Asphyxia; Sudden Death

Introduction

More than a billion people worldwide are infested with one or more species of intestinal nematodes.[1] Ascariasis plagues more individuals in the world than any other parasitic infestation. An estimated 807-1,221 million people in the world are infested with *Ascaris lumbricoides* [2] which implies that approximately 1 out of 4 people have ascariasis. In some tropical areas, almost whole of the population has ascariasis. Ascariasis tends to occur more frequently in places where sanitation is minimal along with poor personal hygiene and where human faeces is used to fertilise crops. Children are more likely to be infested and have higher worm load. [2]

Ascariasis leads to malnutrition and growth retardation. Ascaris infestation has been related to many complications such as acute airway obstruction[3,4,5], peritonitis secondary to perforation[3], torsion/ gangrene of the intestines[6], laryngeal spasm[7], pneumonitis[8], gastrointestinal obstruction[8], anaemia[9], etc. On undertaking a literature search in Pubmed with keywords 'Ascariasis', 'Asphyxia' and 'Death', we found that till date only about a dozen cases have been reported in all which Ascaris infestation was associated with fatal or near-fatal complications. Only in one case, sudden asphyxial death has been reported concerning Ascaris infestation.[3] Here, we report a case of a two-year-old child wherein the worm was found near the tracheal opening but the exact cause of death could not be determined. The differentials are discussed.

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Case Report

Our team received information from the police that the dead body of a two-year-old child has been found at his home. The parents of the deceased were daily wage workers who had four children. The deceased was the third sibling in the order. At the time of the incident, the mother was not present at home as she was caring for the fourth sibling hospitalised for some sickness. The people who were present at home included the father and the other two siblings. According to the statement of the father, he discovered that his son who had gone to sleep last night did not respond in the morning. Thence, he called the neighbour to have a look where it was discovered that he was no longer alive. The father was under the influence of alcohol, and he was nabbed and interrogated by the police. The police suspected foul play on the part of the father as the child was not suffering from any apparent illness when he went to sleep.

The residence of the deceased was in a labour colony where houses are compactly constructed with small rooms and narrow passages. The family of the deceased used to live in a small room of size 10' x 5', which was used as kitchen, bedroom and dining room as well. The room did not have any ventilation and had only one door for the entry. There was no provision of ceiling fans or any source of illumination. The body of a two-year-old child was present in supine position. The boy looked poorly nourished. There was pinkish-purple discolouration present over the front of thighs and front of chest and abdomen (Figure. 1). The dead body was shifted to the mortuary.

The blanket in which the body was wrapped was smelling of urine. Scalp hairs were uncombed. The dead body showed signs indicative of chronic malnutrition. The eyeballs were sunken into the orbits. There was presence of debris and sand particles all over the body. Appreciable cyanosis was present on the finger and toenails (Figure 2). No external injuries were appreciated on the body. Two abrasions were noticed, one

measuring 0.5 cm X 0.2 cm over the tip of the nose and the other one measuring 3 cm X 2 cm just below the right kneecap, on the anterior aspect of the right leg which were about 3 to 5 days old.

The neck dissection did not show any signs of physical trauma. The internal organs were pale and unremarkable. Gastric cavity contained about 50 ml of partially digested food. The pleural and peritoneal cavities showed no fluid collections. To our surprise, after 'dropping down the tongue' when the traction was being made on the posterior pharyngeal wall to separate it from the underlying cervical fascia, we noticed a pinkish cylindrical object near the tracheal opening. While manoeuvring the upper part of the trachea, we noticed a live worm which had meanwhile made its way out of the tracheal opening to the posterior pharyngeal wall (Figure 3). The worm was isolated from the tissue block. On observation, it was found to be an adult *Ascaris lumbricoides* male measuring 11.8 cm and 3.5-4mm thick (Figure 4). The area surrounding the vocal cords and rima epiglottidis was inflamed and showed mucosal oedema. At this stage of the autopsy, it was required to look keenly into the rest of the gastrointestinal system for the presence of other similar members.

Figure 1: Dead body of the child as found at his home on the arrival of police

Figure 2: Appreciable cyanosis seen over the finger-nails

We collected samples from the stomach and intestinal wash for microscopic examination so as to document the presence of any ova. Sections from both the lungs showed mild to focally moderate interstitial lymphocytic inflammatory infiltrate predominantly peri-bronchial in location along with mild fibrosis. No parasitic ova or larva was noted in the lung samples. The toxicological screening of the samples was unremarkable. With the above findings it was difficult to opine the exact cause of death. Various differentials which were thought of are discussed in the discussion part below. The cause of death given in the post mortem report was “exact cause of death cannot be opined however death due to natural causes cannot be ruled out”. This was given because in medico-legal cases the investigating officer is mostly concerned with the cause of death being either natural or unnatural. If death is natural then investigation can be closed however in unnatural cases investigation needs to be continued.

Figure 3: Live *Ascaris lumbricoides* as discovered wriggling over the posterior pharyngeal wall during necropsy

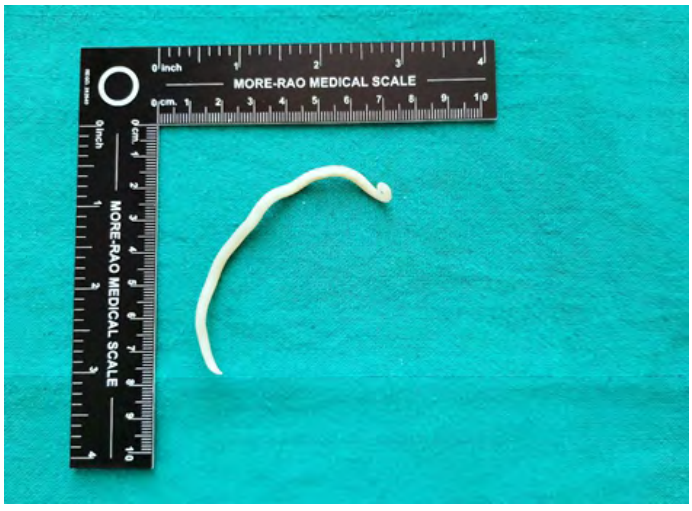

Figure 4: Formalin-fixed specimen of the same *Ascaris lumbricoides*

Discussion

Ascaris lumbricoides is a parasitic nematode which belongs to the order Ascaridida with human being the only host. [10] The presence of adult Ascaris in the body other than within the intestines has been termed as *ectopic ascariasis.* [10] Adult worms have been reported to cause obstructive jaundice, hemorrhagic pancreatitis, appendicitis and liver abscesses. Occasionally, adult worms can pass through the oesophagus and cause a fatal mechanical block in the respiratory pathway. Such migration will be more likely if the host is sleeping or suffers from some debilitating condition.

Till date three cases have been reported where sudden death was attributed to the presence of Ascaris. The various causes were diffuse peritonitis secondary to perforation of the duodenal wall [3], torsion and gangrene of ileum [6] and subacute suffocational mechanical asphyxia. [3] However, in the third case, the authors reported presence of seven adults in the upper respiratory tract of a 4-year old child. In our case, we found only one Ascaris worm in the peri-epiglottic region in a 2-year-old child. Ascaris is a slippery worm, and it can be a problematic task for a forensic pathologist to explain whether a single adult worm is capable of obstructing the pediatric laryngeal lumen or not. Airway obstruction by ascaris has been reported in few cases and is an uncommon complication. Such occurrences were seen in critically ill patients; the most likely explanation is the migration of the worm from the gastrointestinal tract to the respiratory tract during the period of stress or fever. [4] In the present case, there was no history of any serious illness although it was revealed that the deceased child was suffering from low-grade fever for the last four-five days.

Investigation of sudden death in a child has always been a challenging task for a forensic pathologist. In the present case, the critical concern of the investigating officer was to find the cause of death, and ascertain whether his father killed the child or not? The only significant finding that could be attributed to the cause of death in the reported case was the presence of single live ascaris in the peri-epiglottic region with associated inflammatory changes in the same region. However, giving the definitive cause of death as acute airway obstruction in the upper respiratory tract by a single Ascaris was difficult. We also did not find other members elsewhere. So, ruling out of other causes was done via additional investigations described in the case report. After investigation of all the evidences we could not conclude a definitive cause of death. The differentials which may have led to death of the child other than the airway obstruction are as follows.

Firstly malnutrition, this differential was first in the list because there were features of chronic malnutrition evident on the body. Usually chronic malnutrition does not lead to sudden death however in this particular case sudden nature may be an apparent one as in low socio-economic society symptoms are usually neglected until they are very severe and also the child will not be able to speak much if there are problems.

Secondly, death can be due to asphyxia secondary to hypoxic hypoxia as they lived in a congested place with many people around. The area was ill-luminated, no ventilation and dirt all around. All these must have cumulatively led to hypoxia and finally to death. Supportive evidence to this is presence of cyanosis in the nail beds, though not pathognomonic.

Thirdly, it could have been due to an unknown animal bite leading to anaphylaxis leaving no evidence externally and internally apart from laryngeal oedema. Although definitive cause cannot be opined, the authors are of the opinion that the death might have occurred due to obstruction combined with malnutrition.

As a suggestion preventive administration of anti-helminthic drugs should be done especially in the high-risk groups residing in developing countries along with focus on nutrition.

Ethical clearance: A prior approval was obtained from the Institutional Ethics Committee

Conflict of interest: None to declare

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