

Mechanical Asphyxia with *Ascaris lumbricoides*-A Forensic Case Report

Paparau C^{1,3*}, Brincus CG¹, Luca L² and Ghita AE²

¹Dambovit County Forensic Medicine Service, Targoviste, Romania

²National Institute of Legal Medicine, Mina Minovici, Bucharest, Romania

³PhD student at Victor Babes University of Medicine and Pharmacy Timișoara, Romania

*Corresponding author: Paparau C, Dambovit County Forensic Medicine Service, Targoviste, Romania, Tel: +40 0766487815; E-mail: cristi_and85@yahoo.com

Received date: February 13, 2018; Accepted date: February 15, 2018; Published date: February 20, 2018

Copyright: © 2018 Paparau C, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Ascaris lumbricoides is a nematode (roundworm), a parasite which inhabits the intestines of humans. This organism is responsible for the infective disease named ascariasis (a type of helminthiasis) which is prevalent in deprived areas where there is often a combination of poor sanitation and a host made vulnerable by iron-deficiency anaemia, malnutrition or impairment of growth. We present a violent death case; A child aged two, who died of mechanical asphyxia that followed airway obstruction by worms of the species *Ascaris lumbricoides*. Death was considered a forensic case because it occurred suddenly and the child was not known with pre-existing pathological conditions. We examined this case according to the information received from the criminalistics team correlated with the macroscopic autopsy findings and histopathological examinations with results being consistent and which indicated the diagnosis of death aforementioned. The literature cites such deaths which occurred consecutively to trauma or post general anesthesia, but in this situation a possible previous injury was infirmed by necropsy and according to the criminalistics team data the child never suffered a general anesthesia, which makes us consider this particular case as a rarely seen one.

Keywords: Forensic pathology; Mechanical asphyxia; *Ascaris lumbricoides*; Airway obstruction; Autopsy; Infant sudden death

Introduction

Ascaris lumbricoides is a parasite that causes one of the most common human parasitosis, ascariasis disease occurring generally in tropical and subtropical countries, particularly affecting children [1]. Male worms have a length of 15-31 cm and a diameter of 2-4 mm, while females have a length of 20-49 cm and a diameter of 3-6 mm [2]. In certain geographical areas this disease was eradicated through effective health programs and appropriate hygiene standards [3]. Infection occurs by ingestion of embryonated eggs of the parasite [4]. Once ingested larvae penetrate the intestinal mucosa and through the venous and lymphatic circulation reach the lungs, in the alveoli where it begins to develop, then climbs the respiratory tree to be again swallowed and reaching in the intestine, where they mature. This entire cycle lasts approximately 2 months [5]. According to estimates, approximately a quarter of the world population would be infected and about 60,000 people die yearly from the disease [6,7]. Especially those who live in crowded and dirty, places with improper drainage of sewage [8], parasite causing them a slow development, affecting both physical and mental health [9,10] by nutritional deficiencies induced [11,12] by several pathophysiological mechanisms: Intestinal inflammation, competition for nutrients, decrease hepatic protein synthesis, increasing demand for energy etc. [13]. Diagnosis is usually made after digestive complaints, which can sometimes indicate a serious condition, an intestinal obstruction caused by clusters of parasites [4] migration in the bile ducts, in the appendix [14,15] possibly causing invagination or intestinal perforation [4]. Among the most frequent changes in biological constants induced by ascariasis, we mention eosinophilia, but without being specific. The diagnosis of certainty arises from the microscopic analysis of faeces samples in

which can be seen the parasite eggs [16]. According to statistics, in cases of intestinal obstruction that were submitted to treatment, the number of detected worms was larger than 60 pieces per patient [17]. The most common symptoms of ascariasis include abdominal pain, nausea, constipation and vomiting [18], usually by vomiting exteriorizing the adult worms [19] and by this also leading to ascension of grown nematodes in the respiratory tree, where can cause obstruction as well [3]. In cases of young children, although these symptoms exist, they are not always reported or parents do not notice them. Ectopic locations are not at all rare, nematodes can migrate into the respiratory tree [3], in the thoracic cavity [20], in the tear ways [21], in the urinary tract [22] etc. In literature there are few articles about airway obstruction in children with *Ascaris lumbricoides* and these cases are often diagnosed incidentally [22-25]. In some cases (as will be the one further presented) it can be determined the gender and species of helminths by post-mortem histopathology examination [26].

Case Report

A two years old boy died suddenly, shortly (minutes) after a vomiting episode he entered in cardio-respiratory arrest which was declared irresistible by medical staff on the ambulance. Parents reported that with food fragments, the child also vomited roundworm with a length of about 25 cm and they said that the little one had no other medical conditions until then. Investigation data showed that the family lived in bad conditions and poor hygiene. Examination of the corpse on the death scene revealed traces of gastric contents on the body and no traumatic marks.

Autopsy

Forensic autopsy was performed one day after the death occurred. Measurements made on the body have revealed the following

anthropometric indices: Weight=11.5 kg; Height=82 cm; The perimeter of the head=48.5 cm; The perimeter of the chest=49.5 cm; Abdominal perimeter=51.5 cm, which in relation to international development indices means a physical underdevelopment. External examination performed at autopsy not objectified signs of trauma and, during inspection of the body, were observed more adult worms protruding from mouth and nostrils (Figure 1).



Figure 1: Adult worm's protrusion from mouth and nostrils.

In oesophagus and trachea were also found more parasites (Figure 2a) and one nematode was inserted into the main bronchi with head in the right bronchus and the tail in the left bronchus (Figure 2b).



Figure 2a: Oesophagus and trachea with worms.

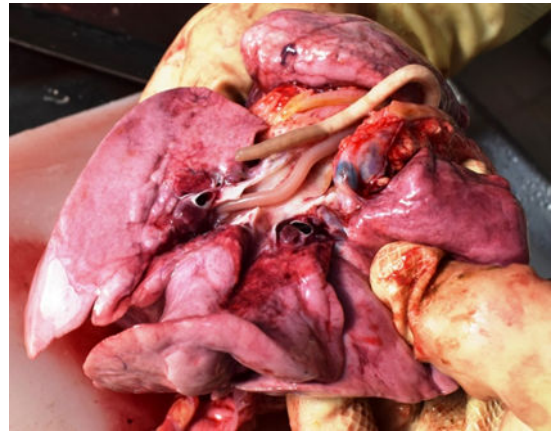


Figure 2b: Trachea and main bronchi containing adult nematode.

Here, because of the size reduced lumen, they were producing a complete obstruction. These aspects were accompanied by elements of an asphyxia syndrome (blood stasis, asphyxial petechiae on the pleura-Tardieu's spots, dark and fluid blood) and the cause of death was considered mechanical asphyxia, secondary developed after obstruction of the airways with a foreign body. Worms found in the respiratory and digestive tracts were collected, weighing approximately 250 g and having an average length of more than 20 cm (Figure 3). Necropsy also revealed superficial erosions in the gastric mucosa, liver steatosis, and the gall bladder in tension presenting in the ampulla of Vater a trapped parasite.



Figure 3: Adult worms collected from respiratory and digestive tracts.

Histopathology

Tissue fragments from the lung with a central bronchial tube containing the parasite were collected for histopathological examination, in which, on the Hematoxylin Eosin stained sections has been observed bronchial lumen expanded, the presence of the nematode, the bronchial epithelium peeled and atelectatic areas of the lung. In addition to this were observed interalveolar ruptures of septa

that most likely occurred in the context of respiratory postobstructive effort (Figure 4).

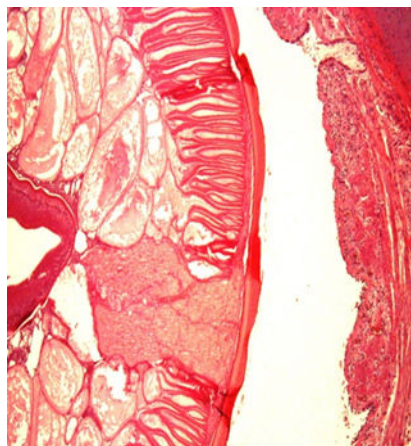


Figure 4: Histopathological aspect of *Ascaris lumbricoides* (Haematoxylin Eosin staining 50X).

Toxicology

Toxicological investigations were negative for alcohols and common drugs, also negative for anesthetics.

Discussions

The literature describes cases of fatal airway obstruction in children with *Ascaris lumbricoides*, some occurring secondary general anesthesia, without being able to explain the pathophysiological mechanism [27,28] in these situations, sometimes generating even medico-legal issues referring to a possible medical negligence. In our case we had few data about the health of the child, no other than those arising from the parents' because family was living in a precarious financial situation and they did not made consultations or medical investigations. According to their claim the child has not received any anesthetic, this making like the most plausible hypothesis guilty for initiation of tanatogenerator chain to be the migration of nematodes by the upper segment of the digestive tract (not knowing the initiator factor) and by the mechanical and irritative effect was caused vomiting reflex which involved the ascension of more worms.

As observed before, *Ascaris lumbricoides* can migrate in more anatomical regions, creating misleading clinical picture, which most often escapes initially to the examiner and delaying diagnosis. Besides digestive symptoms which are most prevalent, obstructive respiratory manifestations are a possibility that cannot be neglected, sometimes being rapidly fatal, not allowing initiate an appropriate therapy. Ascariasis can simulate an allergic disease, making diagnosis more difficult [28]. The most effective (and cheap) investigation for diagnosis of the etiologic factor responsible for the respiratory symptoms is chest radiography, which reveals the foreign body [29]. According to reports available in cases where *Ascaris lumbricoides* produced mechanical asphyxia people were hospitalized due to trauma [30-34] or in postanesthetic period [19]. Also, based on statistics, incidences where *Ascaris lumbricoides* produced mechanical asphyxia consecutive to general anesthesia was not in accordance with the number of nematodes existing in the digestive tract of the patient in question at

that time, with reports sustaining that a single worm originated in the digestive tract caused fatal mechanical asphyxia [31]. In this case, a previous injury was excluded by autopsy findings and according to the criminalistics team data, the child did not previously undergo general anesthesia, which makes us consider the case presented a rare one [19].

Although this pathology is no longer a public health threat in many parts of the world, however it should take into account the fact that free movement of people it's bringing without no doubt diseases that are endemic in other regions of the world, in areas considered "spared" from this pathology's. This and the fact that, in favourable circumstances ascariasis is fatal should increase doctor's vigilance for an early diagnosis, so being able to reduce morbidity and mortality caused by roundworms [35].

References

1. Bethony J, Brooker S, Albonico M, Geiger SM, Diemert D, et al. (2006) Soil-transmitted helminth infections: Ascariasis, trichuriasis and hookworm. *Lancet* 367: 1521-1532.
2. Roberts LS, Janovy JJ, Nadier S (2009) *Foundations of parasitology*, (9th edn), Mc Graw Hill Education Publication, USA.
3. Maletin M, Veselinović I, Stojiljkovic GB, Vapa D, Budakov B, et al. (2009) Death due to an unrecognized ascariasis infestation: Two medicolegal autopsy cases. *Am J Forensic Med Pathol* 30: 292-294.
4. Khuroo MS (1996) Ascariasis. *Gastroenterol Clin North Am* 25: 553-577.
5. Woodruff AW (1967) *Atlas of medical helminthology and protozoology*. *Proc R Soc Med* 60: 838.
6. Baba AA, Shera AH, Bhat MA, Hakim S, Sheikh KA, et al. (2010) Management of biliary ascariasis in children living in an endemic area. *Eur J Pediatr Surg* 20: 187-190.
7. Mishra PK, Agrawal A, Joshi M, Sanghvi B, Shah H, et al. (2008) Intestinal obstruction in children due to ascariasis: A tertiary health centre experience. *Afr J Paediatr Surg* 5: 65-70.
8. Das CJ, Kumar J, Debnath J, Chaudhry A (2007) Imaging of ascariasis. *Australas Radiol* 51: 500-506.
9. Marcos L, Maco V, Terashima A, Samalvides F, Gotuzzo E, et al. (2002) Prevalence of intestinal parasitosis in children of the mantaro valley, jauja, peru. *Rev Med Hered* 13: 85-89.
10. Villamizar E, Méndez M, Bonilla E, Varón H, de Onatra S, et al. (1996) *Ascaris lumbricoides* infestation as a cause of intestinal obstruction in children: Experience with 87 cases. *J Pediatr Surg* 31: 201-204.
11. Castiglione N, Randazzo C, Castiglione S, Sciuto C, Sciacca AR, et al. (1996) A case of severe malnutrition due to *Ascaris lumbricoides* infestation in a boy. *Pediatr Med Chir* 18: 615-617.
12. Blumenthal DS, Schultz MG (1976) Effects of ascari infection of nutritional status in children. *Am J Trop Med Hyg* 25: 682-690.
13. Saldiva SR, Silveira AS, Philippi ST, Torres DM, Mangini AC, et al. (1999) *Ascaris-trichuris* association and malnutrition in brazilian children. *Paediatr Perinat Epidemiol* 13: 89-98.
14. Chiappe A, Arteaga K, Resurrección C, Ñavincopa M, Ticona E, et al. (2016) Intestinal obstruction due to *Ascaris lumbricoides* in an older adult. *Rev Chil infectología* 33.
15. Wani I, Maqbool M, Amin A, Shah F, Keema A, et al. (2010) Appendiceal ascariasis in children. *Ann Saudi Med* 30: 63-66.
16. <https://en.wikipedia.org/wiki/Ascariasis>
17. Silva NR, Guyatt HL, Bundy DA (1997) Worm burden in intestinal obstruction caused by *Ascaris lumbricoides*. *Trop Med Int Heal* 2: 189-190.
18. Akgun Y (1996) Intestinal obstruction caused by *Ascaris lumbricoides*. *Dis colon rectum* 39: 1159-1163.
19. Singh D, Chopra G, Jindal P, Sharma J, Singh D, et al. (2005) *Ascaris Lumbricoides*: Post-operative hypoxia. *Internet J of Anesthesiology* 11:11-13.

20. Almeida ZO (1976) Localization of *Ascaris lumbricoides* in the thoracic cavity, report of a case. Rev Cubana Med Trop 28: 71-75.
21. Balasubramaniam M, Sudhakar P, Subhashini M, Srinivasan S, Padma M, et al. (2000) *Ascaris lumbricoides* in the lacrimal passage. Indian J Ophthalmol 48: 53-54.
22. Gupta P, Sundaram V, Abraham G, Shantha GPS, Mathew M, et al. (2009) Obstructive uropathy from *Ascaris lumbricoides*. Kidney Int 75: 1242.
23. Lapid O, Krieger Y, Bernstein T, Sofer S, Rsenberg L, et al. (1999) Airway obstruction by ascaris, roundworm in a burned child. Burns 25: 673-675.
24. Budakov B, Sovljanski M (1978) Subacute asphyxia caused by ascarids (*Ascaris lumbricoides*). Med Pregl 31: 381-383.
25. Talukdar B, SB (1988) Airway obstruction due to *Ascaris lumbricoides*. Indian Pediatr 25: 476-478.
26. Pierre C, Civatte M, Chevalier A, Terrier JP, Gros P, et al. (1998) Helminth diagnosis in pathologic anatomy. Med Trop (Mars) 58: 85-97.
27. Wu ML (2000) *Ascaris lumbricoides*. Arch Pathol Lab Med 124: 174-175.
28. Cooper PJ (2009) Interactions between helminth parasites and allergy. Curr Opin Allergy Clin Immunol 9: 29-37.
29. Oguz F, Citak A, Unuvar (2000) Airway foreign bodies in children. Int J Paed Otorhinolaryngol 52: 11-16.
30. Podgorny G (1967) Ascariasis complicating a gunshot wound: Case report and review of the literature. North Carolina Med J 28: 21-23.
31. Imbeloni LE (1984) Fatal obstruction of an endotracheal tube by an intestinal roundworm. Resp Care 29: 368-370.
32. QZ G (2000) Sudden asphyxia caused by an ascaris worm obstructing the tracheal tube: A case report. Shichuan Med J 21: 848.
33. Xuan ZL (1994) Sudden asphyxia caused by ascaris worm in the endotracheal tube: A case report. Chin J Nurs 28: 368.
34. Bailey JK, Warner P (2010) Respiratory arrest from *Ascaris lumbricoides*. Pediatrics 126: 712-715.
35. Li Q, Zhao D, Qu H, Zhou C (2014) Life-threatening complications of ascariasis in trauma patients: A review of the literature. World J Emerg Med 5: 165-170.