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# Aquatic leech infestation: a rare cause of severe anaemia in an adolescent Tanzanian girl

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**Abstract** We report on a 15-year-old girl who presented with a history of chest pain, coughing, intermittent haemoptysis, fever, pallor and vomiting to a rural hospital in Tanzania. She was severely anaemic with signs of cardiorespiratory distress. Haemoglobin was 4.8 g/dl; the chest X-ray film was normal. She required one unit of blood. After 3 days, she vomited up a small parasite which proved to be an aquatic leech. Oesophagogastroscopy, then performed, revealed four small mucosal lesions in the pharynx and upper oesophagus. No other leeches were seen. Further oesophagogastroscopy 4 days later showed a normal mucosa. The girl was discharged on iron and folic acid supplements. A small lake near her village was identified as the likely source of her infestation. The family had used the water for drinking without any precautions—Terrestrial leeches can cause profound, life-threatening anaemia, but even more so do aquatic leeches. This type is acquired while bathing or drinking unfiltered water. They attach themselves to mucous membranes, having been described in sites like conjunctiva, nose, pharynx/larynx, trachea/bronchi, oesophagus, vagina, and rectum. Especially in the airways, they can cause even fatal bleeding or obstruction. Treatment consists of removal of the leech. *Conclusion*: In developing countries, even unusual causes like leech infestation have to be considered in the differential diagnosis of severe anaemia in children.

**Keywords** Anaemia · Child · Developing countries · Leech

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## Introduction

Anaemia, here defined as a haemoglobin level of less than 11.0 g/dl, is a very common clinical problem in children world-wide, especially in sub-Saharan Africa and South-east Asia. In these regions, it reaches a prevalence of up to 50% in children under 12 years of age [13]. The main reasons for these high prevalence rates are infections (e.g. malaria, tuberculosis, hookworm, increasingly HIV/AIDS, and others), nutritional deficiencies (e.g. iron, folate, protein-energy malnutrition), and inherited blood disorders (e.g. thalassaemias, sickle cell disease, glucose-6-phosphate-dehydrogenase deficiency) [13]. Nevertheless, unusual but potentially life-threatening conditions, demonstrated by the following case report, have to be considered in the differential diagnosis of anaemia, especially in resource-poor settings.

## Case report

A previously healthy 15-year-old girl, a member of the Iraqw tribe of northern Tanzania, presented with a 1-week history of chest pain, coughing, intermittent haemoptysis (as perceived by herself), fever, pallor and intermittent vomiting to the paediatric department at Haydom Lutheran Hospital, a rural 400-bed health facility in northern Tanzania. On clinical examination, she was severely anaemic with signs of cardiorespiratory distress, and febrile (38.5°C). She was markedly malnourished (body weight 29 kg (< < 3rd percentile)). The remaining examination did not reveal any abnormalities, in particular no obvious bleeding sites, lymphadenopathy or hepatosplenomegaly.

As the laboratory facilities were very limited, only a few investigations were possible. Haemoglobin concentration was 4.8 g/dl, total white blood cell count was 4300/µl with 13% eosinophils. A thick blood film for malaria parasites was negative. A chest X-ray film was completely normal. Due to her cardiorespiratory distress and severe anaemia, she immediately required one unit of blood. Afterwards the haemoglobin concentration was 6.3 g/dl. Her general condition improved satisfactorily and heart rate, blood pressure and respiration remained stable. On the 3rd day in hospital, she vomited up a small parasite which proved to be an aquatic leech (family *Hirudinidae*; order *Gnathobdellida*; class *Hirudinea*; phylum *Annelida*) (Fig. 1 and Fig. 2). It was still alive,

**Fig. 1** An a.p. view of the leech with the oral opening on the left (length 15 mm; diameter 4–5 mm)

**Fig. 2** A lateral view of the leech with the oral opening on the right

but not engorged, the size being 15×4-5 mm (length x diameter). Flexible oesophagogastroscopy, then performed, revealed two small mucosal lesions in the hypopharynx and two more in the oesophagus at 25 cm (no endoscopy pictures available due to lack of printer facilities). No other leeches were found. Further oesophagogastroscopy 4 days later showed a normal mucosa. The girl recovered promptly and showed no more signs or symptoms of cardiorespiratory impairment. She was then discharged on oral iron and folic acid supplements. A long-term follow-up was not possible due to the local circumstances.

As the likely source of her leech infestation, a small lake near her village was identified although no further cases have been reported so far. The family had used the water for drinking without any precautions.

## Discussion

Leeches, which belong to the class *Hirudinea* and have a world-wide distribution, are well-known for their ability to cause anaemia [28]. Whilst secreting enzymes which act as anticoagulants [21], they induce bleeding and can digest considerable amounts of blood. One of the larger ones, *Hirudo medicinalis*, is even used in therapeutic medicine [1,16]. Some live on land animals (not in Europe and Africa), but more on aquatic ones. Leeches are hermaphrodites, but need a partner for reproduction. This may be the reason why reproduction and release of eggs has so far not been described in the accidental human host although they do maturate in the latter [28].

Terrestrial leeches like *Haemadipsa zelanica*, which attach to the skin with their firm jaws, are less harmful to man than aquatic leeches which have weak jaws only suitable for attachment to mucous membranes [28]. The latter type is acquired while bathing in contaminated pools or drinking unfiltered water as in our case. Due to this mode of transmission, almost all cases have been reported from less-developed countries where access to and use of safe water is often a problem, especially in rural areas [5, 9, 12, 18, 24,27]. So far, very few cases have been reported from Europe [4,7]. In sub-Saharan Africa, *Moxybdella africana*, *Dinobdella ferox* and *Phytobdella catenifera*, all of the family *Hirudinidae*, are prevalent [9, 12,28]. Aquatic leeches have been described in sites like conjunctiva [3,4], nose [6], mouth/pharynx/larynx [5, 9, 11, 12, 17, 22, 24,27], trachea/bronchi [2, 14, 17,28], oesophagus [28], vagina [18], bladder [10], and rectum [25]. Most cases have been reported with involvement of the naso-pharynx, lower airways and upper oesophagus. In the stomach, the leech is usually destroyed by gastric acid [28]. Therefore, it has not been described in the lower intestines, although it can pass from outside through the anal sphincter into the rectum [25].

Once attached to the mucosa, in all sites blood loss can be profound and even fatal [8, 9, 12, 18,28]. In our patient, the leech must have been attached for more than one week as indicated by the history and because the girl already showed signs of severe anaemia and cardiorespiratory impairment, hence needing an emergency blood transfusion. Leeches can cause other severe problems, especially in the lower airways, where they can cause life-threatening acute bleeding and/or obstruction [14, 17, 28], and must be removed immediately by bronchoscopy. If the leech is attached too tightly to the mucosa and resists mechanical removal, then hypertonic sodium chloride solution (more suitable in older children) or cocaine/lidocaine can be administered which releases the hold of the leech or paralyses it, respectively [19, 28]. Afterwards, it can be removed easily. In our case, the leech was removed involuntarily through forceful vomiting which enabled us to diagnose this condition in time. If there is no obvious reason for anaemia and the patient is from an area where leeches are prevalent, then endoscopy is to be recommended for further diagnostic work-up. After removal no further examinations are necessary [28].

Regarding the differential diagnoses, in the beginning the most likely diagnosis in our patient was actually pulmonary tuberculosis which is very prevalent in the Haydom area, reaching incidence rates of more than 200 new patients/100000 inhabitants each year (unpublished data). For comparison, in 2000 the annual incidence rate in Germany was 11/100000 [20]. However, the chest X-ray film did not show any signs of pulmonary tuberculosis. Eosinophilia pointed then more to a parasitic

cause, but hookworm is very rare in this semi-arid, dry area. HIV infection was highly unlikely from the beginning, as the prevalence is only $<0.5\%$ in our area [15]. Malaria was ruled out by a thick blood film examination. Congenital blood disorders like sickle cell disease could be excluded as the girl belonged to the Iraqw tribe which does not have this disease due to a different ethnic background (most likely cushitic from Ethiopia) compared to the surrounding Bantu tribes (unpublished data). Another obvious site of bleeding could not be found, either from the history, clinical examination or endoscopy. In particular, bleeding from gastro-oesophageal varices, as a consequence of possible chronic hepatitis B infection which we could not test for in our laboratory, could be excluded by endoscopy. There were also no signs of a malignant disease. Malnutrition and concomitant iron deficiency may have contributed partially to our patient's severe anaemia as she was markedly malnourished. Cardiorespiratory decompensation was most likely then accelerated by the acute ectoparasite-induced blood loss.

Aquatic leech infestation is certainly a rare disease, but has to be considered in the differential diagnosis in endemic areas. As removal of the leech is curative, every effort has to be made to achieve it. Although leeches themselves can have serious effects in man, the transmission of other diseases by leeches has not been described with certainty [28]. Whereas aquatic leeches do transmit pathogens between fish and other aquatic animals, the role of terrestrial leeches as vectors in human diseases has been discussed several times, but has not yet been proven [23, 26,28]. To prevent this type of disease, local people have to be taught more effectively about the necessity to use clean, safe water, and local and government officials must support health education and facilitate access to safe water.

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