



Worm infestation as a cause of severe anemia in a frail older adult: a case report

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Introduction: Worm infestations are a common occurrence in low-income countries. Anemia due to iron deficiency can be brought on by human intestinal worms. The authors report a case of an 86-year-old frail older adult with upper gastrointestinal (GI) bleeding caused by a worm infestation most likely to be hookworm.

Case presentation: An 86-year-old male, presented to the Emergency Department with complaints of bilateral lower limb swelling and shortness of breath for 4 days associated with melena for 2 months. The authors made a provisional diagnosis of heart failure precipitated by anemia. Upper GI endoscopy revealed multiple whitish exudates, which are resistant to water jets. Multiple worms were noted in the second part of the duodenum. Based on clinical evaluation and endoscopy, the diagnosis of oesophageal candidiasis and iron deficiency anemia secondary to upper GI bleeding due to Hookworm infestation was made.

Clinical discussion: In low-income countries, especially those involving the tropical area, worm infestation should be considered as an important cause of obscure acute GI bleeding and severe anemia. Usually, malignancy is suspected in an older adult with severe anemia but hookworm infestation is a treatable disease with a good prognosis and complete recovery. The most commonly used drugs for treatment are mebendazole and albendazole. In a low-income country with a high burden of worm infestations, empirical treatment of iron deficiency anemia with single dose albendazole has been recommended.

Conclusion: Usually, severe anemia in an older adult is mostly attributed to an underlying malignancy. Our case serves as a good example of how a treatable condition can improve the quality of life in a frail older adult. Normally, there is a tendency to defer UGI endoscopy in frail elderly due to ageism. However, the diagnosis of a treatable cause of upper GI bleeding can be made by a simple upper GI endoscopy. Severe anemia due to hookworm infestation is treated effectively and quickly with albendazole and iron therapy.

Keywords: anemia, gastrointestinal bleeding, worm infestation

Introduction

Worm infestations are a common occurrence in low-income countries^[1]. Anemia due to iron deficiency can be brought on by human intestinal worms^[2]. *Necator americanus* and *Ancylostoma duodenale* are the two species most frequently responsible for hookworm infections, which typically spread through fecal-oral transmission and contact with contaminated soil^[3,4]. Constipation, nausea, diarrhea, flatulence, iron deficiency anemia, and hypoproteinemia are among the most typical presenting symptoms^[3]. With an estimated loss of 2.2 million disability-adjusted life years in

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HIGHLIGHTS

- A case of an 86-year-old frail older adult with upper gastrointestinal (GI) bleeding caused by a worm infestation most likely to be hookworm.
- Our case serves as a good example of how a treatable condition can improve the quality of life in a frail older adult.
- The diagnosis of a treatable cause of upper GI bleeding can be made by a simple upper GI endoscopy.
- Severe anemia due to hookworm infestation is treated effectively and quickly with albendazole and iron therapy.

2013, hookworm infections within the soil transmitted helminth group have the largest worldwide burden of disease^[5]. Here, we report a case of an 86-year-old adult with upper gastrointestinal (GI) bleeding caused by a worm infestation most likely due to hookworm. Severe upper GI bleeding and anemia in the elderly in tropical countries can be due to simple reversible causes like worm infestation. Therefore, those patients who are frail and may not tolerate endoscopy can be given a trial of albendazole therapy.

Case presentation

An 86-year-old man went to the emergency room complaining of bilateral lower limb edema, face swelling, shortness of breath

coupled with a progressive development of dizziness for 4 days, and dark-colored stools for 2 months. Due to increased fatigue during the past 2 months, he has been unable to perform activities of daily life. His past history, personal history, family history, and drug history were unremarkable.

The patient's heart rate was 76 beats per minute, respiration rate was 19 breaths per minute, blood pressure was 100/60 mmHg, oxygen saturation was 98% as measured by a pulse oximeter in room air, and body temperature was 98.4°F. There were signs of pallor, as well as bilateral lower limb edema and facial puffiness, icterus, lymphadenopathy, cyanosis, or dehydration were undetectable. Hepatosplenomegaly was absent. Basal crepitations were auscultated on both sides of the chest.

Initial lab tests (Table 1) showed that the patient had severe anemia (Hb-4 gm/dl, MCV-79 fl). Occult blood in the stool was positive, which was suggestive of GI bleeding. Furosemide was prescribed to the patient, and packed red cells were transfused after sending for anemia workup. Echocardiography disclosed a mildly dilated left atrium, a dilated right atrium and right ventricle, severe tricuspid regurgitation with severe pulmonary artery hypertension, moderate mitral regurgitation, and a sclerotic aortic valve. The left ventricular ejection fraction is 55–60%. An impression of valvular heart disease was made. Upper GI endoscopy was done for the evaluation of severe anemia, which revealed multiple whitish exudates which are resistant to water jets. Multiple worms were noted in the second part of the duodenum as shown in Figures 1 and 2. The diagnosis of esophageal candidiasis with upper GI bleeding owing to worm infestation, most likely due to hookworm was made on the basis of clinical assessment and endoscopy. 400 mg of albendazole were



Figure 1. Second duodenum segment containing multiple worms.

administered once daily for the first five days. Ferrous ascorbate 100 mg was started twice daily at discharge together with torsemide at a dose of 20 mg once a day. He was stable clinically and hemodynamically at the time of discharge. On follow-up after 3 months, the patient is doing well and performing his daily tasks with improved mobility. Hemoglobin had improved to 10 g/dl.

Discussion

There are many possible etiologies for anemia in older adults as given in Table 2¹⁶. Worm infestation should be regarded as a significant contributor to the obscure acute GI bleeding that occurs in low-income regions, particularly the tropical region¹⁷. Our patient had melena, which suggests upper GI bleeding as a cause of severe anemia. Our patient had a low MCV with a raised reticulocyte count. He had normal albumin, vitamin B12, and folic acid levels, which suggests the anemia may not be associated with poor nutrition or malabsorption. The diagnosis of hookworms as the source of acute GI bleeding, which may have been categorized as obscure GI bleeding, is usually made after the jejunum is examined via an endoscope. Intestinal hookworm infections have recently been accurately diagnosed by capsule

Table 1

Laboratory investigations of the patient.

Test	Result	References
Hemoglobin (mg/dl)	4.0	11–16
PCV (%)	23.6	37–48
TLC (cells/mm ³)	10 260	4000–11 000
DLC (%)	N 81 L 09	N40-75 L20-45
Platelets (cells/mm ³)	1 70 000	1 50 000–4 00 000
MCH (pg)	36.4	27–34
MCHC (g/dl)	31.4	32–36
MCV (fl)	79	80–96
Iron (µg/dl)	58.64	33–193
UIBC (µg/dl)	136.10	125–345
Ferritin (µg/dl)	253.16	30–400
Vitamin B12 (pg/ml)	2000	200–1100
TSH (IU/ml)	0.117	0.3–4.5
Serum urea (mg/dl)	66	10–50
Serum creatinine (mg/dl)	1.5	0.6–1.3
Serum sodium (meq/l)	149	135–150
Serum potassium (meq/l)	3.1	3.5–5.1
Liver function test		
Albumin (g/dl)	3.5	3.5–5.0
Total bilirubin (mg/dl)	0.63	0.2–1.2
Conjugated bilirubin (mg/dl)	0.15	< 0.3
ALT (U/l)	11	09–43
AST (U/l)	25	10–35
ALP (U/l)	55	35–130

ALP, alkaline phosphatase; ALT, alanine transaminase; AST, aspartate transaminase; DLC, differential leukocyte count; Hb, hemoglobin; MCH, mean corpuscular hemoglobin; MCHC, mean corpuscular hemoglobin concentration; MCV, mean corpuscular volume; TLC, total leukocyte count; WBC, White blood cells.

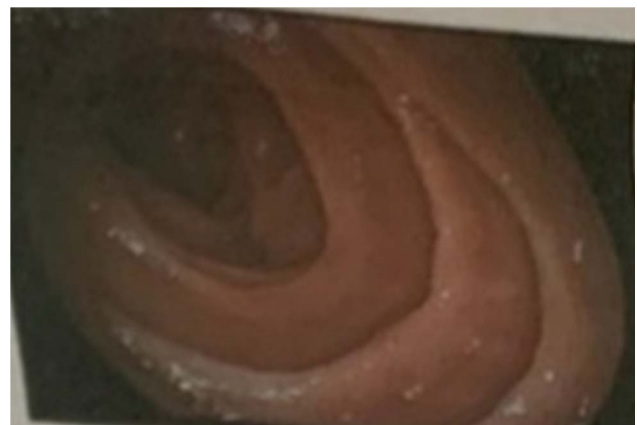


Figure 2. Multiple worms in second part of duodenum.

Table 2
Common causes of anemia in older adult.

1.	Nutritional deficiency
2.	Gastrointestinal blood loss
i.	Gastrointestinal malignancy
ii.	Bleeding ulcer
3.	Drug induced anemia and/or pancytopenia
4.	Anemia of chronic inflammation
5.	Hematological malignancy
6.	Malignancies with involvement of the bone marrow
7.	Hemolysis
8.	Thyroid dysfunction

endoscopy in multiple case reports^[8–10]. According to a study conducted by Patel K.V., the prevalence of anemia after 50 years increases with advancing age and exceeds 20% in those 85 years and older. Talking about male and female percentage, prevalence of anemia ranged from 9.2 to 23.9% in men and in women the range was 8.1–24.7%^[11]. A hookworm infestation is a condition that is curable and has a good prognosis for full recovery. Mebendazole and albendazole are the most often prescribed medications. A single 400 mg dose of albendazole is more effective than a single 500 mg dose of mebendazole^[12]. A gastro-duodenoscopy in one report revealed several hookworms in the first and second parts of the duodenum^[13]. A stool examination in a report revealed hookworm eggs and parasites. During a colonoscopy, dead parasites were identified^[14]. Hookworm is blamed for occult and gradual GI blood loss. Infestation is linked to inadequate hygiene practices and is spread through contact with infested human feces in soil^[13]. A patient who had previously passed 4–5 melena each day for 5 days had dyspepsia and had become weaker over the course of a month in a documented case. Her hemoglobin content was 1.6 gm/dl, and she was pale. An upper GI endoscopy revealed hundreds of hookworms with many bleeding patches in the second and third portions of the duodenum after she received a 6-unit blood transfusion. The duodenum's mucosa appeared normal when the patient underwent a repeat endoscopy 7 days later^[15].

Conclusion

Usually, severe anemia in an elderly is mostly attributed to an underlying malignancy. Our case served as a good example of how a treatable condition can improve the quality of life in a frail older adult. Normally, there is a tendency to defer UGI endoscopy in frail elderly due to ageism. However, the diagnosis of a treatable cause of upper GI bleeding can be made by a simple upper GI endoscopy. Severe anemia due to hookworm infestation must be treated quickly with albendazole and iron with complete recovery. Early endoscopy and diagnosis of worm infestation with treatment with albendazole therapy improved the quality of life in our old patient. Hence, an endoscopy or a trial of albendazole therapy should not be delayed in elderly presenting with severe anemia and upper GI bleeding irrespective of their age or frailty status.

Patient perspective

“I am satisfied with the treatment I received at the hospital, and I hope that other medical professionals will be able to learn from my condition.”

Ethical approval

Ethical approval is not required for case reports in our institution. Patient consent is required for publication of case report. A written informed consent of patient has been taken for publication of data and images.

Consent

Written informed consent was obtained from the patient for publication and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Author contribution

U.B.: contributed in study concept and manuscript review; R.S.: contributed in collection of images and manuscript writing; S.S.S.: contributed in manuscript writing, editing, and review; R.B.: contributed in review; D.P.: contributed in review; B.S.: contributed in review; S.K.S.: contributed in review.

Conflicts of interest disclosure

The authors declare that they have no conflicts of interest.

Research registration unique identifying number (UIN)

Not applicable.

Guarantor

Suveksha Shaurya Shah accepts full responsibility for the work and/or the conduct of the study, had access to the data, and controls the decision to publish.

Data availability statement

Not applicable.

Provenance and peer review

Not applicable.

References

- [1] Drake LJ, Jukes MCH, Sternberg RJ, *et al.* Geohelminth infections (ascariasis, trichuriasis, and hookworm): cognitive and developmental impacts. *Semin Pediatr Infect Dis* 2000;11:245–51.
- [2] Barrett-Connor E. Human intestinal nematodiasis in the United States. *Calif Med* 1972;117:8–13.
- [3] Thomas V, Harish K, Tony J, *et al.* Colitis due to *Ancylostoma duodenale*. *Indian J Gastroenterol* 2006;25:210–1.
- [4] Dock G, Bass CC. Hookworm disease. St Louis, Missouri, USA. CV Mosby Company; 1910: 20–63.
- [5] Murray CJL, Barber RM, Foreman KJ, *et al.* Global, regional, and national disability-adjusted life years (DALYs) for 306 diseases and injuries and healthy life expectancy (HALE) for 188 countries,

- 1990–2013: quantifying the epidemiological transition. *The Lancet* 2015; 386:2145–91.
- [6] Katsumi A, Abe A, Tamura S, *et al.* Anemia in older adults as a geriatric syndrome: a review. *Geriatr Gerontol Int* 2021;21:549–54.
- [7] Sharma BC, Bhasin DK, Bhatti HS, *et al.* Gastrointestinal bleeding due to worm infestation, with negative upper gastrointestinal endoscopy findings: impact of enteroscopy. *Endoscopy* 2000;32:314–6.
- [8] Seidelman J, Zuo R, Udayakumar K, *et al.* Caught on capsule: iron-deficiency anemia due to hookworm infection. *Am J Med* 2016;129:167–9.
- [9] Chen YY, Soon MS. Endoscopic diagnosis of hookworm infection that caused intestinal bleeding. *Gastrointest Endosc* 2005;62:142.
- [10] Wu IC, Lu CY, Wu DC. Acute hookworm infection revealed by capsule endoscopy. *Endoscopy* 2007;39(suppl):e306.
- [11] Patel KV. Epidemiology of anemia in older adults. *Semin Hematol* 2008; 45:210–7.
- [12] Keiser J, Utzinger J. Efficacy of current drugs against soil-transmitted helminth infections: systematic review and meta-analysis. *JAMA* 2008; 299:1937–48.
- [13] Sharma V, Gunjan D, Chhabra P, *et al.* Gastrointestinal bleeding in the tropics: Look for the hookworm. *Trop Doct* 2017;47:48–51.
- [14] Ronquillo AC, Puelles LB, Espinoza LP, *et al.* *Ancylostoma duodenale* as a cause of upper gastrointestinal bleeding: a case report. *Braz J Infect Dis* 2019;23:471–3.
- [15] Bhargava DK, Dasarathy S, Chowdhry GC, *et al.* Upper gastrointestinal bleeding due to hookworms (*Ancylostoma duodenale*) – a case report. *Endoscopy* 1993;25:548–9.