

ANCYLOSTOMIOSIS TRIGGERS HEART FAILURE (CASE STUDY IN ELDERLY PATIENTS)

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Ancylostomiasis is a disease caused by infection with the parasitic worms *Ancylostoma duodenale* or *Necator americanus*. Infection with these worms can occur through contact with soil contaminated with worm eggs or through consumption of contaminated food. The disease can cause serious health problems in humans, especially in the elderly population who have more vulnerable immune systems. One of the serious complications that can arise from ancylostomiasis infection is heart failure. The aim of this study was to investigate whether ancylostomiasis infection can lead to heart failure in elderly patients. This research used a case study approach. The data obtained was analyzed using a qualitative analysis approach. The results showed that based on case studies ancylostomiasis in the elderly can cause severe anemia accompanied by iron deficiency anemia and heart failure. Overall, ancylostomiasis cases have a good prognosis if they get fast and proper treatment. Ancylostomiasis can be prevented by implementing a clean and healthy lifestyle.

Keywords: Ancylostomiasis; heart failure; Elderly Patients

INTRODUCTION

The prevalence of helminthiasis is a very common health problem in Indonesia, especially among underprivileged communities living in areas with poor sanitation. The prevalence of hookworm infection ranges from 2.5% to 62%, showing significant variation across regions.

Hookworms that infect the Indonesian population are caused by *Necator americanus* which causes necatoriasis and *Ancylostoma duodenale* which causes ankylostomiasis (Loukas et al., 2016).

Ancylostoma duodenale, a type of human hookworm, is the prevailing parasitic infection in countries with limited access to clean water, proper sanitation, and good hygiene practices (Hu et al., 2002). *A. duodenale*, along with other soil-transmitted helminths (STH), is transmitted through direct contact with soil contaminated by infectious larvae. Adult worms in the intestine continuously suck blood from the patient. One adult *Necator americanus* worm can cause blood loss of up to 0.1 cc per

day, while one *Ancylostoma duodenale* worm can cause blood loss of up to 0.34 cc per day.

The following will report a case of a 62-year-old man who came to the emergency department of Buleleng Regional General Hospital. The patient came with complaints of weakness and fainting. The author raises this case because ancylostomiasis in elderly people is a rare case but if not treated properly it will lead to fatal complications, so it is hoped that readers will understand better how to diagnose and treat ancylostomiasis.

RESEARCH METHODS

This research used a case study approach. The research data was collected through direct observation of elderly patients. During the observation process, the researcher records various information about the patient's medical history, symptoms experienced, and the body's response to the parasitic worm infection. Data obtained through observation will be analyzed using a qualitative analysis approach. The researcher identifies and analyzes patterns or important findings that emerge from the observation data. The results of the qualitative analysis will provide an in-depth understanding of the role of ancylostomiasis in the occurrence of heart failure in the elderly population, thus providing new insights in the field of health and medical services.

Information on a 62-year-old male patient came to the emergency room of Buleleng Regency Hospital with complaints of easy fatigue accompanied by spinning dizziness and fainting, spinning dizziness worsens when walking, the patient works as a traditional farm laborer and does not use footwear when farming, on physical examination obtained vital signs within normal limits, anemic conjunctiva, pale acral.

On complete blood count examination, leukopenia (Wbc $3.20 \times 10^3 / \mu\text{L}$), eosinophilia (0.87×10^3), anemia (Hb 2.8 g/dL), hemodelution (HCT 11.3%), hypochromic (MCH 16.3pg), microcytic (MCV 65. 0fL), on electrocardiogram examination obtained sinus rhythm with left ventricular hypertrophy, on thoracic photo examination obtained cardiomegaly, on peripheral blood smear examination obtained anisocytosis, microcytic, macrocytic, ovalocytes, hypochromic, pencil cells, fragment cells, teardrop cells, polychromasia, impression of leukocyte countless polymononuclear dominant, found hypersegmentation in neutrophils, lymphopenia, absolute eosinophilia, on serum iron examination 41. $1 \mu\text{g} / \text{dL}$, UIBC $484 \mu\text{g} / \text{dL}$, ferritin $3.1 \text{ng} / \text{mL}$, feces examination revealed parasite infestation (*ancylostoma duodenale*) (Matsumoto et al., 2020).

Based on patient information and examination, the patient can be diagnosed with severe anemia with the cause of hookworm infection, iron deficiency anemia, congestive heart failure, etiological diagnosis of acylostomiasis (Hermans et al., 2013).

This patient was given a PRC transfusion of 1 colf / day with furosemide 20mg premedication, with a total administration of 4 colf, administration of antihelmintics namely albendazole 400mg every 12 hours, for 3 days, administration of iron

preparations Ferrous Fumarate 60mg every 24 hours for 1 month, administration of folic acid 400mcg every 24 hours for 1 month, administration of ascorbic acid 50mg every 8 hours for 1 month, administration of bisoprolol 1 25mg every 24 hours, spironolactone 25mg every 24 hours, flunarizine 5mg every 12 hours.

On the fourth day of treatment, a therapy evaluation was performed, and the patient's clinical condition showed significant improvement with reduced complaints. Vital signs were stable, and complete blood work showed improvement, with increased hemoglobin and MCHC (Mean Corpuscular Hemoglobin Concentration), and decreased eosinophils.



Figure 1. AP thorax photo

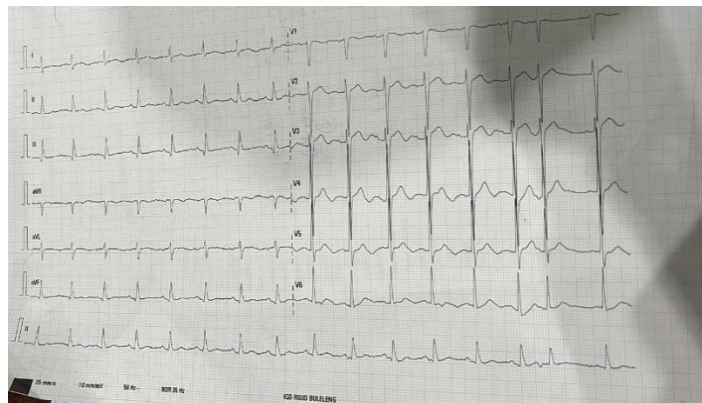


Figure 2. Electrocardiogram



Figure 3. Ancylostoma Duodenale eggs

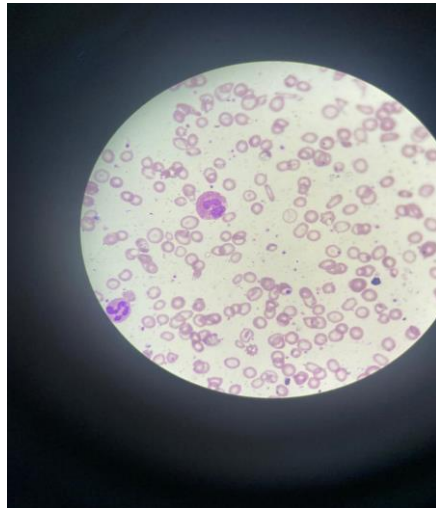


Figure 4. Erythrocytes and Eusinophils

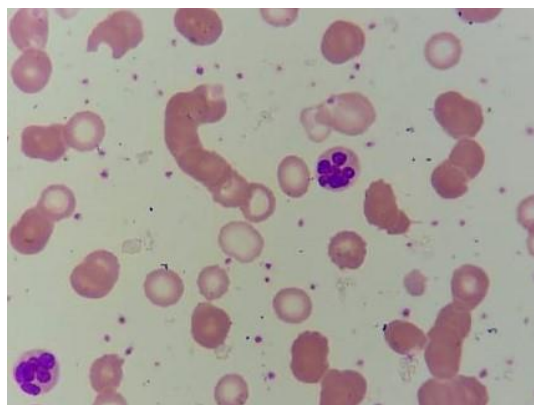


Figure 5: Hypersegmentation of Neutrophils

RESULT AND DISCUSSION

Hookworms are widely distributed throughout the world, especially in tropical and subtropical regions with hot temperatures and high humidity. Hookworm infection is prevalent among mine workers in Europe, China, and Japan, earning them the name "hookworms." In Indonesia, the population is affected by two types of hookworms: *Necator americanus*, which leads to necatoriasis, and *Ancylostoma duodenale*, causing ankylostomiasis (Harmening, 2002).

Ancylostoma duodenale and *Necator americanus* adult worms reside in the human small intestine, particularly in the jejunum and duodenum. They attach themselves to the mucous membrane by using their teeth to bite and feed on the host's blood from the bite wound. Adult worms in the intestine continuously suck the blood of the patient. A single adult *Necator americanus* worm can cause blood loss of up to 0.1 cc per day, while a single *Ancylostoma duodenale* worm can cause blood loss of up to 0.34 cc per day (Harmening, 2002).

The pathological abnormalities caused by adult hookworms and their larvae cause many complaints and clinical symptoms that are not typical. To determine the exact diagnosis of hookworm infection, microscopic examination of feces is required to find worm eggs.

Patient complaints and clinical features of hookworm infection may include:

- (1) microcytic hypochromic anemia and a general picture of blood deficiency
- (2) indigestion in the form of epigastric malaise, constipation, diarrhea or steatorrhea,
- (3) ground-itch (itching of the skin at the site of entry of filariform larvae), and
- (4) bronchitis symptoms due to the presence of larvae in the lungs that cause coughing, sometimes accompanied by bloody sputum (Bernadette & Elaine, 2012).

Blood tests of patients with hookworm infection show a picture: hemoglobin which decreases to less than 11.5 g/dl in female patients and less than 13.5 g/dl in male patients. In addition, the blood picture also shows MCHC (Mean Corpuscular Hemoglobin Concentration) which is less than 31-36 g/dl. Peripheral blood smear shows a picture: hypochromic microcytosis, leukopenia with relative lymphocytosis, with leukocyte counts less than 4,000/ml, eosinophilia which can reach 30% and anisocytosis, or poikilocytosis (Kurniati, 2020; Wysocka & Turowski, 2000).

In this case, a 62-year-old man working as a rice farmer, from the anamnesis conducted at the emergency department of RSUD Buleleng, the patient admitted to weakness and fainting, the patient did not complain of limb weakness and fever. Vital signs were found to be within normal limits. Physical examination found anemic conjunctiva and pale acral (Santoso, 2023). Then an electrocardiographic examination was performed and found sinus rhythm with left ventricular hypertrophy. CT-scan examination without contrast was obtained brain atrophy. Then a complete blood test was obtained severe hypochromic microcytic anemia with leukopenia, eosinophilia, anisocytosis. Examination continued with peripheral blood smears found anisocytosis, microcytic, macrocytic, ovalocytes, hypochromic, pencil cells, fragment cells, teardrop cells, polychromasia, neutropenia, neutrophil hypersegmentation, lymphopenia, absolute eosinophilia. Ferritin, serum iron, UIBC (Unsaturated Iron Binding Capacity) examinations were performed and iron deficiency results were found (Adams et al., 2007).

The occurrence of iron deficiency anemia linked to hookworms varies based on an individual's iron reserves, the severity of infection, and the specific infecting species, with *A. duodenale* causing more blood loss than *N. americanus*. One of the

ways hookworm infection contributes to iron deficiency anemia is through persistent blood loss in the gastrointestinal tract. Adult hookworms will burrow into the upper mucosa of the small intestine, feeding on tissue and blood, resulting in impaired nutrient absorption. The hookworm also changes tissue and blood feeding sites every 4-6 hours. Primary blood loss is when blood passes through the intestine from the hookworms as they feed. Secondary blood loss occurs from bleeding due to mucosal damage (McCance & Huether, 2014).

Anemia causes abnormalities in cardiac function and structure. Peripheral ischemia due to anemia causes vasodilation and a decrease in blood pressure. This activates the renin angiotensin aldosterone system, leading to decreased renal blood flow and glomerular filtration rate, and increased water and salt absorption. Increased extracellular fluid volume due to fluid retention leads to hemodilution and lower hemoglobin levels. The excess plasma causes an increased cardiac load and results in ventricular dilatation. In the long run, left ventricular hypertrophy, heart muscle death and heart failure occur which further worsens (Mazurek & Jessup, 2015; Members et al., 2012; Stoltzfus et al., 1997).

Patients with heart failure are at risk of iron deficiency due to disruption of iron absorption in the small intestine. The mechanisms underlying this condition are ischemia of the intestinal mucosa, thickening of the intestinal wall due to edema, and the role of proinflammatory mediators that inhibit iron absorption (Allen et al., 1998).

This patient was given PRC transfusion 1 colf / day with furosemide 20mg premedication, with a total administration of 4 colf, administration of antihelmintic, namely albendazole 400mg every 12 hours, for 3 days, administration of iron preparation Ferrous Fumarate 60mg every 24 hours for 1 month, administration of folic acid 400mcg every 24 hours for 1 month, administration of ascorbic acid 50mg every 8 hours for 1 month, administration of bisoprolol 1. 25mg every 24 hours, spironolactone 25mg every 24 hours, flunarizine 5mg every 12 hours. Proper diagnosis can help in proper and rapid management to prevent serious impact on the patient, in addition to the patient getting a good prognosis.

On the fourth day of treatment, a therapy evaluation was conducted, and the patient's clinical condition showed significant improvement with notable relief in complaints. Vital signs were stable, and the complete blood test results indicated improvement, with increased hemoglobin and MCHC (Mean Corpuscular Hemoglobin Concentration), as well as decreased eosinophils. The patient was informed about the possibility of reinfection if clean and healthy living habits are not maintained. Additionally, the importance of preventive measures, such as wearing closed footwear while farming, and regular deworming every 6 months, was explained to the patient.

CONCLUSION

Based on the case study above, ancylostomiasis in the elderly can cause severe anemia accompanied by iron deficiency anemia and heart failure. Ancylostomiasis in the elderly is a rare case, so proper treatment is very important. If proper treatment can be done, it will give a good prognosis and not cause damage to other organs. Although Ancylostomiasis is not considered a dangerous disease and has the potential to cause death, in special conditions especially in elderly patients, if

ancylostomiasis is not treated properly, it can cause serious problems such as heart failure. Therefore, maintaining clean and healthy living habits and regularly taking deworming medication are important steps to prevent the adverse effects of the infection. If proper treatment can be done, it will give a good prognosis and not cause damage to other organs.

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