Eosinophilia Secondary To Strongyloides In Rhode Island
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With an increase in travel and an influx of immigrants and refugees from the tropics over the last few decades, clinicians in Rhode Island are more commonly encountering tropical diseases. The Federation for American Immigration Reform estimated that the average annual rate of increase in the foreign-born population in Rhode Island to be 2400 persons, with the Dominican Republic and Guatemala two of the largest countries from which people emigrate. As a result, hematologic abnormalities such as eosinophilia can arise without any other symptoms, perplexing clinicians as to the proper workup. Hematologists at The Rhode Island Hospital have noticed a significant increase in referrals of eosinophilia with mild leukocytosis or anemia, making it important to discuss major causes in immigrant populations. Infections such as hookworm and Strongyloides stercoralis (Strongyloides) are the most common parasitic nematodes to cause eosinophilia in tropical and subtropical areas.

CASE
A 42 year-old man with a history of diabetes and hypercholesterolemia who emigrated four years prior from Columbia was referred to the hematology clinic after his primary care physician found a leukocytosis with increased eosinophils. The patient had several stool cultures for ova and parasites over the last two years that were positive for Blastocystis hominis which was treated with nitazoxanide. The patient’s eosinophilia persisted post-treatment. The patient denied any diarrhea, rashes, itching, allergies, nausea, vomiting, cough, fevers, chills, night sweats, weight changes, or any other symptoms.

Laboratory data showed a BUN of 8 mg/dL (normal [nl] 7-25 mg/dL and creatinine of 0.7g/dl (nl 0-4-1-3 mg/dL). Liver function tests and electrolytes were normal. White blood cell count was 12 x 10^3/mm^3 (nl 3.5-11 x 10^3/mm^3) with 10% (nl 1-3%) eosinophils present. Peripheral blood flow cytometry was negative for any lymphocyte abnormality. Hemoglobin and platelet count was within normal limits.

The patient had further workup with stool ova and parasites, Strongyloides IgG antibody, hemoglobin electrophoresis, IgE level, and serum protein electrophoresis. Results showed an IgE level of 1381 mIU/ML (nl <1) and a Strongyloides IgG antibody of 8.37 (nl <1) indicating an underlying infection of Strongyloides. The patient was treated with two courses of albendazole therapy with improvement of his eosinophilia.

DISCUSSION
Peripheral blood eosinophilia can occur from a variety of causes including parasitic infections. From primary blood disorders to systematic diseases to infectious processes, eosinophilia is sometimes
the only clue of an underlying problem. Some causes include mastocytosis, malignancy, Churg-Strauss, asthma, adrenal insufficiency, allergic reactions, drugs, and an array of invasive parasites.1

**WORKUP**

Initially, clinicians need to take a full history and perform a physical exam to uncover potential causes of eosinophilia. History includes history of allergic symptoms, international travel (especially tropical areas), recent and current medications, and any constitutional symptoms including fever, weight loss and night sweats.4,5 Physical exam should focus on skin lesions, rashes, nasal erythema and organomegaly. If the history reveals international travel or foreign birth, as in our patient, work up of parasitic causes should be done. Work-up includes three stool ova and parasite samples and work-up of any endemic parasitic infections to the area. It is important to remember that even if the stool ova and parasite examination is negative that Strongyloides could still be present. Because Strongyloides have low larval densities in the feces, stool exam can be insensitive. An IgG antibody ELISA to Strongyloides is the test of choice in those individuals in which there is a suspicion of Strongyloides.6 A study in 1981 showed that the ELISA test was 84\% sensitive in diagnosing Strongyloides.7 False negative results can occur in patients who are immunocompromised.

**STRONGYLOIDES STERCORALIS SYMPTOMS AND TREATMENT**

Strongyloides is endemic in tropical and subtropical regions and occurs most often in the United States in immigrants, refugees, and in those who travel to endemic areas. Strongyloides infects humans when human skin comes in contact with larvae of Strongyloides which are found in soil or other material which was in contact with human feces. The larvae travel from the skin to the lungs, duodenum and jejunum. In the mucosa of the duodenum and jejunum the larvae mature into adult worms which can live for up to five years. The larvae then can penetrate to the perianal skin or colonic mucosa to start another life cycle.8 This is why infections with Strongyloides can persist for decades.

Patients with Strongyloides usually present with asymptomatic eosinophilia. Other presentations include pruritus, malabsorption, duodenitis, dry cough, pneumonitis, and any symptoms of an infection including fever, diarrhea, abdominal pain, cough or nausea and vomiting.9

The mainstay of treatment for Strongyloides infection is either single dose ivermectin 200 micrograms/kg or albendazole 400mg twice a day for two to three days. In head to head studies ivermectin was 92\% successful while albendazole was only 60\% successful in removing the parasite.10 Sensitivity increases with albendazole if another course of therapy is given for five to seven days after the first course. Side effects are rare from either medication. Patients should be followed up with repeat testing of the ELISA antibody and complete blood counts. Patients who continue to have a positive ELISA or eosinophilia may require repeat or prolonged treatment. In cases where there is pulmonary involvement or there is disseminated disease a seven day course of albendazole is recommended.

**CONCLUSION**

As clinicians across the state see more immigrants and refugees, and as more people travel to tropical and subtropical parts of the world, asymptomatic eosinophilia has become more common. In patients who travel from a tropical or sub tropical part of the world workup should include stool ova and parasite examination and also a Strongyloides IgG antibody. Patients with Strongyloides should be treated promptly and have continued surveillance until the IgG antibody is negative. With prompt recognition, disseminated Strongyloides, a potentially fatal condition, can be prevented.

**REFERENCES**


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**Disclosure of Financial Interests**

The authors and their spouses/significant others have no financial interests to disclose.

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