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The Creative Clinician

Eosinophilia Secondary To Strongyloides In Rhode Island

Samir Dalia, MD, and Gerald A. Colvin, DO

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.¹ 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.² We present a case to illustrate the workup of eosinophilia and to describe the diagnosis and treatment of *Strongyloides*.

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.

The patient's family medical history was relevant for an unknown anemia disorder and diabetes. The patient did not smoke, drink or use any illicit drugs or herbal medications. His medications included metformin, fenofibrate, olmesartan, pravastatin and aspirin. He denied any new medication changes or allergies to any medications.

On exam he was afebrile, with a blood pressure of 143/80 and a pulse of 75 beats per minute. He was well nourished and comfortable. Cardiopulmonary exam showed no abnormalities. Abdominal exam showed a soft abdomen without any masses or organomegaly. Extremity, lymph node exam and skin exam were all negative.

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 $12 \times 10^3/\text{mm}^3$ (nl $3.5\text{-}11 \times 10^3/\text{mm}^3$) 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 3-209) 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.³

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

1. Extended Immigration Data for Rhode Island. Federation for American Immigration Reform. http://www.fairus.org/site/PageServer?pagename=research_research53c1
2. Nutman TB, Ottesen EA, et al. Eosinophilia in Southeast Asian refugees. *J Infect Dis* 1987;155:309-13.
3. Tefferi A. Blood eosinophilia. *Mayo Clin Proc* 2005; 80:75.
4. Lombardi C, Passalacqua G. Eosinophilia and diseases. *Arch Intern Med* 2003; 163:1371.
5. Nutman T. Evaluation and differential diagnosis of marked, persistent eosinophilia. *Immunol Allergic Clin North Am* 2007; 27:529-49.
6. Gill GV, Bailey JW. Eosinophilia as a marker for chronic strongyloidiasis—use of a serum ELISA test to detect asymptomatic cases. *Ann Trop Med Parasitol* 1989;83:249-52.
7. Carroll SM, Karthigasu KT, Grove DI. Serodiagnosis of human strongyloidiasis by an enzyme-linked immunosorbent assay. *Trans R Soc Trop Med Hyg* 1981;75:706-9.
8. Siddiqui AA, Berk SL. Diagnosis of *Strongyloides stercoralis* infection. *Clin Infect Dis*. 2001;33:1040-7.
9. Segarra-Newnham M. Manifestations, diagnosis, and treatment of *Strongyloides stercoralis* infection. *Ann Pharmacother* 2007;41:1992-2001.
10. Muennig P, Pallin D, et al. The cost-effectiveness of ivermectin vs. albendazole in the presumptive treatment of strongyloidiasis in immigrants to the United States. *Epidemiol Infect* 2004;132:1055-63.

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