

Screening for *Strongyloides* Infection Among the Institutionalized Mentally Disabled

Dilip Nair, MD

Background: Strongyloidiasis is an intestinal helminthic infection common among the mentally disabled population and can cause persistent occult infection before resulting in disseminated, possibly fatal disease.

Methods: Two cases of strongyloidiasis are described. The literature was searched using the key words "*Strongyloides*" and "mass screening."

Results and Conclusion: Strongyloidiasis is clinically important and well documented in the mentally disabled populations both in endemic and nonendemic regions of North America. It has a substantial latent phase during which screening can be conducted, and its treatment with thiabendazole is convenient, effective, and reasonably well tolerated. Although strongyloidiasis is usually incidentally detected by findings of eosinophilia during routine blood screening, peripheral eosinophilia occurs only in 50% to 80% of infected persons and is extremely nonspecific for *Strongyloides* infection. Given the high cost of critical care for a patient with disseminated disease, screening mentally disabled populations in institutional settings for strongyloidiasis by administering the *Strongyloides stercoralis* antibody ELISA appears justifiable, particularly if risk factors for hyperinfection syndrome are used to select a subpopulation to be screened. (J Am Board Fam Pract 2001;14:51–3.)

Strongyloidiasis is an intestinal helminthic infection that is prevalent among the North American mentally disabled population, including among those living in institutional settings. It can cause persistent occult infection for decades before potentially resulting in disseminated, possibly fatal disease. The issue of systematic screening for this infection among this population has not been well addressed. Most clinicians stumble on asymptomatic strongyloidiasis as illustrated in the examples that follow. Family physicians often care for such populations of patients and are perhaps uniquely equipped to address issues of screening among them. Strongyloidiasis appears to be common enough to make screening worthwhile.

Methods

The medical literature was searched using the key words "*Strongyloides*" and "mass screening." Two cases of strongyloidiasis are described. Accepted principles of sound screening were applied.

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From the Department of Family and Community Health, Marshall University School of Medicine, Huntington, WV. Address reprint requests to Dilip Nair, MD, Department of Family and Community Health, Marshall University School of Medicine, 1600 Medical Center Drive, Suite 1500, Huntington, WV 25701.

Illustrative Cases

Two 51-year-old men with profound mental retardation and spastic cerebral palsy, residing in a group home in southwestern West Virginia, were incidentally found to have peripheral eosinophilia on a routine complete blood cell count. One patient had an absolute cell count of 2,664/ μ L (36% eosinophilia), and the other an absolute cell count of 828/ μ L (12% eosinophilia).

Both patients had lived in institutional settings in West Virginia since early childhood. They both had numerous other chronic but stable medical problems, among them allergic rhinitis and conjunctivitis. No obvious symptoms or signs of parasitic illness were observed, but the investigation into the eosinophilia nevertheless included microscopic examination of three stool samples each for ova and parasites, which were negative for both patients. When serologic testing by enzyme-linked immunosorbent assay (ELISA) was obtained, however, both men had detectable levels of immunoglobulin G antibodies to *Strongyloides stercoralis*. No other residents of the home had detectable levels of antibody.

The parasite was never isolated, but correction of the hematologic and serologic abnormalities was achieved between 1 and 3 months after treatment

with 3-day courses of thiabendazole at a dose of 25 mg/kg.

Routine Screening Blood Tests

Finding these two cases of asymptomatic strongyloidiasis in institutionalized mentally disabled men from the same group home in West Virginia is not unique. The Appalachian region of the United States is well known to be endemic for strongyloidiasis.¹⁻³ Moreover, this parasitic infection is well documented in mentally disabled populations both in endemic and nonendemic regions of North America.⁴⁻⁶ What is of note in the illustrative cases is the manner in which the infection was detected—incidentally, on reviewing routine blood work.

Routine or screening blood tests are ordered frequently in clinical practice in the hope that such discoveries of important but occult disease might be made. Indeed, a main contribution to the literature on strongyloidiasis in the institutionalized mentally disabled had its roots in “a review of routine blood tests obtained on a group of mentally retarded adults.”⁵

No preventive health practice guidelines, however, advocate the routine use of complete blood cell count, not to mention serologic markers, to screen for parasitic disease among institutionalized mentally disabled patients. In fact, the literature on the use of serum eosinophil counts to screen for parasitic disease among another population with relatively endemic prevalence—returning tropical travelers—is divided at best and pessimistic at worst. Whereas there are those who advocate the practice, there is also sufficient information to cast doubt on its wisdom.⁷ The same situation exists with respect to opinion on the use of screening stool samples by microscopic examination among travelers or even among immigrants from endemic regions.^{7,8}

Screening for Strongyloidiasis

Screening for strongyloidiasis among institutionalized mentally disabled patients does appear to be a sound practice in many respects. The disease is clinically important given the possibility of overwhelming, disseminated infection especially among immunocompromised patients. In one eastern Kentucky case series, disseminated strongyloidiasis was estimated to occur in 1.5% to 2.5% of cases.⁹ This hyperinfection syndrome has been accompa-

nied by bacteremia with enteric organisms in 45% of cases in one series.¹⁰ Disseminated infection with bacteremia has been associated with a 70% mortality rate.¹¹

Moreover, strongyloidiasis has a substantial latent phase during which screening can be conducted. Its treatment with thiabendazole is convenient, effective, and reasonably well tolerated. In fact, ivermectin, which is recently supplanting thiabendazole as the treatment of choice for strongyloidiasis, has an even more attractive side-effect and therapeutic profile.

Strongyloidiasis appears to be common enough to make screening worthwhile. General prevalence estimates vary widely depending on the clinical and geographic setting. It must be noted that prevalence estimates in neighboring eastern Kentucky have consistently ranged from 3% to 5% in hospital and community settings for many years.¹⁻³ This prevalence might be expected to be even higher among institutionalized mentally disabled patients. A study of 64 such patients in a facility in Pennsylvania showed a prevalence of between 7.8% and 10.9% depending on the case definition.⁵

Further definition of subpopulations at particularly high risk for strongyloidiasis and the associated hyperinfection syndrome has been described in a community setting.¹¹ White race, male sex, recent corticosteroid use, and previous gastric surgery, as well as other immunosuppressive conditions, all appear to be relevant risk factors. The prevalence of strongyloidiasis among those institutionalized mentally disabled patients who have these risk factors is likely to be even higher than existing estimates.

The accuracy and cost of the screening procedures are admittedly much more problematic issues. A complete blood count measurement at Cabell Huntington Hospital hospital costs \$37. Peripheral eosinophilia, however, is not only extremely nonspecific for *Strongyloides* infection, it is also found only in 50% to 80% of infected persons.⁸ Studies among asymptomatic travelers showed that eosinophilia had a 91% specificity but only a 27% sensitivity for all parasitic infection.⁷

A nationwide laboratory service quoted the cost of stool microscopy for ova and parasites at \$135 for three examinations (Laboratory Corporation of America, Columbus, Ohio, August, 1999). Added to this fairly high cost is that, except in cases of hyperinfection, the worm burden is relatively low

and microscopy relatively insensitive—60% for five or more samples.¹² Fewer than three stool examinations might lower costs but would further sacrifice sensitivity.^{13,14} While agar plate culture, a stool culture method developed in Japan, has been shown to have a 96% sensitivity with only one specimen, this culture method is not widely available.¹³

Coproantigen assays for *Strongyloides* organisms are not as yet commercially available. Other tests, such as the “string test” sampling of duodenal fluid, duodenal aspiration, and small-intestine biopsy, are clearly not feasible on a routine basis, particularly with mentally disabled populations.

Enzyme-linked immunosorbent assay for *Strongyloides stercoralis* antibodies, however, is commercially available, easy to administer, and relatively affordable. The price quoted by one nationwide laboratory was \$80 for institutional customers (Laboratory Corporation of America, Columbus, Ohio, August, 1999). A formal cost-benefit analysis is beyond the scope of this article. Nevertheless, if the cost of critical care for a patient with disseminated strongyloidiasis is assumed to be \$80,000, it becomes evident that screening with ELISA is cost-effective even if only one case of disseminated strongyloidiasis is detected for every 1000 patients tested. Given a prevalence rate for strongyloidiasis in the population being screened of 10% and a rate of disseminated strongyloidiasis among cases of infection of 2%, then this detection rate is quite plausible.

Genta¹⁵ has studied performance of ELISA in a population of 917 patients and has concluded that it has a sensitivity of 97% and a specificity of 95%. He has also reviewed numerous seroprevalence studies that use the ELISA technique, with results reported qualitatively. He asserts that given a prevalence rate of 10%, the test has a 91% positive predictive value and a 98% negative predictive value.⁸

Conclusions

The practice of screening mentally disabled populations in institutional settings for strongyloidiasis by administering the *Strongyloides stercoralis* antibody ELISA appears to be quite justifiable, particularly if risk factors for hyperinfection syndrome are used to select a subpopulation to be screened. In the final analysis, proof that this practice constitutes sound medical screening will come only from prospective outcome-oriented studies. In the

meantime, family physicians caring for mentally disabled patients in group-living settings will probably continue to order routine blood tests in the hope of discovering asymptomatic cases. Perhaps *Strongyloides stercoralis* antibody ELISA should be included among those routine blood tests.

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