

INFESTATION WITH *STRONGYLOIDES STERCORALIS* ASSOCIATED
WITH SEVERE SYMPTOMS*

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INFESTATION with *Strongyloides stercoralis* is common in the tropics and relatively frequent in the subtropics. At intervals isolated cases are reported from widely scattered areas of the temperate zone. The condition is extremely rare in Canada. Because of this latter fact, and in view of the severe symptoms which resulted from the infection a report of this case is of interest.

CASE HISTORY

Miss N., a staff nurse, in a local hospital was admitted as a patient in June, 1932. The patient had been a resident of Canada since birth and for some years previous to her illness had not been outside the prairie provinces.

In May, 1931, she suffered from an attack of diarrhoea which lasted several days. In September of the same year a severe diarrhoea developed, associated with nausea, epigastric distress and urticaria. At the time neither blood nor mucus was noted in the stool. This attack lasted three weeks. Subsequently, intermittent attacks of a similar nature recurred at intervals of two to three weeks. Within the year she had lost twelve pounds in weight and because of general debility was obliged to cease work.

For ten weeks following her admission to hospital all examinations failed to disclose the nature of the trouble. Basal metabolic rates, roentgenograms, gastric and urine analyses revealed nothing abnormal. Microscopic examination of the faeces showed the presence of blood and pus, but no specific organism was isolated by culture methods. A secondary anaemia, associated with eosinophilia, was present: haemoglobin 58 per cent; erythrocytes 2,100,000, leucocytes 7,200, with 9 per cent eosinophils. The patient developed an intermittent and slight variation in temperature; however agglutination tests for *Br. melitensis*, *Br. melitensis abortus*, *B. dysenteriae* and *B. paratyphosus* were negative.

The attacks of urticaria recurred more frequently, some oedema of the feet developed, and the diarrhoea became intractable. The patient was markedly neurasthenic and by August 15th she had lost forty pounds in weight, and the prognosis appeared serious. At this time a further careful microscopic study of the stools was made. The patient was given a drastic purgative, and a subsequent examination of the faeces revealed the presence of the eggs of *Strongyloides stercoralis*. These eggs hatched *in vitro*. At intervals the motile rhabditiform larvae were also noted in the stools. The appearance of abundant larvae in the faeces coincided with the outbreaks of urticaria.

Under the direction of Dr. H. D. Kitchen thymol was administered, and the patient showed immediate improvement. In three weeks the stools were normal in consistency, and careful examination failed to disclose the presence of any of the parasites. The oedema disappeared, and there was no recurrence of the urti-

caria. No further epigastric distress was noted, the neurasthenic symptoms rapidly abated, the appetite improved, and within one month the patient had regained her normal health.

COMMENT

While this patient responded favourably to medication with thymol, and evidently the parasite was eradicated, yet several observers claim that frequently no relief, or at best but a temporary beneficial result, is obtained by the use of this drug. In 1928 DeLangen¹ suggested the use of gentian violet, since the adult parasitic worm is susceptible to its toxic effect. The dye is given in coated tablets by mouth over a period of several days. Faust² reports the beneficial results obtained in 200 patients suffering from strongyloidosis, to whom the dye had been administered. He speaks highly of this novel method of treatment.

The *Strongyloides stercoralis* resembles the hookworm in the method of invasion. As a filariform larva it penetrates the skin or mucosa, and then enters the venous circulation, after passing through the heart and invading the alveoli of the lung it migrates to the epiglottis and thence to the intestinal tract. Direct infestation may also occur. After the parasite enters the digestive tract it either attaches itself to the mucosa of the intestine, usually in the duodenum and jejunum, or the larva enters the crypts and develops into an adult worm; the female then deposits her eggs.

Two types of development are known. The eggs commonly hatch in the intestine and are passed in the faeces as rhabditiform larvae. These larvae may become metamorphosed into the filariform larvae, which is the infective stage of the parasite, or they may become transformed into male and female worms. The eggs from these females hatch as rhabditiform larvae, which after a few days moult and change to the infective filariform larvae.

Following infestation of the host a catarrhal inflammation of the invaded mucosa results, and later, as Ophüls³ points out, a colitis may

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also develop. The rhabditiform embryos as a rule are passed in the fæces, but on occasion they undergo transformation in the lower intestine into the filariform larvæ forms; these larvæ then penetrate the colonic mucosa, giving rise to the colitis. No evidence in this case was forthcoming either as to the origin or the route of infestation; however, the patient was exposed to the hazards of infection pertaining to her profession as a nurse in a large general hospital.

Some investigators have considered the outbreaks of urticaria in strongyloidosis to be the result of the direct irritation produced by the larvæ when they penetrated the skin; this irritation, which is characterized by an intense erythema, recurs during reinfection. The successive attacks of a general urticaria from which this patient suffered quite evidently were not the result of infection through the skin, but were, apparently, associated with reinfection through the colon.

Massive infestation with *Strongyloides stercoralis* may result in death. In 1876 Normand⁴ reported the deaths of five French soldiers in Cochin China from this cause, and fatal cases in temperate zones have been noted by Ophüls⁵

and by Ginsberg.⁶ However, not all persons infected with the parasite develop symptoms. Moreover, the infestation may be associated with other infective agents as the cause of a diarrhœa or dysentery, hence some uncertainty exists regarding the pathogenic power of this parasite.

In the case here reported the patient presented the symptoms characteristic of a severe *Strongyloides stercoralis* infestation—intermittent attacks of diarrhœa associated with neurasthenia, epigastric distress and recurring urticaria together with progressive anæmia, some œdema, and extreme emaciation. The presence of the parasite was finally disclosed, but exhaustive examination failed to reveal any concomitant infection, and the history of the case supports the considerable accumulated evidence that strongyloidosis may give rise to severe symptoms.

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THE ANATOMY AND PHYSIOLOGY OF THE CORONARY CIRCULATION*

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ANY good drawing of the heart such as that in Spalteholz' Anatomy will serve to recall to our minds the elementary points in connection with the anatomy of the coronary arteries. There are normally two main coronary arteries, the right and the left, both arising from the aorta in the sinuses of Valsalva. They are both ensheathed in a liberal amount of fat as they course over the pericardial surface. The right coronary has its origin from the anterior part of the aorta just behind the anterior cusp of the aortic valve. It emerges on the anterior surface of the heart between the roots of the aorta and the pulmonary artery. The main trunk courses downwards over the surface of the right ven-

tricle, close to the auriculoventricular sulcus, rounds the acute margin of the heart and finally runs towards the apex where it terminates in the wall of the left ventricle. Its branches are numerous and variable and need not concern us; suffice it to say it supplies most of the wall of the right ventricle and the right auricle, and sends deep branches into the anterior part of the interventricular septum. The conducting system of the heart is supplied mostly by the right coronary. The left coronary arises from the left posterior sinus of Valsalva, and emerges on the surface under cover of the left auricular appendage, where it soon divides into two large and more or less constant trunks, the descending and circumflex branches. The descending branch runs downwards along the anterior

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