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CHAPTER 114

Trichuriasis

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INTRODUCTION

Members of *Trichuris* species are successful nematode parasites of the mammalian bowel, and *Trichuris trichiura* has had much opportunity to coevolve with man. Its human presence is associated with poor hygiene rather than a specifically tropical environment, although warmth and moisture in the soil enhance transmission through promotion of the viability of the infective stages. Until about 35 years ago, four things led to the underestimation of *T. trichiura* as a pathogen:

1. Low-intensity infections, which are by far the most common, are asymptomatic.
2. *Trichuris* is seldom found as the only pathogen, but is commonly just one of multiple health and environmental threats.
3. The onset of significant symptoms is often too slow to alarm the family.
4. It produces a transient, although prolonged, disease of the developing child while seldom causing disability to adults.

However, infections are amenable to treatment with effective anthelminthics that have minimal side effects; this makes case detection and treatment most rewarding and population-based prevention most productive.

THE AGENT

Trichuris trichiura is a member of the nematode superfamily Trichuroidea and is related to *Trichinella spiralis*. The genus was previously often called *Trichocephalus*, logically enough since the hairlike part (tricho-) is in fact the head end (cephalus). However, the original name given by Linnaeus (1771), in the mistaken belief that the hairlike part was the tail (uris), is the official name. Whipworm is a commonly used unofficial name. The adult is shaped like a whip, with the handle representing the wider posterior section containing the reproductive organs and the intestine, while the long, fine anterior part, called the stichosome, contains the long pharynx. The adult is about 4 cm long. The male has a curled posterior end. The eggs are thick-walled and barrel-shaped, about 50 μm long, with a plug at each pole.

Eggs, passed in the feces, contain a zygote and are not infective until embryonation, which takes place in the soil over 2–4 weeks (***Fig. 114.1***). The egg now contains the L1 larva. Following human ingestion, the larva is released in the stomach and passes into the intestine. It penetrates the epithelium in the mucosal crypts of the cecum.[1] The larva develops by molting, and the adult develops from the L4 stage, by now having migrated with the epithelial cells up the sides of the crypts. The anterior part of the adult lies in a tunnel within the epithelium between the mouths of the crypts, while the posterior part is free in the lumen. The stichosome is surrounded by a syncytium and debris of the epithelium. Each female produces 3000–20 000 eggs per day; the life expectancy of a worm within the host has been estimated at 1–3 years,[1] which would imply that some adults live far longer.

EPIDEMIOLOGY

T. trichiura is estimated to infect 600–800 million individuals worldwide.[2,3] However, many helminthic infections have an aggregated ("clumped") distribution among their hosts. This is extreme in trichuriasis, where over 90% of a community may be infected but only 10% or less have intense, symptomatic infections.[4] Familial aggregation occurs.[5] After treatment, there is a tendency for the most heavily infected to become the most heavily reinfected, but there is much crossing over between light and heavy strata too.[6] Evidence to support a possible genetic basis to the predisposition to trichuriasis has been shown. Significant heritabilities for susceptibility to infection have been shown in two independent Asian populations and two quantifiable trait loci associated with susceptibility have been identified in one of these populations.[7,8]

As with *Ascaris lumbricoides*, warm, damp soil provides the best medium for transmission once it is fecally contaminated. *T. trichiura* is found in humid, tropical environments as well as in temperate climates including northern Europe and South Africa. ***Figure 114.2*** shows the estimated prevalence of endemic trichuriasis by country. Although transmission occurs in cool climates, hyperendemicity is correlated with higher temperatures and lower altitudes.[9] *T. trichiura* is observed as a coinfection with *A. lumbricoides* more commonly than might be due to chance, perhaps because of their common mode of transmission.[10]

THE DISEASE

Most infections are asymptomatic. In heavy infections (many adult worms, see next section), stools become loose and frequent and there is tenesmus. Frequency can exceed 12 stools per 24 hours and nocturnal stooling is especially characteristic. Stools consist largely of mucus but may also be watery. There is a characteristic acrid smell. Frank blood is common. Trichuriasis is one of the most frequently identified causes of recurrent rectal prolapse and the worms may be seen on the prolapsed mucosa. Children with this degree of symptomatic infection are almost invariably severely anemic and growth-retarded.[11] They are also geophagic and much of their stool may consist of ingested earth or even small stones. Finger-clubbing is common, correlated in prevalence and severity with the number of adult worms harbored.[12]

PATHOGENESIS AND IMMUNITY

Light infections (20 adult worms or fewer) are not associated with any discernible morbidity. Heavy infections (200 adult worms or more) are