

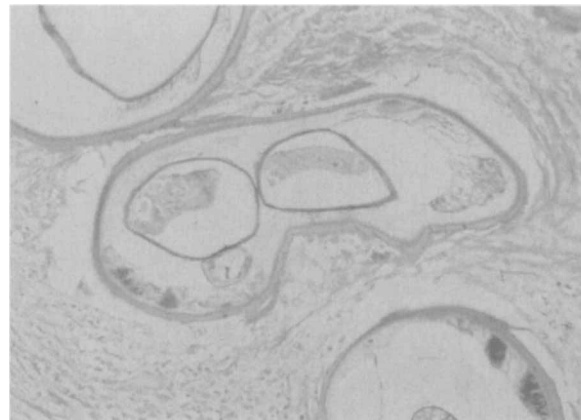
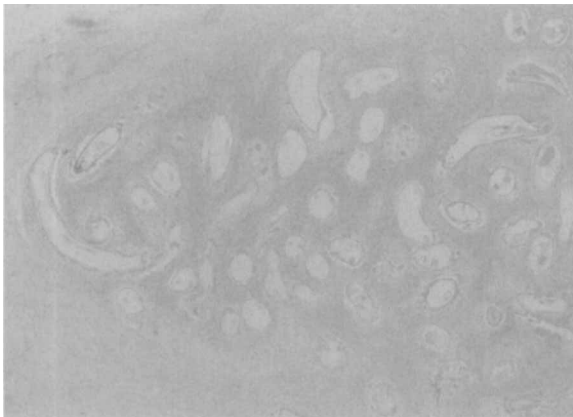
## A case of an old nodule

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A 42-year-old male headmaster from Sierra Leone presented at the clinic with a non-tender nodule over his right iliac crest. The nodule had been present for at least 5 years and had gradually increased in size. It had caused no problems until recently, when it had begun to rub on his clothing. He had been in the UK for 7 years, and before that he had lived in a rural part of Sierra Leone near a river. He mentioned being bitten extensively by small flies throughout his time in Sierra Leone. He had no other symptoms or past medical history.

Examination revealed a non-tender subcutaneous

nodule over the right iliac crest which appeared to be fixed to deep tissues. There were no other abnormal findings. The nodule was removed and sections are shown above.

### QUESTIONS

1. What is the diagnosis?
2. What other methods of diagnosis are available?
3. What are the main clinical features?
4. What is the recommended treatment?
5. Where in the world does this disease occur?

## ANSWERS

1. The tissue sections show mature adult nematode worms consistent with *Onchocerca volvulus*. The diagnosis is onchocerciasis (river blindness).
2. Onchocerciasis can be diagnosed by finding adult worms in excised nodules. Usually, the diagnosis is made by finding microfilaria in bloodless skin snips taken from around the iliac crests or outer canthus of the eye. These skin snips are incubated in saline and then observed under a microscope. Microfilaria can also be seen in the anterior chamber of the eye using a slit lamp. The microfilaria are unsheathed and need to be differentiated from non-pathogenic *Mansonella ozzardi* and *M. streptocerca*. Enzyme-linked immunoassays and polymerase chain reaction amplification of parasite DNA are also available for diagnosis.
3. Many patients are asymptomatic or may just have nodules. The majority of symptoms can be divided into cutaneous and ocular. The commonest initial symptom is cutaneous itching with a maculopapular rash. This may clear or become chronic, leading to excoriation, hyperpigmentation and lichenification. There is loss of elastin with time, leaving the skin thin and wrinkled. There may be depigmentation over the shins and loose folds of skin hanging down from the groin. The initial ocular lesion is punctate keratitis; this may develop into sclerosing keratitis, leading to gradual opacity of the cornea and blindness. Posterior segment lesions usually occur at the same time, and chorioretinal lesions and optic neuritis are seen. The clinical features vary with geographic location.
4. Ivermectin, a macrocyclic lactone, has replaced diethylcarbamazine (DEC) as the current treatment of choice. It is donated free by the manufacturer Merck Sharpe and Dohme to organized treatment programs. It is given as a single oral dose of 150 µg/kg repeated at intervals of 6–12 months. Ivermectin is microfilaricidal; it does not kill the adult worms but causes temporary sequestration of microfilaria in the uterus of the adult female worms, preventing their release. This effect is sustained for several months, reducing dramatically the number of microfilaria in the subcutaneous tissues. As ivermectin does not kill the adult worm, patients need to remain on treatment until the adults die of old age; this can take over 10 years. Ivermectin is associated with far fewer side effects than DEC. Nodulectomy can be used as an adjunct to ivermectin treatment. It is especially useful if there are nodules

- on the head, as a high concentration of microfilaria near the eyes may lead to more rapid progression of eye disease.
5. Ninety-five per cent of onchocerciasis cases occur in a band across Africa between 15°N and 15°S. There are also small foci in The Yemen, Saudi Arabia, and Central and South America.

## DISCUSSION

Onchocerciasis is the fourth most common cause of blindness in the world after cataract, vitamin A deficiency and trachoma. There are an estimated 17.7 million people infected with *Onchocerca volvulus* worldwide; among these, 270 000 are blind and 500 000 have severe visual impairment. Humans appear to be the only reservoir of infection.

Infection occurs following the bite of an infected female *Simulium* fly (black fly). Larvae are deposited at the site of the bite and develop into mature adults in the skin over several months. They then form nodules with other adults, usually over bony prominences such as the iliac crest. The adult female can release over 1000 microfilaria per day for over 10 years. The nodule has a fibrous capsule and rich blood supply. The microfilaria migrate from the nodule in the subdermis and lymphatics. They are picked up by *Simulium* flies during biting and develop in the stomach and flight muscles into infective larvae before moving to the mouthparts.

The vector varies between regions. *S. damnosum* predominates in West Africa and can travel long distances. In East Africa, *S. neavei* is the principal vector and is more restricted. In Latin America, there are several vectors, including the brightly colored *S. metallicum*. *Simulium* spp. require fast-flowing water for the development of their larvae; hence the concentration of onchocerciasis cases around waterways.

The pathology of onchocerciasis is due to inflammation occurring around dead microfilaria. There are both antibody and cellular immune responses, with eosinophils playing a key role in the inflammation. The adult worms escape destruction by making substances that inhibit the normal immune response.

The introduction of ivermectin has led to dramatic decreases in the number of new cases of blindness due to onchocerciasis and the disease has been eradicated from some areas. Sustained mass treatment campaigns have reduced transmission by over 80% in some regions. Vector control is no longer widely practiced in view of the effectiveness of ivermectin.

**Acknowledgments**

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**Further reading**

1. McMahon JE, Simonsen PE. Onchocerciasis. In Cook GC, ed. Manson's tropical diseases, 20th edn. Saunders, 1996: 1338–51.
2. Burnham G. Onchocerciasis. *Lancet* 1998; 351: 1341–6.
3. Molyneux DH, Davies JB. Onchocerciasis control: moving towards the millennium. *Parasitol Today* 1997; 13: 418–25.

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