

# Schistosomiasis: extensive urinary bladder infiltration in an unusual case of suspected cancer

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## Abstract

We present a case of a teenage boy with haematuria who underwent a trans urethral removal of bladder tumour (TURBT) for multiple solid bladder lesions with sandy patches. Investigations led to a diagnosis of schistosomiasis. The clinical, radiological, macroscopic, and microscopic histological findings are highlighted. We discuss the complex parasitic life cycle of *Schistosoma* and the well evidenced link between schistosomiasis and bladder cancer, specifically high-grade squamous cell carcinoma.

**Keywords** Bilharziasis; bladder cancer; *Schistosoma haematobium*; schistosomes; snail fever; squamous cell carcinoma; urinary schistosomiasis

## Case report

A teenage boy presented to his GP with several episodes of painless visible haematuria over months and a history of frequent freshwater swimming when growing up in The Gambia. He had no history of fever, rash or breathing problems and no significant past medical history. Haematuria remained persistent despite antibiotic treatment. He was urgently referred to haematuria clinic for suspected bladder cancer. Urinary tract ultrasound (US) scan showed an abnormal appearance of the bladder with an 8 mm non-mobile isoechoic focal lesion arising from the posterior urinary bladder wall. Post micturition there was also a 20 × 7 mm isoechoic vascular focus arising from the right urinary bladder wall.

He then underwent cystoscopy, bladder biopsy and trans urethral removal of bladder tumour (TURBT). Clinically, the bladder appeared grossly abnormal with multiple solid looking lesions with sandy patches to the posterior wall, suggestive of schistosomiasis. Schistosomiasis ELISA was positive at Level 5. There were also *Schistosoma haematobium* eggs seen in urine.

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Histological examination of the fragments of bladder tissue showed extensive infiltration by numerous schistosome eggs and dense inflammation in the surrounding bladder tissue with urothelial hyperplasia (Figures 1 and 2). There was no evidence of squamous metaplasia, dysplasia or neoplasia.

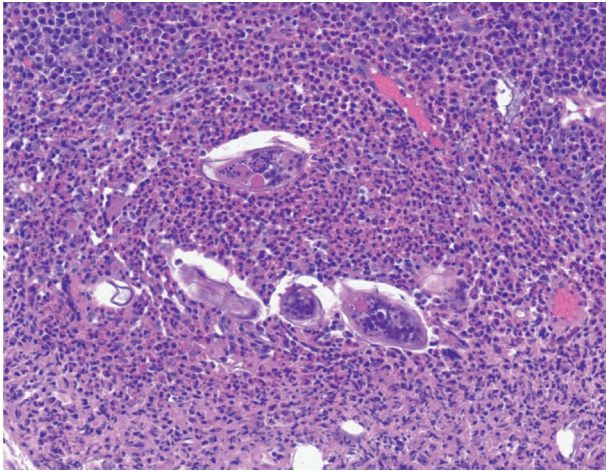
This case demonstrates a very high parasitic load (Figure 3) with terminal spines visible on the eggs (Figure 4), consistent with a diagnosis of *S. haematobium* infection with bladder infiltration.

He was treated with Praziquantel 20 mg/kg × 2 doses and follow up was arranged with Infectious Diseases clinic with repeat urine microscopy to ensure clearance.

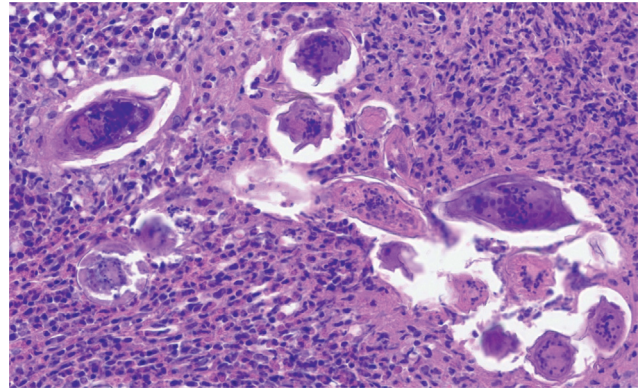
## Discussion

Schistosomiasis is a neglected tropical disease caused by blood flukes, called schistosomes and has the second greatest economic impact of a parasitic disease, after malaria.<sup>1</sup> The disease was first described in humans by Theodor Bilharz during an autopsy in Cairo in 1851, leading to the name Bilharzia. However, evidence of schistosomiasis dates over 6000 years ago.<sup>2</sup> Schistosomiasis currently affects almost 240 million people per year worldwide, most commonly in Africa, Asia and South America, but is rarely seen in the UK. Over 700 million people from over 70 countries live in endemic areas. Annually, around 200 thousand people die from schistosomiasis, mostly from poorer rural communities.<sup>1,3</sup>

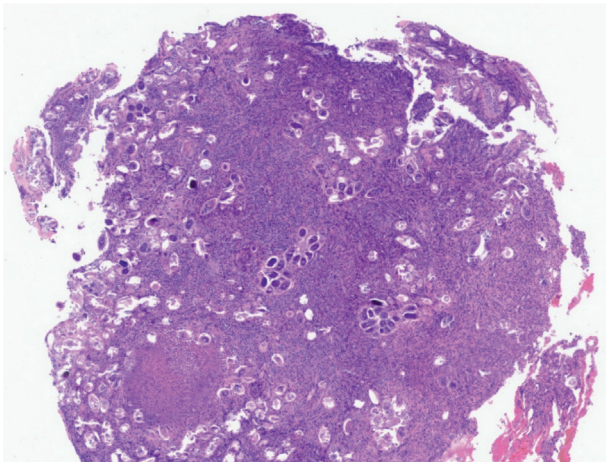
Schistosomiasis has a complex life cycle, starting as a snail-borne parasitic disease. Humans become infection hosts through skin exposure to contaminated freshwater. Infective larvae called cercaria burrow into the skin and mature into adult flukes in the liver, travelling via the lungs. Young flukes then migrate into blood vessels surrounding organs, such as the venous plexus of the bladder where paired adult worms sexually reproduce and lay eggs in the bladder mucosa and submucosa, which then shed in the urine. The resulting morbidity is due to the production of hundreds of schistosome eggs per day which are highly antigenic. There are complex immune interactions between host and parasite. Trapped eggs induce intense granulomatous inflammatory responses due to delayed hypersensitivity responses to soluble egg antigen (SEA) secreted from eggs.<sup>4</sup> This may lead to presentation with complications of chronic infection and genitourinary/intestinal symptoms depending on the infective species. The histological appearance of the eggs can help identify the species (Table 1). This case demonstrates a high



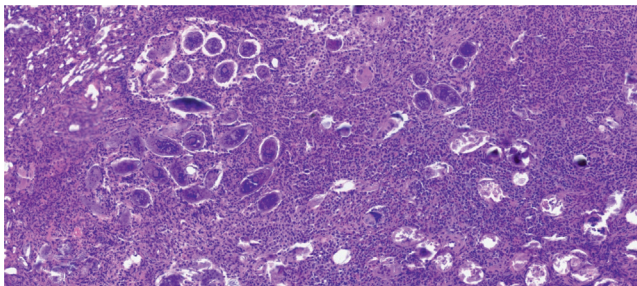
**Figure 1** Haematoxylin and eosin (H&E) stained section showing dense bladder inflammation surrounding schistosome eggs.



**Figure 4** H&E-stained section demonstrating *S. haematobium* eggs with visible terminal spines.



**Figure 2** H&E-stained low power view of bladder chip showing extensive infiltration of bladder wall by schistosome eggs.



**Figure 3** H&E-stained higher power view of high parasitic load of schistosomes within the bladder.

burden of disease with bountiful *S. haematobium* eggs visible histologically.

Schistosomiasis can be mistaken for bladder cancer, as demonstrated in this case, or can be a cause of it. There are strong links between bladder cancer, more specifically high-grade squamous cell carcinoma, and untreated schistosomiasis infection, whereby *S. haematobium* is defined as carcinogenic.<sup>5,6</sup>

**The histologic description of *Schistosoma* eggs by species**

<i>Schistosoma</i> species	Histologic appearance of eggs
<i>S. mansoni</i>	Thin transparent shell with lateral spine
<i>S. haematobium</i>	Oval with terminal spine
<i>S. japonicum</i>	Rounded with subterminal or no spine

**Table 1**

Proposed mechanisms of malignancy includes local tissue damage, irritation, toxins or secondary bacterial infection.<sup>5</sup>

The intestines and liver can be commonly affected, but infection of the reproductive system, lungs and brain may also occur. Furthermore, untreated schistosomiasis may cause chronic renal failure, portal hypertension and liver enlargement. Urogenital schistosomiasis may present with dysuria, frequency and visible haematuria. It can be diagnosed through urine/stool microscopy or *Schistosoma* serology.

Schistosomiasis treatment is relatively inexpensive using anthelmintic praziquantel, as given in this case. Programmes have been implemented globally, successfully reducing prevalence, including roles for preventive chemotherapy in endemic areas.<sup>3</sup> However, there can be long incubation periods and many people remain asymptomatic. Moreover, praziquantel only eliminates adult schistosomes and not eggs/immature worms. Schistosomiasis vaccine development is underway and could have major impact improving morbidity and mortality if successful.<sup>3</sup>

**Conclusion**

This was a case of schistosomiasis infection in a teenager who was being investigated for possible bladder cancer following episodes of visible haematuria. If left untreated, schistosomiasis can cause considerable morbidity and mortality, with risk of developing squamous cell carcinoma of the bladder. ◆

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### Practice points

- Schistosomiasis is a parasitic infection common in endemic regions around the world (in Africa, Asia and South America) and can be simple and inexpensive to treat with praziquantel
- It is commonly reported in younger people (5–15 years old) who have been exposed to contaminated freshwater in endemic regions
- Untreated infection can lead to chronic inflammation and high-grade squamous cell carcinoma of the bladder
- Microscopically seen as infiltration of eggs within the bladder wall
- Macroscopically may appear as yellow sandy patches in the bladder

### Self-assessment multiple choice questions

**1. Schistosomiasis is most commonly a risk factor for which type of bladder cancer?**

- a. Small cell carcinoma
- b. Adenocarcinoma
- c. Squamous cell carcinoma
- d. Papillary urothelial carcinoma
- e. Lympho-epithelial like carcinoma

Correct answer: c

**2. Which *Schistosoma* species is most commonly detected in urogenital infections in endemic regions?**

- a. *Schistosoma intercalatum*
- b. *Schistosoma japonicum*
- c. *Schistosoma mekongi*
- d. *Schistosoma mansoni*
- e. *Schistosoma haematobium*

Correct answer: e

**3. Which *Schistosoma* species have eggs with lateral spines?**

- a. *S. mansoni*
- b. *S. haematobium*
- c. *S. japonicum*
- d. *S. mekongi*
- e. *S. guineensis*

Correct answer: a