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Urogenital Schistosomiasis: No Longer a Diagnosis of the Developing World

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Abstract

Schistosomiasis is a chronic, parasitic disease caused by the blood flukes (trematode worms) of the genus Schistosoma. There are two major forms of schistosomiasis, intestinal and urogenital. The blood fluke Schistosoma haematobium causes urogenital schistosomiasis, with its highest prevalence in Africa and the Middle East. Given the emerging migrant populations in Australia, from the Africa and Middle East, urogenital schistosomiasis needs to be given consideration in differential diagnosis of patients with renal colic, cystitis, haematuria and urinary tract stricture/obstruction. Travel history is also pertinent to diagnosis. The burden of schistosomiasis in the developing world is remarkably high, with 243 million people requiring treatment in 2011. With the increase of migrant populations to Australia, the burden of disease and its implications need to be acknowledged in the developed world.

Keywords: *Schistosoma haematobium*; Pathology; Pathogenesis; Epidemiology; Parasitology; Urogenital schistosomiasis; Schistosomiasis; Urinary bladder neoplasms

Case Study

A 20-year-old African migrant presents to the Emergency Department with a 24-hour history of left flank pain and dysuria. The patient denied any history of trauma, sexual activity or family history of significant illness and is otherwise fit and healthy. He recently migrated to Australia from the Democratic Republic of the Congo in 2009 as a refugee. Urinalysis revealed erythrocytes and leucocytes. Renal tract imaging in the form of a CT KUB revealed extensive calcification of his distal left ureter suggestive of renal tract calculi (Figures 1 and 2).

The patient underwent cystoscopy, left retrograde pyleogram and ureteroscopy revealing a heavily calcified ureteric wall with biopsies revealing oval, heavily calcified, well circumscribed structures characteristic of calcified schistosoma eggs under the glandular mucosa. On further investigation, the patient had a urine specimen sent externally in 2007 for investigation of macroscopic haematuria, which indicated the presence of *Schistosoma haematobium* of moderate severity. The patient was subsequently lost for follow up. They are now under the management of an infectious disease unit, receiving active treatment with praziquantel and are currently well.

Background

The presentation of urogenital schistosomiasis is relatively uncommon in the developed world with prevalence mainly in tropical and subtropical areas, with exposure to or working in agriculture deemed as the highest risk [1]. Given the recent surge in migrant populations in Australia [2] schistosomiasis as a differential diagnosis warrants consideration. Since the year 2000, we have had seven case reports of urogenital schistosomiasis at our tertiary centre. Out of the seven patients, five had recently migrated from Africa; one patient had recently traveled to Africa and one patient having recently migrated from the Middle East. This number is slightly higher in comparison to four presentations in six years at two different Australian infectious disease units at two different hospitals in Melbourne [3].

Discussion

Key facts

Schistosomiasis is a chronic, parasitic disease caused by blood flukes (trematode worms) of the genus *Schistosoma* [4]. There are two major forms of schistosomiasis; intestinal and urogenital, with urogenital schistosomiasis caused by the blood fluke *Schistosoma haematobium*, with its highest prevalence in Africa and the Middle East [1].

Epidemiology

Schistosomiasis is prevalent in tropical and sub- tropical areas. It is especially common in poor communities without access to safe

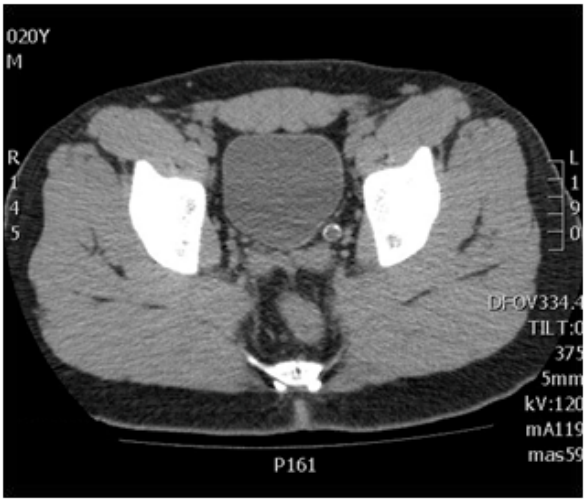

Figure 1: CT KUB- transverse section revealing circumscribed calcified lesion of distal left ureter.

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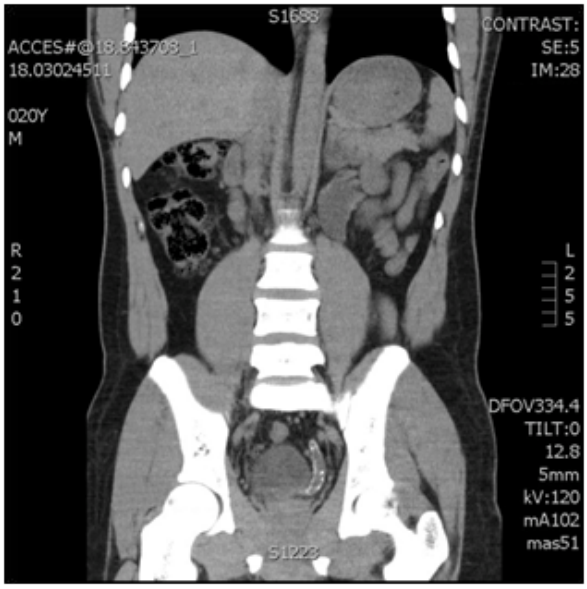

Figure 2: Coronal section revealing well circumscribed calcification throughout the distal left ureter.

drinking water and adequate sanitation; hence people at highest risk are those involved with agricultural, domestic and recreational activities, which expose them to infested water [3]. Currently, at least 90% of people requiring treatment for Schistosomiasis live in Africa. *S.haematobium*, the primary cause for urogenital schistosomiasis has the highest prevalence in Africa and the Middle East [1]. WHO statistics indicate that 243 million people required treatment for schistosomiasis in 2011 [1,5]. In areas of overall higher levels of infection, urogenital schistosomiasis is known to peak in the 6-20 age groups with areas of lower levels of infection more prevalent in older age groups. This observation is attributed to the development of acquired immunity [6].

Transmission and pathogenesis

Freshwater snails release the parasite (larval forms) into the water, which is then penetrates the skin during contact with infested water. The female parasite *S. haematobium* then infiltrates pelvic veins and releases terminal spine eggs, which then penetrate the tissues of the pelvic organs, where they are eventually excreted through the urine [7]. Some of these eggs fail to exit the bladder thus embolize within the capillary necks of the pelvic end organs and tissues [7]. They induce granulomas and small fibrotic nodules known as 'sandy patches' [8]. This then causes bladder and urethral inflammation associated with haematuria in greater than 50% of cases and associated deformities of the collecting system, primarily ureteric stricture and obstructions, cystitis, hydronephrosis and ultimately renal failure if left untreated.

The inflammatory cascade caused by *S. haematobium* also activates oncogenes, inactivates tumour suppressor gens and alternates in apoptotic gene products, hence predisposing patients to carcinoma of the bladder [8]. *S. haematobium* also predisposes women (more than men) to HIV infection through immunomodulation mechanisms [9].

Clinical signs and symptoms

Signs and symptoms of schistosomiasis exhibited are as a result of the body's reaction to the parasites' eggs, as opposed to the worms themselves [7]. With urogenital schistosomiasis, the most common presentations are dysuria, frequency and haematuria [10]. Fibrosis, cystitis and strictures associated with the bladder and ureter, as well as hydronephrosis and renal failure are sequelae of advanced disease. Carcinoma of the bladder is also a late complication [9,11]. Women may present with genital lesions, vaginal bleeding, dyspareunia, and nodules of the vulva [5]. Genital lesions may cause epididymitis, salpingitis, endometritis and cervicitis, which may induce sterility [1,10]. The largest burden and commonest presentation in children is chronic anaemia, due to blood loss from haematuria and production of hemolytic factors by schistosoma [8].

Investigations

Diagnosis is based on the presence of *S. haematobium* eggs in the urine. Urine collection should be between 11 am and 2 pm (peak output) with an egg count as an indicator to severity of disease (<100 eggs- light infection, 100 - 400 – moderate infection, >400 severe infection). Congo red stain is often used in conjunction to assess for viability of eggs [10].

Economic and health burden

The burden of disease associated with *S. haematobium* (accounting for up to 2/3 of all diagnosed schistosomiasis) is considerable with up to two- thirds of schistosomiasis accounting for *S. haematobium* [6]. Anaemia in children results in stunting of growth and reduced ability to learn although these effects are reversible with treatment [9]. Chronic disease results in long-term inability for people to work and in some instances results in death associated with chronic diseases related to anaemia. In sub- Saharan Africa alone, there are around 200,000 deaths per year due to schistosomiasis[1,5].

Treatment and prevention control

Praziquantel is the gold standard in treatment against all forms of schistosomiasis. Metrifonate is also an alternative source however is not available in all countries [10]. Praziquantel works by disturbing the ionic exchange through the worms membrane resulting in tetanic paralysis and reduced glucose absorption [10]. Praziquantel is effective, safe and low- cost. Despite the risk of re- infection post treatment, the risk of developing severe disease is diminished and even reversed when treatment is initiated and repeated in childhood [1].

The control of schistosomiasis relies on large- scale treatment of at-risk population groups, with access to safe water improved sanitation, hygiene education and snail control at high priority. At risk populations according to the World Health Organizations' targeted for treatments include school- aged children in endemic areas; adults considered to be at risk in endemic areas, people with occupations involving contact with infested water such as fishermen, farmers, irrigation workers, and women, whose domestic tasks bring them into contact with infested water. Entire communities living in highly endemic areas have also been targeted [1].

Success in treatment and prevention control relies on access to praziquantel, with evidence suggesting that only 10% of people requiring treatment were reached in 2011. Monitoring is essential and the key tool in determining the impact of control interventions [5].

The World Health Organization's response to schistosomiasis involves coordinating the strategy of preventive chemotherapy in consultation with collaborating centers, academic and research institutions, international development agencies and other United Nations organizations. Working with partners, WHO has advocated for increased access to praziquantel and resources for implementation [1]. A substantial amount of praziquantel, to treat more than 100

million children of school age per year has been pledged by the private sector and development partners [1,5].

Conclusion

The economic and health burden of schistosomiasis in the developing world is substantial. Given the current fluctuations in migration populations to the developed world, it is essential that diseases endemic to a patient's country of origin or exposure be seriously considered in the differential diagnosis of their clinical presentation. As already highlighted, the implications of advanced disease and misdiagnosis pose a severe burden of disease on the patient. This also stipulates a burden on the economic and health care system as well. Great care and ongoing support into the treatment and prevention controls of such endemic diseases must be a consideration of the developed world, in lieu of the dynamics in population growth and development.

Conflict of Interest

Authors declared that there is no conflict of interest.

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