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Citation

Abstract
Background and Objective: Schistosomiasis is one of the most prevalent parasitic infections in the world, and continues to be a global public health concern in the developing world. The main objective of the article is to study the various clinicopathological features of Chronic schistosomiasis in different anatomical sites; also emphasizing on the need to suspect this parasitic disease even in non-endemic or low-endemicity areas.

Material and methods: Ours was a prospective study, conducted at King Faisal Hospital (Taif, Kingdom of Saudi Arabia) from year 2001 to 2005. The study included 32 cases of schistosomiasis involving various organs.

Results:32 cases of schistosomiasis affecting various organs were reported. Appendix was the most common organ involved with 16 cases, while ureteric involvement was seen only in 1 case. Urinary bladder involvement was seen in 5 cases while 4 cases affected intestinal tract. Liver, gall bladder and prostate involvement was seen in 2 cases each. All cases were completely cured on treatment with Praziquantel except 2 cases of urinary bladder which developed squamous cell carcinoma.

Conclusion: Early diagnosis and treatment of the infection results in complete cure without any complication, and therefore high level of suspicion is required in persons visiting or residing in highly endemic areas.

INTRODUCTION
Schistosomiasis remains one of the most prevalent parasitic infections in the world. It is endemic in 76 countries and territories, and continues to be a global public health concern in the developing world. Because it is a chronic insidious disease, it is poorly recognized at early stages, and becomes a threat to development by disabling men and women during their most productive years. It is particularly linked to agricultural and water development schemes and is typically a disease of the poor who live in conditions that favour transmission and have no access to proper care or effective prevention measures. Although the distribution of schistosomiasis has changed over the past 50 years and there have been successful control programmes, the number of people estimated to be infected or at risk of infection remains unchanged.

Despite major advances in control and substantial decrease in morbidity and mortality, schistosomiasis continues to spread to new geographic areas. Environmental changes that result from the development of water resources and the growth and migration of population can facilitate the spread of schistosomiasis. According to WHO, 200 million people are infected world wide, leading to loss of 1.53 million disability adjusted life years. Depending on the parasitic species liver, colon, urinary bladder and ureter are the main organs affected, however any organ can be affected even like lungs, skin, kidney and central nervous system.

An expatriate doctor going to work in non-endemic or low-endemicity areas should be aware of the disease and should always be on a look out for an encounter with schistosomal eggs in stool, or in the tissue sections of appendix, urinary bladder, ureter, rectal biopsy etc., because a timely administration of praziquantel can considerably reduce the morbidity associated with the disease.

MATERIAL AND METHODS
We present a review of 32 cases of Chronic schistosomiasis presenting over a span of 4 years (2001 to 2005) at King Faisal Hospital, Taif, Kingdom of Saudi Arabia. Schistosomiasis was not the suspected initial clinical diagnosis in these cases. These were collected prospectively from the department of surgical pathology. Detailed clinical histories, examination, routine as well as all relevant investigations were obtained later from all the concerned departments.
RESULTS

There were 32 cases of Schistosomiasis of various anatomical organs. The clinical presentations of the cases are given in Table 1.

**Figure 1**

Table 1: Clinical profile of the patients

<table>
<thead>
<tr>
<th>Site</th>
<th>No. of cases</th>
<th>Mean age (yr)</th>
<th>Sex</th>
<th>Preserning complaints</th>
<th>Sequelae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix</td>
<td>16</td>
<td>25</td>
<td>11</td>
<td>5 Right iliac fossa pain, features suggestive of acute appendicitis</td>
<td>Cured</td>
</tr>
<tr>
<td>OIF</td>
<td>04</td>
<td>55</td>
<td>3</td>
<td>1 Pain, diarrhoea</td>
<td>Cured</td>
</tr>
<tr>
<td>Liver</td>
<td>02</td>
<td>22</td>
<td>2</td>
<td>- Hepatomegaly, Portal hypertension</td>
<td>Cured</td>
</tr>
<tr>
<td>Gall bladder</td>
<td>02</td>
<td>36</td>
<td>2</td>
<td>Pain</td>
<td>Cured</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>05</td>
<td>40</td>
<td>5</td>
<td>- Dysuria, abdominal pain, hematuria</td>
<td>2 patients developed squamous cell carcinoma</td>
</tr>
<tr>
<td>Ureter</td>
<td>03</td>
<td>19</td>
<td>1</td>
<td>- Haemorrhages, fever</td>
<td>Cured</td>
</tr>
<tr>
<td>Prostate</td>
<td>02</td>
<td>55</td>
<td>2</td>
<td>- Increased urinary frequency, retention of urine</td>
<td>Cured</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>32</strong></td>
<td><strong>24</strong></td>
<td><strong>8</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sixteen patients had appendiceal involvement. These patients presented with symptoms of acute appendicitis. Microscopic sections from appendix showed numerous calcified eggs in the wall of appendix, with infiltration of eosinophils and polymorphonuclear leucocytes (Fig.1).

**Figure 2**

Figure 1: Appendix: numerous calcified eggs of schistosoma seen (H & E x 125).

There were 2 cases of gall bladder involvement in a 32 and 40 years female. The patients had symptoms of acute cholecystitis along with cholelithiasis. Numerous calcified eggs were seen in the wall. One patient had associated mucous secreting adenocarcinoma of the gall bladder (Fig.3a). Many calcified eggs were seen within the mucin pools (Fig.3b).

Hepatic schistosomiasis was found in two cases. The patients presented with hepatosplenomegaly and portal hypertension. Ultrasound examination showed hepatomegaly and portal fibrosis. Microscopic examination revealed round or oval eggs embedded in the parenchyma of liver along with periportal fibrosis. In 2 cases the eggs were surrounded by epithelioid cells and showed foreign body giant cell reaction.

Four patients (3 males and 1 female) presented with colicky hypogastric pain / pain in left iliac fossa and diarrhoea. Occult blood in faeces was present in one case, but stool examination was negative for schistosoma eggs. Additional supportive evidence like anaemia and eosinophilia were also observed. Microscopic examination showed numerous eggs in the submucosal, muscle and serosal layers of the intestine (Fig.2).
Five patients had involvement of urinary bladder and presented with symptoms like dysuria and abdominal pain. Urine specimen from these patients showed microhematuria, pyuria and eggs of Schistosoma haematobium. Histopathology showed multiple eggs seen in submucosa and muscle layers (Fig. 4). In 2 patients silent foci of squamous cell carcinoma were also present.

There was one patient with ureteric schistosomiasis. He was a 19 years Saudi male with history of visit to Egypt after which he complained of fever and repeated bouts of hematuria. Ultrasound demonstrated hydronephrosis and ureteral obstruction. Ureteric biopsy showed numerous deposits of schistosomal eggs almost obliterating the entire wall (Fig. 5).

Both the patients with prostatic schistosomiases complained of increased frequency and retention of urine. Numerous eggs were seen in the stroma (Fig. 6a & Fig. 6b).
All the above patients except 2 with squamous cell carcinoma of urinary bladder were treated successfully with praziquantel, and no sign of recurrence or any sequelae of the disease were observed in subsequent check ups.

**DISCUSSION**

Schistosomiasis occurs widely throughout the tropics and subtropics, affecting some 200 million persons, and is most prevalent in sub-Saharan Africa. In highly disease-endemic areas, prevalence rates can exceed 50% among the local population, and high rates have been reported among expatriates living in such areas and even among short-term travelers to these areas.

The transmission cycle requires contamination of surface water by excreta, specific fresh water snails as intermediate host and human water contact. Of the 16 species of schistosomes known to infest man or animals, the 5 principal ones that infect man fall into three groups that are characterized by the type of egg produced: (a) eggs with a lateral spine, e.g., *S. mansoni*; (b) eggs with a terminal spine, e.g., *S. haematobium* and *S. intercalatum*; and (c) eggs that are round and minutely spined, e.g., *S. japonicum* and *S. mekongi*. Urinary form is caused by *S. haematobium*, and intestinal form by *S. mansoni*, *S. japonicum* or *S. mekongi*. *S. intercalatum* causes a form of rectal schistosomiasis.

Schistosomiasis results from the host’s immune response to schistome eggs and the granulomatous reaction evoked by the antigens they secrete. Clinical manifestations of acute infection can occur within 2-12 weeks of exposure to cercariae-infested water, but most acute infections are asymptomatic, and many persons with chronic infections recall no symptoms of acute infection. The most common acute syndrome is Katayama fever, with fever, loss of appetite, weight loss, abdominal pain, hematuria, weakness, headaches, joint and muscle pain, diarrhea, nausea and cough. Chronic schistosomiasis mainly affects individuals with long standing infection in poor rural areas, and can cause disease in the liver, intestinal tract, bladder (including bladder cancer), kidneys, or lung.

When schistosomiasis is endemic, 1-2% of appendectomy specimens contains schistosomes. In our cases schistosomal infection in appendix was not active, and the acute appendicitis was due to some bacterial agents. Probably appendicular location of the eggs occurred accidentally in the endemic zone of the country or a visit to that country. Granulomatous appendicitis occurs during egg laying. Alternatively an obstructing appendicitis occurs due to fibrosis around dead eggs. The eggs then appear calcified in the wall. It is therefore now important that the surgeon and the pathologist be aware of this pathology which has so far been considered unusual.

Intestinal schistosomiasis is caused mainly by *Schistosoma mansoni*. The distal part of the colon is more frequently and severely affected. In most cases no gross changes are seen. Microscopically the lesions are composed of granulation tissue within which innumerable ova of *S. mansoni* and numerous chronic inflammatory cells including eosinophils are encountered. Eggs retained in the gut wall can induce inflammation, hyperplasia, ulceration, micro-abscess and polyposis formation. *Schistosomal polyps are mainly found*
in rectum and sigmoid colon, and manifest usually as protein losing enteropathy. Fibre endoscopic electrosurgical polypectomy is now a standard technique for the treatment of polyps. Inflammatory masses in the colon may mimic cancer; however the relation has been debated.

None of our patients presented with polyposis. All our cases were operated for symptoms related to other disorders. Rectal biopsy for suspicion of Schistosoma was not performed in any of our case.

Hepatic schistosomiasis occurs predominantly in adolescents who are heavily and repeatedly infected during childhood and is said to be one of the most prevalent cause of portal hypertension in man. Eggs of S. mansoni and S. japonicum embolize to the liver where the granulomatous inflammatory response induces perisinusoidal inflammation and periportal fibrosis known as clay pipe stem fibrosis causing hepatomegaly. In advanced cases there is complete disorganization of hepatic architecture with fibrous enlargement of portal tracts, blood vessels congestion, thrombosis and inflammation but no cirrhosis. This periportal fibrosis which can be visualized on USG, CT or MRI is characteristic of schistosomiasis. Periportal collagen deposits can lead to obstruction in blood flow, portal hypertension and ultimately varices, variceal bleeding, splenomegaly and hypersplenism. Coinfection with either hepatitis B virus (HBV) or hepatitis C virus is associated with accelerated deterioration of hepatic function and increase risk of hepatocellular carcinoma. None of our cases had coexistent viral hepatitis.

Schistosomal cholecystitis is a rare entity with few cases described in medical literature. It is unclear whether the eggs trigger acute cholecystitis, since most of the cases have concomitant gallstones, similar to our case. Histopathology reveals extensive fibrocalcific reaction of the walls and ducts resulting in stricture formation of bile causing cholelithiasis. In one of our case with gall bladder adenocarcinoma, schistosomiasis was probably an incidental finding since there is no evidence till date regarding their association.

Urinary tract disease is a specific trait of infection with S. haematobium. This resides in the pelvic veins and produces mass lesions in the bladder and ureters leading to hydroureter and hydrenephrosis. Dysuria, proteinuria and haematuria are the most common clinical presentation. Late manifestations include calcification in the bladder, obstruction of the ureter, renal colic, hydrenephrosis and renal failure. Secondary bacterial infections are common.

Cystoscopy reveals sandy patches (areas of roughened bladder mucosa surrounding egg deposits) which are pathognomonic of bladder schistosomiasis. The association between S. haematobium and squamous cell carcinoma is well documented, as found in 2 of our cases. In Egypt, squamous cell carcinoma accounts for 18 to 28% of all cancers, with an incidence of 10.8 per 100,000 populations. Male smokers appear to be at particular risk.

Schistosomiasis in prostate is extremely rare and presents as increased frequency of urine. Only few cases have been reported in literature.

Schistosomiasis infection during childhood causes substantial growth retardation and anaemia and also causes structural abnormalities of the urinary tract.

The detection of Schistosome eggs in faeces or urine is diagnostic of schistosomiasis. The use of formalin based techniques for sedimentation and concentration may increase the diagnostic yield. Antibody detection is useful in few circumstances but its use is limited because antibodies persist even after parasitologic cure. A recently developed immunoblot assay for the detection of adult worm antigen reportedly has 95% sensitivity and 100% specificity.

Praziquantel 40 mg /kg bodyweight in a single dose is the treatment of choice. This results in 90% cure rate and considerable reversibility of pathological abnormalities due to schistosome infection.

To conclude, one can say that the prevalence of schistosomiasis is changing rapidly; water resource development projects and population movements have led to introduction of schistosomiasis into regions and countries that have not been endemic for the disease. Thus, a high index of suspicion and increased awareness can prompt the clinician and the pathologist to look for the eggs of Schistosoma in surgically resected specimens in persons visiting high endemic areas, enabling early diagnosis and treatment of infection with easily available chemotherapeutic agents.

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