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Severe chronic iron deficiency anaemia secondary to Trichuris dysentery syndrome – A case report

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Abstract. Trichuris dysentery syndrome is caused by *Trichuris trichiura* which contributes to one of the most common helminthic infections in the world. It is associated with heavy colonic infection that manifests as mucoid diarrhoea, rectal bleeding, rectal prolapse, iron deficiency anaemia, and finger clubbing. Here, we report a case of trichuris dysentery syndrome complicated with severe chronic iron deficiency anaemia in a 4-year-old girl who required blood transfusion. The nematode was visualized on stool microscopic and colonoscopic examination. A longer duration of anti-helminthic treatment is required to achieve effective and better outcome.

INTRODUCTION

Trichuris trichiura is a soil-transmitted helminth which is found to be prevalent in the warm, moist, tropical and subtropical countries with poor sanitation. It is also common in areas where protein energy malnutrition and anaemia are prevalent as well as in areas where access to medical care and educational opportunities are often limited. The prevalence of *T. trichiura* is found to be high especially in children reaching up to 95% (Stephenson *et al.*, 2000).

The largest number of cases was found to be prevalent among school-age children (5-14 years) in Sub Saharan Africa, India, China, the rest of Asia and nearby islands, Latin America and Caribbean and Middle Eastern Crescent. A study done by Al-Mekhlafi *et al.* (2006), revealed that about 98.2% of orang asli communities in Selangor, Malaysia aged between 2 to 15 years have trichuriasis. In addition, several studies in Malaysia has demonstrated that trichuriasis are also prevalent in traditional villages ranging from 13% up to 99% and other areas such as estates (36-93%) and squatters (44-62%) (Norhayati *et al.*, 2003).

Trichuris dysentery syndrome has been diagnosed in 6 children who were admitted initially with diarrhoea to Hospital Universiti Sains Malaysia, Kelantan. The diagnosis was confirmed by the presence of chronic diarrhoea, short stature, anaemia and *T. trichiura* by colonoscopy. As *T. trichiura* is prevalent in Kelantan, there is possibility of underdiagnosed cases in this area as the diagnosed cases need to have parental consent for colonoscopy which is not frequently obtained (Noorizan & Raj, 2001).

Human acquires infection with *T. trichiura* when embryonated eggs are ingested via contaminated food or water. The first-stage larvae hatch and mature in the distal small bowel. The larvae migrate to the caecum, where they finally mature into adult worms in about 2 to 3 months. The slender anterior end of the adult worm penetrates the mucosa and from there the burrowing activity takes place and lies embedded in the caecal

wall while the posterior end protrudes into the lumen of the large intestine (Stephenson *et al.*, 2000). Eggs appear in faeces about 3 months after infection and undergo development in soil.

T. trichiura infections are mostly asymptomatic. However, most people in endemic areas are colonized by a small number of worms (usually less than 15), and the parasite is regarded as a commensal organism rather than a pathogen (Bundy *et al.*, 1987). In light infection, their existence is harmless to the host. However, when it progresses to heavy infection, a specific disease known as Trichuris dysentery syndrome (TDS) develops (Cooper *et al.*, 1992) which commonly affects children between 2 and 10 years of age (Ramsey, 1988). This syndrome is characterized by mucoid diarrhoea, rectal bleeding, rectal prolapse, iron deficiency anaemia, and finger clubbing (Cooper & Bundy, 1988). Thus, this shows that although most of the affected people are asymptomatic, it may complicate the host particularly children with severe infection. The purpose of this case report is to highlight the severe chronic anaemia as one of the complications that had developed as a result of long term *T. trichiura* infection in a child.

Case report

A 4-year-old Malay girl presented with a history of prolonged fever for 1 month duration associated with mild shortness of breath and lethargy for 1 week prior to admission. According to her mother, she had intermittent fever and loose bloody stools about 2 to 3 times per day since the age of 2 years. However, her condition worsened whereby she looked pale and less active for the past 1 month prior to admission and refused to eat since 1 week before admission.

There were multiple histories of admissions to different hospitals due to anaemia at the age of 1 year. The cause of anaemia was most probably due to worm infection; however, the degree of anaemia was mild, not requiring blood transfusion. She was given anti-helminthic during that presentation. Unfortunately, the treatment schedule was interrupted when she defaulted follow-up. There was history of pica (eating sand) and prolapse of rectum during defecation since the age of 2.

She has 3 siblings. Other siblings were healthy with no similar complaint. She is staying in Bachok, Kelantan which is probably an area with poor sanitation. She came from a low socio-economic background. Her mother is a housewife while her father works as a vegetable seller.

There was no history of bleeding tendencies, easy bruising or cyanosis. No history of similar illness among other family members.

Other systemic review was unremarkable.

Clinically, she was pale, febrile (37.8°C) and fretful. There was no finger clubbing or other sign of iron deficiency anaemia such as koilonychia and angular stomatitis. The weight and height were 13 kg and 94 cm respectively (below 3rd centile). There was generalized crepitation heard over both lungs. The heart sounds were normal and no murmur was noted. She had hepatomegaly with liver palpable about 5 cm below the subcostal margin. Multiple shotty lymph nodes were palpable over inguinal, axillary, cervical and occipital regions. There was no rectal bleeding or prolapse during examination.

Chest x-ray revealed cardiomegaly and bilateral pneumonic changes. However, on echocardiogram examination, no structural abnormality of the heart was noted.

Laboratory findings

Full blood count examination showed leucocytosis (total white cells of 30.32 X 10^9/L), anaemia (haemoglobin of 6.8 g/dL) and thrombocytosis (platelet count of 415 X 10^9/L). Other blood count indices were low (red blood cell count and haematocrit levels were 2.49 x 10^9/L and 18.8% respectively).

Full blood picture revealed evidence of microcytic hypochromic anaemia, eosinophilia (4.5%), leucoerythroblastic and dysplastic changes.

Liver function test, blood urea serum electrolytes, coagulation profile, stool and blood for cultures and blood film for malarial parasite were unremarkable. Mycoplasma,

Epstein Barr virus and cytomegalovirus serological tests were unremarkable. Autoimmune screening for Coomb's test, anti dsDNA and anti-nuclear antibody (ANA) gave negative results. Stool microscopic examination showed *T. trichiura* ova with no other ova or parasite seen. Egg count was not done as it was not part of the routine stool microscopic procedure in this setting. Stool for occult blood was negative.

Serum iron and ferritin were low (32.12 ug/L and 12.40ug/L respectively).

She was initially treated as bronchopneumonia and iron deficiency and was started with syrup augmentin 300 mg three times daily.

She was treated empirically with syrup albendazole 400 mg once daily for 3 days as the history was suggestive of worm infection and this was further supported by positive stool microscopic examination. Syrup multivitamin 2.5 mls once daily and syrup folate 2.5 mls once daily were given. She was given blood transfusion with 10ml/kg packed cells.

The patient had shown marked clinical improvement following these treatments and was discharged on day 11 of admission with the diagnosis of Trichuris dysentery syndrome.

On follow-up, colonoscopy was done to exclude other possible causes of anaemia which revealed numerous *T. trichiura* adult worms along the rectum and sigmoid colon. Syrup albendazole 400 mg once daily for 3 days was repeated to ensure adequate eradication of the worms. However, this patient had defaulted the subsequent follow-up. Thus, we are unable to monitor the disease progress.

DISCUSSION

TDS has been associated with massive *T. trichiura* infection mainly among children. In light infection, most of the patients are asymptomatic and the parasite usually harmless to the hosts. As it progresses to massive infection, it can cause complications with colonic hyperaemia, oedematous mucosa and multiple erosions as a result of inflammatory changes (Kim *et al.*, 2003).

Furthermore in patients with greater worm burden, they may present with anaemia, diarrhoea, abdominal pain, weight loss, malnutrition, appendicitis, colonic obstruction, perforation or intestinal bleeding. Specifically in heavily infected children, they usually manifest as anaemia, chronic diarrhoea, stunting and finger clubbing (Stephenson *et al.*, 2000).

Disease occurs either due to mechanical effects or allergic reaction. The diarrhoeal episodes are preceeded by immunological response which is mediated by specific IgE antibody and mast cell degranulation. Other hypothesis suggested that it is induced by antigen-induced secretion of chloride (Mahmoud, 2000).

Non-specific immunity in terms of macrophage numbers in the mucosa as well as the production of macrophage-derived cytokine, tumour necrosis factor α (TNFα) are important factors (MacDonald *et al.*, 1991). This process is induced by bacterial products such as lipopolysaccharrides and peptidoglycans, leaking across the damaged colonic epithelium in TDS could activate hepatic macrophages to produce TNFα which lead to increase permeability and also increase local TNFα production (Breese *et al.*, 1994).

Both mast cells and macrophages are capable of producing a wide array of pro-inflammatory cytokines which could have profound effects in the colon. Macrophages are usually the major source of TNFα in inflamed intestine, especially those macrophages which have recently been extravasated from the blood (Gordon *et al.*, 1990; Galli *et al.*, 1991). TNF also has been described to be associated with stunting in children (Cooper *et al.*, 1990). Other cytokines such as IL-1 and 6, granulocyte-macrophage colony-stimulating factor, transforming growth factor l3, prostaglandins and leukotrienes have been documented in inflamed human intestine (Schreiber *et al.*, 1992).

Trichuris infection can cause blood loss due to oozing of blood at the sites of

attachment where it is responsible for a daily blood loss of 0.005ml per worm per day which only accounts for about 10-15% from the blood loss due to *N. americanus* and 2-3% of that attributed to *A. duodenale*. In infected children it may finally lead to anaemia. This is particularly seen in cases where the children also have co-infection with hookworm, malaria and/or a low intake of dietary iron. (Roche *et al.*, 1957).

Furthermore, *Trichuris* infection can suppress the appetite, growth, physical fitness, physical activity, work capacity, cognitive development and school performance in malnourished populations.

In chronic *Trichuris* infections, children may suffer from chronic colitis. This form of chronic intestinal inflammation may lead to growth failure or profound growth stunting which can either occur by secondary effects or direct effects on metabolism. The secondary effect can be attributed to some mechanisms such as concomitant decrease in plasma insulin like growth factor-1 (IGF-1), increase in tumor necrosis factor- α (TNF-α) in the lamina propria of the colonic mucosa and peripheral blood (likely to decrease appetite and intake of all nutrients) and a decrease in collagen synthesis on nutrient balance (Cooper, 1990).

In growth stunting, this condition can be reversed by repeated treatment for the infection and oral iron supplement. However, this statement was commented by some researchers from Jamaica that the significant developmental and cognitive deficits are unlikely to disappear without increasing the positive psychological stimulation in the child's environment (Stephenson *et al.*, 2000).

Mebendazole and albendazole, both of which are on the WHO Essential Drugs List, are very effective against *T. trichiura* (Stephenson *et al.*, 2000). Multiple doses are needed to attain complete parasitological cure in all cases. Mebendazole has been proven as the treatment of choice in trichiuriasis. This drug is associated with 40-75% cure rates by single dosing of 500 mg. Standard dose regime of mebendazole of 100 mg twice daily for 3 days provides about 70% successful rate. Second course of mebendazole is indicated if patient is not cured within 3 to 4 weeks (Bartoloni *et al.*, 1993).

Mebendazole acts by selectively and irreversibly blocking glucose uptake and other nutrients. This will result in worm death. Other alternative treatment is albendazole. The main drawback is that the efficacy or successful rate for trichuriasis is slightly lower than for mebendazole (Bartoloni *et al.*, 1993). However, the ability to be given as a single dose regime makes the albendazole provides better adherence or compliance as compared to mebendazole. By extending the duration of the treatment up to 3 days may be helpful in achieving cure rates up to 80% (Ramalingam *et al.*, 1983, Norhayati *et al.*, 1997; Hall & Nahar,1994). In some reported cases, patients might need a longer duration of treatment about 5 to 7 days to improve (Sirivichayakul *et al.*, 2003).

However, as in this girl, the adult worms were not cleared by albendazole treatment that was given for 3 days duration. Repeated treatment was given on the next follow-up in view of the presence of adult worms during colonoscopic examination. The outcome of the treatment could not be determined as the patient defaulted follow-up. In this case, home visit by the community nurse would be of a great help to assist the continuity of our treatment.

The role of combination therapy has been studied by previous researcher. The use of albendazole in combination with ivermectin resulted in greater significant outcome in weight gains among infected children as compared to monotherapy with placebo, albendazole or ivermectin over 4 months therapy (Stephenson *et al.*, 2000).

Control measures should be emphasized especially in endemic areas which focused particularly on personal hygiene, avoidance of pica, proper sanitation and faecal disposal and avoidance of night soil as fertilizer. Other siblings should be screened too in preventing and reducing transmission (Mohammad *et al.*, 2009).

Pertaining to this case, other family members especially other siblings should be screened for *T. trichiura* infection. If other family members are found to be positive for the parasite, they need to be treated. The

patient was suggested to be followed-up regularly to ensure clearance of the worms and to monitor the long term complications that she may have developed.

In conclusion, close monitoring and follow-up of patients with TDS are crucial as the syndrome can result in long term complications and increased morbidity in patients especially children.

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