Clubbing and whipworm infestation

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SUMMARY The association of clubbing, growth retardation, pallor, abdominal distension, and prolonged bloody diarrhoea with whipworm (*Trichuris trichiura*) infestation is described and discussed. Failure to recognise this association leads to misdiagnosis and unnecessary investigation.

Clubbing of the fingers has been described in association with several disorders of the gastro-intestinal tract. The best known of these are Crohn's disease (Chrispin and Tempny, 1967; Fielding and Cooke, 1971; Perry *et al.*, 1972), ulcerative colitis (Jalan *et al.*, 1970; Perry *et al.*, 1972), and coeliac disease (Hamilton *et al.*, 1969). More recently clubbing has also been reported in gastro-oesophageal reflux with protein-losing enteropathy (Herbst *et al.*, 1976) and in intestinal parasitic infections (Kamath, 1973; Lee *et al.*, 1976).

We have for some time noted the association of intestinal parasitic infestation and clubbing. Several other signs and symptoms are present, so that a 'syndrome' can be described. Its recognition is of some importance as the clubbing often precipitates extensive and unnecessary investigation of the child.

Patients and methods

Ten children were studied. Their ages ranged from 2.5 to 10 years. 5 were male and 5 female. All were coloured (mixed racial origin) and came from poor socioeconomic backgrounds. After initial clinical assessment including growth and nutritional status, the following investigations were performed: chest x-ray, Mantoux skin tests, full blood counts, and serum proteins (total and albumin). Several stool samples from each child were examined microscopically for helminth eggs and the cysts and trophozoites of protozoa. Each stool specimen was also cultured for bacterial pathogens. Intestinal absorption studies (xylose absorption and 5-day stool fat estimation) were done on 5 of the patients.

On completion of the investigations the children were given oral iron, mebendazole 100 mg twice daily for 3 days, and metronidazole 100 mg 8 hourly for 7 days as indicated by the haematological and stool findings.

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Results

The constant clinical findings in all patients are summarised in Table 1. Clinical and laboratory findings of individual children are summarised in Table 2. Digital clubbing was a marked physical finding in all patients. Growth retardation was severe and all were below the 3rd centile of the Boston standards (Stuart and Stevenson, 1959) for weight and height, but there were no gross stigmata of acute malnutrition (Waterlow, 1972). The mean albumin level was 35.7 g/l, which is above the lower limits of normal accepted in our laboratory (35.0 g/l). 5 of the 10 had mild hypoalbuminaemia on this criteria but all were above 30.0 g/l. All had a hypochromic anaemia, mean haemoglobin 6.8 g/dl, range 4-10 g/dl. Eosinophilia was present in 8 of the 10 children, ranging from 4 to 47% of nucleated cells. Persistent gaseous abdominal distension and chronic bloody diarrhoea were present in all cases. A normal chest x-ray and negative Mantoux skin test were found in every child.

All had multiple infestations of parasites (Table 2), *Trichuris trichiura* being found in all cases. Egg counts and sigmoidoscopy were not performed but abundant *Trichuris* eggs were present in all pre-treatment specimens and the infestation was considered moderately severe. 2 had pathogenic bacteria present (*Shigella* and *Salmonella*) initially and repeat examinations after treatment were negative.

Table 2 summarises the results of absorption studies performed on 5 of the 10 children. 2 children had steatorrhoea (Cases 1, 5) and 1 a low urinary

Table 1 *Clinical features of all patients*

Digital clubbing
Growth retardation
Pallor
Abdominal distension
Chronic diarrhoea

Table 2 *Clinical details and investigations*

Case no.	Age (years)	Sex	Weight (kg)	Height (cm)	Hb (g/dl)	Eosinophilia (%)	Serum proteins, total/albumin (g/l)	Stools: parasites and bacterial pathogens	Malabsorption studies	
									Stool fat (g/24 h)	5-h urine xylose (% recovery)
1	2.5	F	9.9	84	7.2	4	69/30	Tt; Gl	5.9	20
2	4.5	F	13.2	88	6.6	15	82/37	Tt; Al	—	—
3	5.5	M	13.5	99	4.3	20	80/38	Tt; Gl; Eh	—	—
4	10	M	15.0	108	9.1	22	60/34	Tt; Gl	—	—
5	5.0	M	10.0	85	5.0	7	79/39	Tt; Al; Gl; Eh	5.4	16.5
6	4.5	M	9.0	84	4.5	12	72/33	Tt; <i>Salmonella</i>	1.7	27
7	5.5	F	14.5	—	4.0	47	81/39	Tt; Al	—	—
8	4.0	F	11.8	86	8.7	—	69/32	Tt; Al; Gl	4.25	30
9	8.0	M	14.8	100	10.0	—	57/30	Tt; Al; <i>Shigella</i>	2.4	26
10	8.0	F	19.0	115	8.6	35	74/38	Tt; Al	—	—

Tt = *Trichuris trichiura*; Al = *Ascaris lumbricoides*; Gl = *Giardia lamblia*; Eh = *Entamoeba histolytica*.

xylose recovery (Case 5) which returned to normal (i.e. >20%) after treatment. Both had *Giardia lamblia* infestation.

Results of treatment. On a normal ward diet and with eradication of the infestation the most striking immediate effect was weight gain, ranging from 0.5 to 1.5 kg per week. Less striking but equally constant was the regression of clubbing, disappearing by 3 months in most and in all by 6 months after therapy was started. One exception was a child found again to have *Trich. trichiura* infestation, but with further treatment the clubbing disappeared. On oral iron therapy haemoglobin levels rose to normal and signs of iron deficiency regressed.

Discussion

The clinical findings listed in Table 1, the finding of multiple parasites always including *Trich. trichiura*, and the striking weight gain after eradication of the infestation provide an easily recognisable 'syndrome'. Most of these findings including digital clubbing have been described in association with *Trich. trichiura* infestation (Kamath, 1973; Lee *et al.*, 1976). However, the total clinical picture does not seem to be generally recognised. The presence of clubbing tends to mislead and a variety of incorrect diagnoses are made. The children are then referred long distances, hospitalised for prolonged periods, and on occasion subjected to unnecessary and potentially hazardous investigations.

Growth retardation was a feature of these children and is almost certainly related to their poor socio-economic background. The multiple parasitic infestations observed also indicate an unsanitary home environment. Chronic dysentery is due to whipworm infestation, and chronic blood loss in turn accounts for the pallor and iron deficiency anaemia. Dysentery and anaemia may have contributed to the nutritional status of these children.

Generalised malabsorption does not appear to play a major role, as of the 5 tested only 2 children had mild steatorrhoea. Gross hypoalbuminaemia was not a feature in these children. This contrasts with the findings of a similar series of children from Malaysia where the majority had hypoalbuminaemia and many had very low values (Kamath, 1973).

The striking weight gain on treatment may have been due to the more nutritious diet available in the hospital, improvement in appetite with the treatment of iron deficiency, and the cessation of diarrhoea. The impression of weight gain being more rapid and of greater magnitude than seen in other hospitalised children with growth retardation in this age group has led to the speculation that another unknown factor may be involved.

The aetiology of the clubbing is unknown. It is not related to malabsorption nor to hypoalbuminaemia as neither was present in all patients. Iron deficiency anaemia is associated with koilonychia rather than digital clubbing. With eradication of the infestation clubbing reversed in about 3 months. This is similar to experience reported from Malaysia where it was thought the clubbing was most closely related to the heavy worm load and the chronicity of the diarrhoea (Lee *et al.*, 1976). It does appear to be related to the presence of *Trich. trichiura* as in the one case where clubbing did not regress incomplete eradication or reinfestation with this helminth was found. Increased circulating reduced ferritin has been postulated as the cause of clubbing (Hall, 1959) but we have not investigated this aspect because of the technical difficulty of estimating reduced ferritin. It is tempting to suggest that the unknown factor contributing to the growth retardation and the cause of the clubbing are the same.

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