THE FINGER-NAILS IN CHRONIC HYPOALBUMINAEMIA

A NEW PHYSICAL SIGN

BY

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[WITH SPECIAL PLATE]

Abnormal changes in the finger-nails often provide evidence of systemic diseases. This paper calls attention to a hitherto undescribed change which has been related to severe hypoalbuminaemia. This is the appearance of paired narrow white bands in the finger-nails of patients with serum albumin levels persistently below 2.2 g. per 100 ml. These two transverse bands run parallel to the lunule. They are not palpable, do not indent the nails, and are separated from each other and from the lunule by areas of normal pink nail (Special Plate, Fig. 1). The distal white band may be slightly wider than the proximal band (Plate, Fig. 2).

Method of Study and Selection of Patients

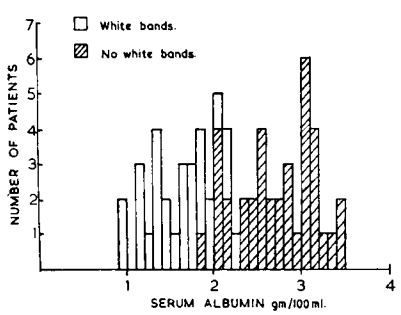
The finger-nails were examined in 250 healthy adults, 500 patients with normal serum albumin levels, 31 patients with the nephrotic syndrome (criteria of Leiter, 1931), and 34 patients with hypoalbuminaemia from other causes. Renal biopsy (Muercke *et al.*, 1955) was carried out in all patients with the nephrotic syndrome. Serum albumin was estimated by the method of Grassmann *et al.* (1951). Values below 4 g. per 100 ml. of serum were taken as abnormal (Squire, 1955).

Observations were also made of the nails after infusion of salt-poor human serum albumin, after corticotrophin and cortisone therapy, and after an increase of serum albumin, which was noted following spontaneous diuresis.

Results

Incidence of White Bands and Relation to Serum Albumin Levels

The accompanying Graph shows the relationship between serum albumin levels and white bands in 65 patients with hypoalbuminaemia. These bands were not found in any healthy subjects or in patients with serum albumin levels above 2.2 g. per 100 ml.



Analysis of serum albumin levels and white bands in 65 patients with hypoalbuminaemia.

Table I shows the distribution of white bands in 31 patients with the nephrotic syndrome. They were found in 23 (74%). They were absent, however, in 4 out of 5 patients with diabetic nephropathy, whose serum albumin levels were between 2.0 and 3.1 g. per 100 ml. White bands were not seen in 2 of 5 patients with systemic lupus erythematosus complicated by the nephrotic syndrome. One had Raynaud's phenomenon and a serum albumin of 2.1 g. per 100 ml.; the other had a serum albumin of 2.7 g. per 100 ml. White bands were not found in 2 out of 13 patients with membranous glomerulonephritis. One of these had entered the chronic phase of his illness when the serum albumin level rose; the second had white finger-nails with a distal pink area. This finding was described by Terry (1954a) in patients with cirrhosis.

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TABLE I.—*Distribution of White Finger-nail Bands in* 31 *Patients with the Nephrotic Syndrome*

No. of Patients	Diagnosis*	White Bands	
		Present	Absent
13	Membranous glomerulonephritis ..	11	2†
5	Systemic lupus erythematosus ..	3	2
5	Diabetic arteriolar nephrosclerosis ..	1	4
4	Lipoid nephrosis	4	0
3	Proliferative glomerulonephritis ..	3	0
1	Renal vein thrombosis‡	1	0

* Diagnosis made by renal biopsy.
† One patient had a serum albumin of 3·2 g. per 100 ml.
‡ Diagnosis confirmed at operation.

In the group of 34 patients with hypoalbuminaemia due to other diseases only 9 had serum albumin levels below 2.3 g. per 100 ml. Table II presents the findings in these 9 patients.

TABLE II.—*Analysis of Finger-nail Findings in* 9 *Patients with Serum Albumin Levels Below* 2.3 *g. per* 100 *ml.*

Patient	Diagnosis	Finger-nail Findings	Serum Albumin g./100 ml.
A	Hepatic cirrhosis	White bands	2·1
B	,, ,, ...	,, ,,	2·2
C	Sprue	,, ,,	2·0
D	,, ...	,, ,,	1·7
E	Idiopathic hypoalbuminaemia ..	,, ,,	1·9
F	Hepatic cirrhosis	,, nails	2·1
G	,, ,, ...	,, ,,	2·0
H	,, ,, ...	Normal	2·0*
I	Renal vein thrombosis	,,	1·8†

* Two weeks previously the serum albumin was 2·7 g. per 100 ml.
† Observations made two days after thrombosis of renal veins.

The white bands were more prominent in patients with severe and prolonged hypoalbuminaemia (below 1.8 g. per 100 ml. for at least four months). Occasionally a patient with very severe and prolonged hypoalbuminaemia showed a proximal band divided by a thin line of normal erythema (Plate, Fig. 3).

No relationship was found between the white bands and blood haematocrit levels, or between the levels of blood urea, serum cholesterol, and serum globulin. In most patients the white bands were seen on the second, third, and fourth fingers; they were rarely seen in the thumb-nail. When the bands were very faint they were usually more pronounced in the third and fourth finger-nails. When pressure was applied to the finger-tips the white bands blended with the colour of the nail beds, but for a second or two after pressure was released they became more obvious. Unlike the transverse depressions indicating periods of retarded growth—known as Beau's lines (Beau, 1846)—the white bands did not extend to the distal end of the finger-nails. However, in one patient with membranous glomerulonephritis they were replaced by diffusely white opaque nails (Plate, Fig. 4).

Effect of Intravenous Albumin Therapy on the White Bands

Two patients with the nephrotic syndrome due to primary amyloidosis (Case 1) and membranous glomerulonephritis (Case 2) were each infused with 750 g. of salt-poor human serum albumin. These case histories are presented below.

Case 1.—A 44-year-old engineer noticed ankle oedema in December, 1953. Two months later he was found to have gross proteinuria, and white bands were seen in all finger-nails, except the thumb. The urine contained fatty, hyaline, and cellular casts. The serum albumin was 1.9 g. per 100 ml. and the serum cholesterol was raised. Renal biopsy showed amyloid disease. During three weeks in May, 1954, he received intravenously a total of 750 g. of albumin. This resulted in a diuresis with a 16 lb. (7.26 kg.) weight loss and a transitory rise in the serum albumin. Three months later oedema reappeared and the serum albumin was

again severely depressed. The white bands became almost indistinguishable after three weeks of infusion, but as the serum albumin fell they again became obvious.

Case 2.—A 44-year-old taxi-driver developed ankle oedema in December, 1953, and a diagnosis of nephrotic syndrome due to subacute membranous glomerulonephritis was made. In June, 1954, he had anasarca and white bands in all finger-nails, gross proteinuria, an elevated serum cholesterol, and a serum albumin of 2.2 g. per 100 ml. Over a three-weeks period he was infused with 750 g. of serum albumin: diuresis followed the first 75 g. He remained free of oedema, and his serum albumin level has remained above 3.4 g. per 100 ml. The white bands became progressively less marked. On the seventeenth day the serum albumin was normal and the white bands were no longer seen.

Effects of Cortisone and Corticotrophin Therapy on the White Bands

Two other patients with the nephrotic syndrome were observed. One was treated with cortisone and the other with corticotrophin.

Case 3.—A 65-year grandmother developed ankle oedema in January, 1954. Two months later there was pitting oedema of the legs, thighs, abdomen, and periorbital area, along with bilateral pleural effusions and minimal ascites. The tongue was red and raw, and there was cheilosis and perlèche. Prominent white bands were present in all finger-nails. She had gross proteinuria; the serum cholesterol was 1,400 mg. per 100 ml. and the serum albumin 1.6 g. per 100 ml.

In September, 1954, cortisone therapy was started. There was an excellent diuresis. The serum albumin level gradually rose over a period of three months and the white bands became indistinct. They had disappeared by the time the serum albumin had reached 2.9 g. per 100 ml.

Case 4.—A 14-year-old schoolboy gradually developed anasarca in June, 1954. Six months later, examination showed pallor, anasarca, and white finger-nail bands. Urinalysis revealed gross proteinuria and doubly refractile bodies in the sediment. The serum albumin was 1.5 g. per 100 ml. and the serum cholesterol 608 mg. per 100 ml.

Diuresis occurred after ten days of corticotrophin therapy. He was maintained in good physical condition on intermittent cortisone therapy. By April, 1955, he was free of oedema; a trace of protein was found in the urine, and the serum albumin had risen to 3.7 g. per 100 ml. The white bands were no longer visible.

Discussion

Abnormalities of the finger-nails which reflect systemic diseases have been described by numerous authors. It has been known for many years that Beau's lines—a transverse depression of the nails—are the remnants of past illnesses, accidents, or other conditions. By noting the relative position of Beau's lines and the fact that it takes approximately six months for the nail to grow from the nail bed to its entirety, it is often possible to estimate the approximate date of the illness or episode of stress.

Terry (1954a) emphasized the development of white nails in patients with cirrhosis and suggested "that white nails are endocrine stigmata." Later, Terry (1954b) described the red half-moons in the finger-nails of patients with congestive failure. Edwards (1948) pointed out the specific change in the nails in vasospastic and in peripheral arterial disease. He described the pterygium, which is a thinning of the nail fold and a widening of the cuticle. This change occurred in patients with Raynaud's disease and in those with scleroderma. Edwards observed that this finding was a sensitive indication of the severity of the underlying disease.

As shown above, the majority of physical signs reflect or suggest a specific disease process. The finding of paired white bands, however, is unique in that it indicates a specific biochemical abnormality—hypoalbuminaemia. These paired white bands were found in a variety of disease states, all associated with persistently low serum albumin. They have been observed both in oedematous and in non-oedematous patients. Most frequently, white bands were seen in patients with the nephrotic syndrome, due to a variety of causes. Their presence may be useful in differentiating oedematous states related to hypoalbuminaemia from oedema of cardiac origin.

The formation of paired white bands is probably due to chronic nutritional deficiency of albumin. This view is supported by other evidence of nutritional deficiencies in patients with white bands—for example, a red raw tongue, active cheilosis, and perlèche. Large amounts of multivitamin injections were without effect on these "nutritional deficiency" findings, but a rise in serum albumin, spontaneous or due to treatment, caused them to disappear.

Summary

A previously unrecorded physical finding of paired white bands in the finger-nails of hypoalbuminaemic patients is described.

This finding is unique because it reflects a specific biochemical abnormality—chronic hypoalbuminaemia.

Although white bands are most often seen in patients with the nephrotic syndrome, they are not specific for any one disease state.

Paired white bands do not regress with vitamin therapy, but they will disappear when the serum albumin is maintained above 2.2 g. per 100 ml.

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LEUKAEMIA AND DIABETES INSIPIDUS

CASE REPORT, WITH UNEXPECTED EFFECT OF CORTISONE

BY

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[WITH SPECIAL PLATE]

It is agreed nowadays that interference with the supraoptico-hypophysial system in man may give rise to diabetes insipidus. The causes are many and are fully discussed by Warkany and Mitchell (1939) in their critical review of the subject in children. Among the rare causes they mention leukaemic infiltration of the diencephalo-pituitary region.

A search of the literature has revealed only four previously reported cases, all in adults (Lenk, 1911; Sheldon, 1927; Kugelmeier, 1937; Castaigne and Hubault, 1953). Sheldon's case was aleukaemic with lymphatic glandular enlargement, and in Castaigne's the spleen, liver, and glands were not enlarged, whereas in Lenk's and Kugelmeier's cases enlarged lymph nodes and splenomegaly were present and the blood picture was definitely leukaemic. In all these cases the leukaemia had been present for some months before the clinical features of diabetes insipidus occurred.

S. C. TRUELOVE AND W. C. D. RICHARDS: BIOPSY IN ULCERATIVE COLITIS

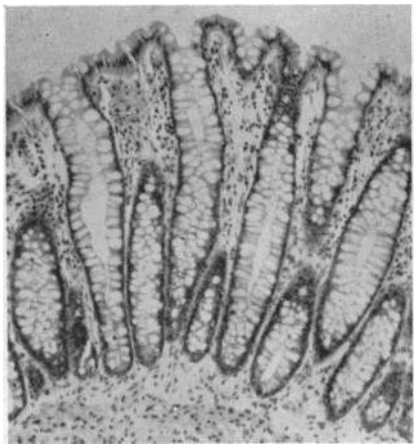


FIG. 1.—Normal colonic mucosa. (H. and E. ×120.)

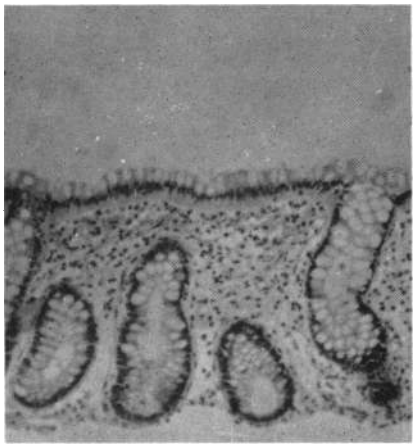


FIG. 2.—Ulcerative colitis: no significant inflammation. (H. and E. ×150.)

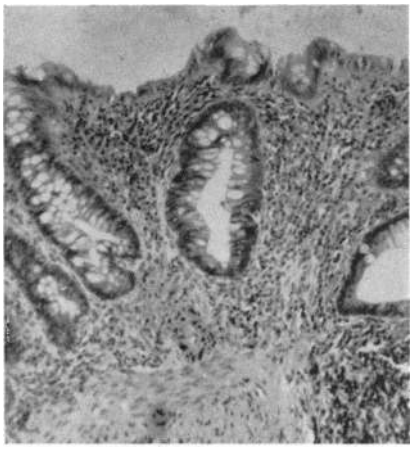


FIG. 3.—Ulcerative colitis: moderate inflammation. (H. and E. ×120.)

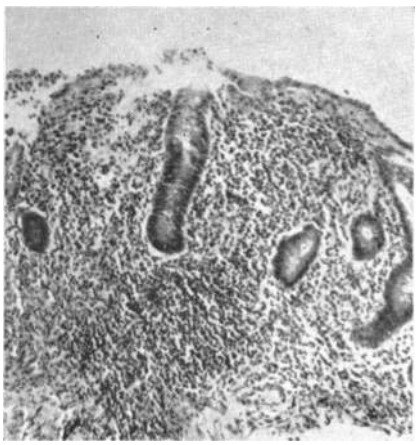


FIG. 4.—Ulcerative colitis: severe inflammation. (H. and E. ×120.)

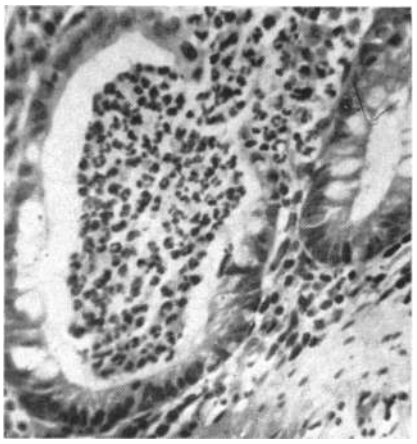


FIG. 5.—Ulcerative colitis: typical crypt abscess. (H. and E ×250.)

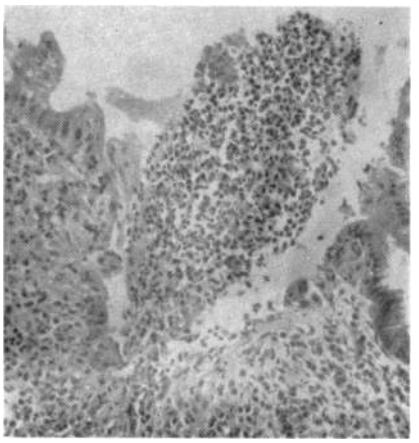
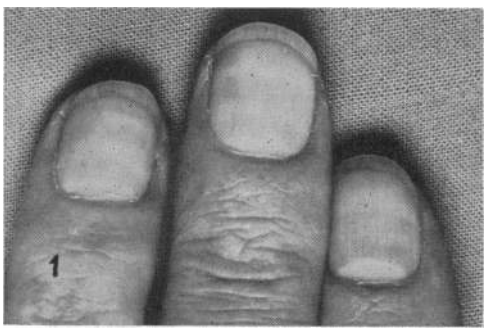


FIG. 6.—Erosion in ulcerative colitis. (H. and E. ×150.)

R. C. MUEHRCKE: FINGER-NAILS IN CHRONIC HYPOALBUMINAEMIA



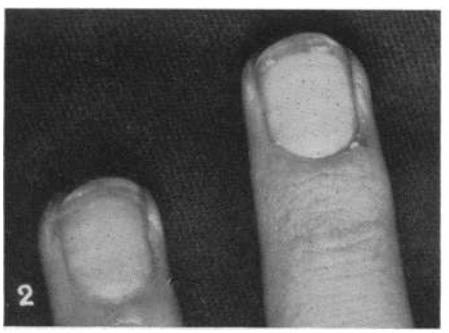


FIG. 1.—Transverse, paired white bands in abnormal finger-nails; 43-year-old male with nephrotic syndrome due to membranous glomerulonephritis. Serum albumin below 1.8 g. per 100 ml. for 26 months.

FIG. 2.—Wide distal white band and narrow proximal band in finger-nails of young adult with chronic hypoalbuminaemia and glomerulonephritis.

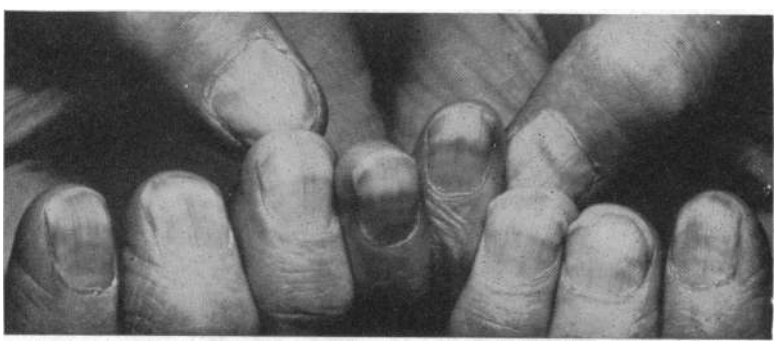


FIG. 3.—Proximal white band separated by line of normal erythema: 62-year-old male with severe hypoalbuminaemia due to membranous glomerulonephritis.

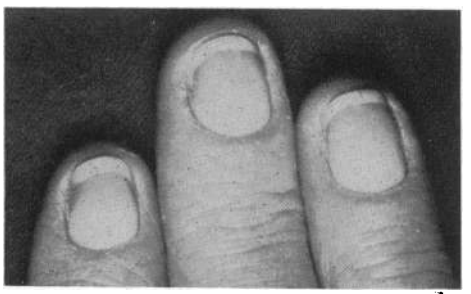


FIG. 4.—Diffusely white opaque nails which replaced paired white bands in a 56-year-old woman who had entered the chronic phase of her illness.