

SKIN AND NAIL DISORDERS IN RELATION TO CHRONIC RENAL FAILURE

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Abstract. Several non-specific skin diseases were found in 51 patients with chronic renal failure. The nail changes appeared to be more specific. The distal band is connected with renal diseases. It contains no melanin and could be due to capillary changes. It is probably reversible. The disappearance of the brown distal arc with growth of the nail has not previously been described. We have seen in some of our patients a paling of the colour and decrease in width of the brown nail arc, although never a total disappearance of the distal nail arc.

The occurrence of skin lesions in conjunction with chronic renal failure is well known and dermatitis, pruritus, melanoderma, and prurigo arise quite frequently in uremic patients (4, 8, 9, 12). A higher incidence of calcinosis cutis has been noted in these patients since the introduction of hemodialysis in the treatment of renal diseases (3). Bean (2) described, in addition, a reddish discoloration of the distal nail. For these lesions Lindsay (6, 7) introduced the term "half-and-half nail"; he described them as follows: "The distal portion of each nail bed was red, pink, or brown occupying 20% to 60% of the total nail length and always sharply demarcated; the proximal portion was of dull whitish ground glass appearance". These changes were only seen in patients with chronic renal disease. No nail abnormalities were noted in a separate small group of patients with acute renal failure. There seemed to be no relationship between the serum electrolyte levels and the nail abnormalities, and none was found between the severity of the azotemia and the width of the nail band. Lindsay (6, 7) localized the change in the nail bed, not in the nail plate, since this is not affected by nail growth.

Stewart & Raffle (10) described lesions in chronic renal disease as brown nail bed arcs affecting the distal part of the fingernail bed just proximal to the point of separation of the nail from its bed. Their

conclusions were similar to those of Lindsay. Histological examination of the nail bed of two deceased patients with arcs showed melanin granules in the basal layer of the epidermis.

Isolated cases of "half-and-half nail" were also reported by Baran & Gioanni (1) and by Leyden & Wood (5). The latter authors localized the pigment in the nail plate and suggested that rapid renal decompensation with subsequent acidosis and concentration of the toxic substances of uremia might stimulate melanin formation by the melanocytes of the nail matrix. Histological examination showed a normal nail matrix, nail bed, and proximal portion of the nail plate; brown pigment was present throughout the distal portion of the nail plate.

The present study was undertaken to determine the incidence and the nature of the skin and nail disorders in patients with chronic renal failure.

MATERIAL AND METHODS

The skin and nail lesions were studied in 59 renal patients of whom 31 were under chronic hemodialysis and 28 had a functioning renal cadaveric graft (Table I).

For histologic examination the whole little fingernail of the right hand with the matrix and the nailbed was removed from two deceased patients.

After fixation in A.F.A. (alcohol 80%, formalin 15%, acetic acid 5%) they were cut longitudinally and stained with haematoxylin-eosin; Masson's trichrome; PAS; Fontana-Masson method for melanin and with potassium ferrocyanide for Fe.

SKIN DISORDERS

Patients on chronic hemodialysis

The following dermatoses could be observed:

1. Dermatoses without apparent relationship to the chronic renal disease: psoriasis (1 patient) and pemphigus chronicus benignus familiaris (1 patient).

Table I

	♀	♂	Total
<i>Renal diseases in 31 patients on chronic hemodialysis (♀: 12; ♂: 19)</i>			
Chronic glomerulonephritis	6	13	19
Subacute glomerulonephritis	1	—	1
Chronic pyelonephritis	4	3	7
Congenital renal disorders	1	1	2
Nephrosclerosis	—	1	1
Cystinosis	—	1	1
<i>Original renal disease in 28 patients with a functioning renal cadaveric graft (♀: 11; ♂: 17)</i>			
Chronic glomerulonephritis	7	15	22
Congenital renal disorders	2	—	2
Gouty kidney	—	1	1
Nephrosclerosis	—	1	1
Chronic pyelonephritis	2	—	2

2. Dermatoses due to therapeutic agents: contact dermatitis around the shunt (3 patients).

3. Dermatoses possibly associated with the renal disease or chronic hemodialysis:

(a) diffuse pigmentation of the skin, especially in sun-exposed areas (1 patient).

(b) pruritus with intermittent course (6 patients).

(c) pseudoacanthosis nigricans (1 patient): a woman aged 42 with typical papillomatous and warty elevations, located in the armpits, in the anogenital region, and around the areola mammae. After renal cadaveric transplantation the lesions disappeared.

(d) Acute diffuse alopecia beginning from 3 weeks to a few months after the commencement of chronic hemodialysis (3 patients). The lesions were considered as a telogen effluvium due to heparin.

(e) Soft tissue calcification with skin ulceration (1 patient). This woman had on the left tuberculum anterior tibiae a yellow, hard mass covered by a crust and surrounded by a blue-red inflamed border. Histologically, only calcium was found in this tumour.

Table II. Summary of 9 cases with nail disorders

Pat. no.	Sex	Age (y.)	Clinical diagnosis
<i>Chronic hemodialysis</i>			
1	♀	29	Chronic glomerulonephritis
2	♀	35	Chronic glomerulonephritis
3	♂	22	Chronic pyelonephritis
4	♀	33	Chronic pyelonephritis
5	♂	46	Chronic pyelonephritis
<i>Functioning renal cadaveric graft</i>			
6	♀	30	Chronic glomerulonephritis
7	♂	24	Chronic glomerulonephritis
8	♀	28	Chronic glomerulonephritis
9	♂	31	Chronic glomerulonephritis

Patients with a functioning renal cadaveric graft

All the transplant patients showed, in various degrees, skin disorders due to prolonged therapy with corticosteroids, such as striae distensae, acne, and moon-face. One patient had extensive ulcerations and erosions of the mouth due to the immunosuppressive treatment. Disappearance of the pruritus after the kidney transplantation was observed in all patients.

NAIL DISORDERS

In 9 of the 59 patients clinical nail changes were found (Table II). The fingernails were characterized by a distal brown area (Fig. 1); more proximally the nail might appear paler. In 6 patients the lunula faded so as to become completely invisible. In the other 3 patients no lunular change could be observed. The distal arc was brown or light brown and always sharply demarcated.

None of the patients knew the initial date of the nail discoloration. There was no relationship between the nail disorder and the type of the renal disease responsible for the renal failure. In most of the patients there was also a brown arc on the toenails,



Fig. 1. Nail changes in a 28-year-old woman with a functioning renal cadaveric graft. (Patient no. 8.)

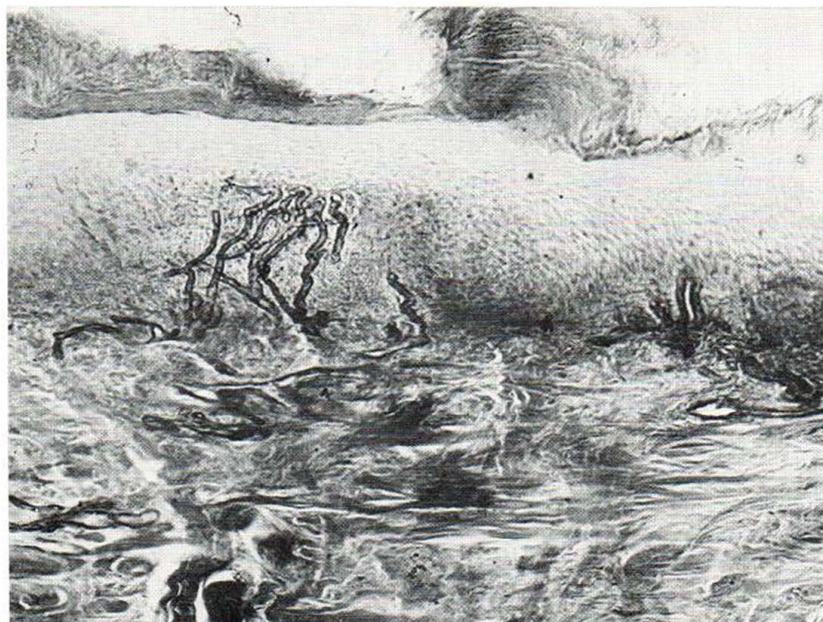


Fig. 2. The number of capillaries is increased under the distal nail arc. The capillary walls are thickened. (PAS, $\times 360$).

though never as clear as on the fingernails. The brown arc on the toenails was also less clearly demarcated. In some patients, on chronic hemodialysis as well as with a functioning cadaveric graft, observed over a period of 10 months, the width and the intensity of the brown distal arc decreased.

Histology

The nail plate itself showed no changes. Under the nail plate the number of capillaries was increased; there was also a remarkable thickening of the capillary walls (Fig. 2). No pigment granules were found.

DISCUSSION

The various skin lesions found in 55% of the patients examined are important but not specific to renal diseases. They can also appear in connection with other internal processes. The nail changes appear to be more specific but their interpretation is difficult.

Terry (11) described in the normal nail bed an "onychodermal band" as a "barely perceptible pale narrow band that runs transversely across the distal portion of the nail, immediately proximal to the free edge of the nail. The band has a slightly amber tinge and a faintly translucent quality. In the fingernails the onychodermal band is usually 0.5–1.5 mm wide. These appearances are difficult or impossible to see unless the fingers are pointing directly at a good source of light".

Terry found the characteristics of the normal band exaggerated in the "white nails" of hepatic cirrhosis patients. A relationship between this onychodermal band and the distal brown arc has been proposed by many authors; however, the onychodermal band is never as wide and never as pigmented as the "half-and-half nail". In our group of patients on hemodialysis we often found the nail to be pallid and have an inconspicuous lunula without any brown distal arc. These signs are probably due to the associated anemia (on average 20% hematocrit) or the poor general condition. Improvement of the latter initiated a regression of these nail alterations.

We cannot confirm Lindsay's opinion that the proximal whitish ground-glass appearance is essential, since in many of our patients we did not observe any lesion of the proximal part of the nail. Stewart & Raffle also found, in some of their patients, a normal

Table III. Frequency of brown distal arc in chronic renal patients and in unselected patients

	Chronic renal patients		Unselected patients	
	Number	Frequency	Number	Frequency
Stewart & Raffle	34	35%	500	1.4%
Lindsay	—	—	1 500	1.6%
Present group	59	15%	100	0,—%

proximal area of the nail as well as a distal brown arc.

The frequency of the brown distal arc in chronic renal patients and in unselected patients is summarized in Table III.

These observations show a positive relationship between chronic renal failure and the brown distal arc.

On histological examination, Stewart & Raffle (10) found melanin granules in the basal layer of the nail bed epidermis and Leyden & Wood (15) found melanin pigment granules throughout the distal portion of the nail plate. However, we were unable to find any pigment in routine sections nor in slides stained for melanin or for Fe. We observed, on the contrary, an increase in the number of capillaries and a distinct thickening of their walls. The lesions are thus not due to a disease of the nail but to a change in the nail bed.

Evolution

Disappearance of the brown distal arc simultaneously with nail growth has not been hitherto described. We did see in some of our patients a decrease paling of the colour and decrease in width of the brown nail arc, although never a total disappearance of the brown distal nail arc even after months of observation.

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