creased resorption of tissue fluid, for oedema will occur only when there is no longer a state of equilibrium between the two.

We have previously noticed transient and otherwise unexplained episodes of bilateral oedema of various degrees of severity in patients with disseminated lupus erythematosus, systemic sclerosis, dermatomyositis, polyarteritis nodosa, and rheumatoid arthritis, and spontaneous periodic oedema was the presenting feature in two patients, one with disseminated lupus erythematosus and one with dermatomyositis. The capillary permeability in these patients was +16% and +19% respectively (Fig. 2).

Unexplained oedema, whether chronic or "spontaneous periodic," should raise the possibility of increased capillary permeability due to an underlying collagen vascular disease, and we suggest that such patients should be investigated with this in mind.

This work was carried out while we were in receipt of a grant from the Medical Research Council and we are grateful for this. We are also grateful to Professor F. T. Farmer and his staff for advice about the isotope studies, and to the doctors who referred patients to us.

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Brown Nail-bed Arcs and Chronic Renal Disease

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British Medical Journal, 1972, 1, 784-786

Summary

A brown arc affecting the distal part of the fingernail-bed, just proximal to the point of separation of the nail from its bed, has been found in 12 out of 34 patients with chronic renal disease (35%) compared with an incidence of less than 2% in a series of unselected patients. It represents a distinctive form of pigmentation, possibly due to lipochromes. No decisive association could be found between the presence or absence of the pigmented nail arc and the level of impaired renal function. Nevertheless it seems that renal disease predisposes towards the development of brown nail arcs.

Introduction

The significance of a brown arc set across the distal part of the fingernails and toenails proximal to the line of separation of the nail plate from the bed (see Fig.) is not generally recognized. There is little mention of this clinical sign since its first description by Bean (1962). The standard monograph on nail disorders (Samman, 1965) does not refer to such arcs, nor are they mentioned in discussions of skin manifestations of systemic

disease (Andrews and Domonkos, 1963; Rook *et al.*, 1968; Braverman, 1970). Lindsay (1967) described a condition of similar appearance which he termed "the half-and-half nail," and there has been an isolated case report (Baran and Gioanni, 1968). Bean (1962), Lindsay (1967), and Baran and Gioanni (1968) all related the nail lesion to associated renal disease and azotaemia. We have measured the prevalence of pigmented arcs among unselected hospital patients and among patients attending a renal clinic and attempted to relate the presence of arcs to the orthodox clinical and biochemical features of renal failure.

Patients and Method

Thirty-four patients attending a renal clinic over a three-month period were assessed in respect of their nails, skin, and renal function, the features noted being as listed in Table I. In addition, similar pigmented arcs were sought in all patients seen at our various clinics or in our wards during a one-year period.

TABLE I—Features Assessed

Dermatological	Renal
Presence or absence of brown nail arc	Nature of chronic renal disease
Depth of arc	Renal function:
Colour of arc	Serum creatinine
Length of attached nail	Blood urea
Colour of remainder of nail-bed	Serum total proteins
Involvement of fingers and/or toes	Serum albumin
Abnormal skin pigmentation	Degree of proteinuria
Pruritus	Grade of renal deficit
Other skin disorder	Presence of non-renal disease

Diagrammatic distribution of brown arcs.

Results

Of the 34 patients with established chronic renal disease 12 (35%) were found to have a brown arc of varying degree and 22 showed no nail abnormality (Table II). The intensity and depth (between 1 and 7 mm) varied from patient to patient. There was no associated onycholysis, and the remainder of the nail-bed was either a normal colour or showed the pallor of anaemia, in which case the lunulae were rendered inconspicuous. Ten of the 12 affected patients had a well-defined brown arc on the toenails also, but in most patients the toenails were so

TABLE II—Relation between Serum Creatinine and Brown Arcs in 34 Patients with Established Chronic Renal Disease

Disease	Serum Creatinine (mg/100 ml)					
	<1	1-4	>4	<1	1-4	>4
	Arc Present (12 patients)			Arc Absent (22 patients)		
Glomerulonephritis	—	—	1	—	1	1
Pyelonephritis	—	—	2	—	1	3
Ureterosigmoid anastomosis	—	2	—	3	4	1
Nephrotic syndrome	—	1	—	1	—	—
Analgesic nephropathy	—	1	1	—	1	1
Polycystic	—	—	1	—	—	—
Obstructive	—	1	—	—	—	—
Hypertensive nephropathy	—	—	—	—	—	1
Unknown origin	—	—	1	—	—	—
Transplanted kidney	—	—	—	—	1	—
Maintenance haemodialysis	—	—	1†	—	—	3‡
Total	—	5	7	4	8	10
Percentage*	—	42	58	18	36	45

* Percentage in each arc group with creatinine levels in the range shown.

† Glomerulonephritis.

‡ 2 pyelonephritis and 1 glomerulonephritis.

altered by traumatic dystrophy that categorization in respect of pigmented arcs was impossible.

The presence or absence of a brown arc was not associated closely with general skin pigmentation. Three of the 12 patients with brown arcs had skins which tanned easily (as opposed to the others who were fair skinned) while four of those with no arcs had the distinctive "muddy complexion" seen commonly in chronic renal disease. Three of these four mentioned widespread pruritus while the others had no such complaint.

Assessment of the patient's renal function was based on serum creatinine and blood urea estimations. Within the selected group of 34 patients with chronic renal disease of various grades of severity no obvious association was seen between increasing levels of serum creatinine and the presence of the brown arcs (Table II). Similarly, there were no significant differences in respect of blood urea, serum total proteins, serum albumin, extent of proteinuria, or associated non-renal disease between the two subgroups (arcs present and arcs absent). However, of the 12 patients with brown arcs seven had severe or moderately severe renal failure and five had less severe disease. Three of these five had the least conspicuous nail changes, in respect of both distinctness and depth of the arcs.

Seven patients with brown nail arcs were discovered among at least 500 other patients examined by us over the course of a year, giving a prevalence of less than 2% for brown arcs in the general hospital population. Four of the seven patients with brown arcs showed no evidence of renal impairment, although one of these had a urinary tract infection and hypothyroidism. Two of the four had biliary cirrhosis but without the white nails often seen in cirrhotic subjects (Terry, 1954), and the fourth patient was an obese mild diabetic subject. The other three patients with brown arcs showed evidence of renal impairment. All three had urinary infection; in one the renal failure was mild and associated with hypertension, in the second it was associated with diabetes mellitus, and in the third with arteriosclerotic dementia, folic acid deficiency, and elliptocytosis.

Discussion

Since the pigmentation does not grow out with the nail, it would seem to be of the nail-bed and not of the nail-plate. In the most markedly involved nails the description "half-and-half nail" was justifiable since the distal half of the nail-bed was brown and the proximal half pale pink. However, this term as used by Lindsay (1967) was not entirely apposite since he applied it when the proximal portion of each nail-bed was of "dull whitish ground glass appearance" and the distal portion "red, pink, or brown." In our patients the distal arc was invariably brown while, proximally, the nail was of normal translucency although it often appeared pale because of associated anaemia. Histological

examination of the nail-bed of two deceased patients with arcs showed melanin granules in the basal layer of the epidermis, but it was not possible by the available histological techniques to show any other pigment.

Terry (1955) pointed out that, in the normal nail-bed distal to the lunula, the pink zone is often subdivided into a main zone and an ill-defined paler pink band which runs transversely across the distal portion of the nail-bed immediately proximal to the free edge and which is visible only in a good light. He termed the latter the "onychodermal band." It would seem that this onychodermal band and the brown arc described here are coextensive. It is of interest that although in normal nails this band was described as being paler than the main pink area it was also described as being of a "slightly amber tinge and a faintly translucent quality" (Terry, 1955). If this is indeed normal the brown arcs to which we wish to call attention are an exaggeration of the normal pattern. It is our impression that many normal onychodermal bands are actually a deeper pink than the main pink zone. For the purposes of this paper brown arcs imply an appearance visible from 4 feet (1.2 metres) away.

In an examination of 2,500 unselected patients Terry (1955) noted an abnormally "prominent" onychodermal band in only nine subjects, none of whom apparently had renal disease. Five patients had hepatic cirrhosis and in three of these the main pink zone was white—the so-called "white nails" (Terry, 1954). He thought that these three patients were of particular interest since the juxtaposition of the abnormal faintly pigmented translucent onychodermal band and the white nail permitted these two physical signs to be readily distinguished. Brown arcs were certainly a distinct feature in our two cirrhotic patients even in the absence of the white nails.

In contrast to the low incidence of this physical sign outside the renal clinic, its presence in over a third of the patients with chronic renal disease is striking. Despite the lack of correlation with any of the usual criteria of renal function, the general association between brown arcs and renal disease does seem to be real.

While its significance in physicochemical terms is not obvious, the brown arc in the nail-bed may be in a site where certain types of acquired pigmentation are manifested early. Whether the brown pigment of the arc is lipochrome, melanin (Douglas and Kerr, 1968), or some unknown pigment is not clear. The location of the brown arcs near to but not beyond the free margin of the nail suggests that the arcs may be the result of a process similar to the oxidative darkening of skin lipochromes known to occur in some cases of uraemia (Tsaltas, 1969, 1970), but in our patients an association with general skin pigmentation was not seen.

In conclusion, an appreciable percentage of patients with chronic renal disease show pigmentation of their onychodermal bands but this sign is not yet proved to be pathognomonic. However, the presence of brown arcs would seem to be rare in other disease states. Brown arcs may well be missed if not specifically sought. With increased interest in the pathogenesis of uraemia and with more patients benefiting from treatment of their chronic renal disease, this readily elicited clinical sign is worthy of renewed attention. Furthermore, if this feature is observed in a patient the possibility of renal disease should be considered early in the differential diagnosis.

We acknowledge the original observation of Dr. W. C. Wakefield, which initiated this study.

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MEDICAL MEMORANDA

Late Appearance of Bochdalek Hernia

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British Medical Journal, 1972, 1, 786

A case is reported in which a diaphragmatic hernia of the congenital posterolateral (Bochdalek) type appeared after intra-abdominal surgery in a 5-year-old. This supports the view that hernias of this type which present after the newborn period are caused by herniation occurring after birth through a defect present since the embryonic stage.

Case Report

A 5-year-old boy was admitted to the Royal Manchester Children's Hospital with a history of breathlessness and intermittent left subcostal pain of about eight weeks' duration. His symptoms had initially been mild but during a few weeks before admission he had occasional episodes of vomiting and his breathlessness increased. The symptoms began after an ileal loop urinary diversion had been constructed because of urinary incontinence due to a thoracolumbar meningomyelocele. This had been performed through a left paramedian incision. The ureters had been mobilized easily and the loop formed from a part of the terminal ileum. He developed a postoperative paralytic ileus lasting two days, during which time his abdomen became noticeably distended. This settled with conservative treatment and he was discharged 10 days later. It was during this convalescent period at home, when increasing mobilization was being attempted, that his breathlessness was first noted.

Lateral view of chest after barium meal.

At the time of admission he was noticeably breathless on exertion though not unduly distressed at rest. He was found to have decreased chest expansion with increased dullness and diminished breath sounds on the left side. Bowel sounds were audible over the left hemithorax.

The chest x-ray picture was suggestive of a left diaphragmatic hernia and this was confirmed by a barium-meal examination, which showed a loop of colon in the chest (see Fig.). Chest x-ray appearances before the urinary diversion had been normal.

Operation was performed through a left subcostal incision and a posterolateral diaphragmatic hernia was found. A large loop of colon was withdrawn from the chest and the defect was noted to be a patent pleuroperitoneal canal with smooth margins. Only a narrow opening remained after the bowel had been withdrawn. There was no tear in the diaphragm and no hernia sac. The defect was closed with interrupted silk sutures. Both lungs expanded well after the operation and there were no postoperative complications.

Comment

Nearly all congenital diaphragmatic hernias present in the first days of life as a severe respiratory emergency, but they may present in later childhood or even adult life, when they usually produce chronic respiratory or gastrointestinal symptoms. Others remain asymptomatic and are found in the course of routine x-ray examination of the chest. Hernias of the Bochdalek type presenting in later life should be differentiated from traumatic diaphragmatic hernias where the defect, although commonly posterolateral, is due to a tear in the diaphragm (Lucido and Wall, 1963; Robb, 1963; Myers, 1964). In a case reported by Fromm and Lucas (1971) it was stated that a previously normal chest x-ray picture was one factor which precluded the possibility of a congenital Bochdalek hernia. In so far as the term congenital applies to the defect in the diaphragm this is not necessarily so.

In the case described here the hernia was through a patent pleuroperitoneal canal, which is the commonest abnormality associated with congenital diaphragmatic hernias. It was a false hernia with no sac, the parietal pleura and peritoneum being continuous.

It seems likely that the factors responsible for the herniation were largely related to the postoperative paralytic ileus. The abdominal distension with the increased intra-abdominal pressure probably caused the narrow defect to widen and the bowel to herniate into the chest. Contributing factors may have included the disturbed relationships of the intra-abdominal contents during and after the urinary diversion procedure and the possibility of some degree of postoperative lung collapse.

I am grateful to Mr. A. Jolleys for his helpful criticism and for permission to report the clinical details.

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