Skin changes in dialysis patients: a review

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Introduction

Skin involvement in chronic renal failure is characterized by a multitude of different aspects. Often pruritus, xerosis cutis, hyperpigmentations, and actinic elastosis occur. These symptoms tend to alter and are aggravated relatively quickly when chronic renal insufficiency leads to compulsory dialysis treatment. The following article reviews the clinical and histological aspect of cutaneous alterations of the skin of patients with chronic renal failure and during dialysis treatment.

Clinical and histological features of the skin in patients with chronic renal failure

Cutaneous alterations in the skin of patients with chronic renal failure are frequently found, but are variable. Pico et al. found skin changes, some subtle, in all 102 patients examined [1].

Pruritus, increasing with deteriorating renal function, is a very frequent complaint [2]. The aetiology is unclear, but it tends to become more severe with loss of renal function [3]. Pruritus can be accompanied by dryness of the skin but no correlation exists between the two: 48% of patients with chronic renal insufficiency indicate pruritus, but xerosis cutis can be demonstrated in 60% [3,4]. The water content in the stratum corneum does not correlate with the severity of pruritus [4]. A marked decrease of sebaceous and sweat gland secretion is prominent and correlates histologically with atrophy of the sebaceous and sweat glands. Xerosis cutis increases the susceptibility to infections and this is aggravated by delayed wound healing of the skin [5].

Alterations in the cutaneous pigmentation, in particular macular hyperpigmentation of the palms and soles, and diffuse hyperpigmentations of the mucosal membranes, can be seen relatively early during progression of the disease [1].

Half and half nails, which are more typical for the dialysis patients, can also be present. They are characterized by proximal white discoloration and distal red/brownish colour (Figure 1).

Premature ageing of the skin mainly presents regarding as actinic elastosis. Other clinical aspects of the skin of patients with chronic renal insufficiency are increased susceptibility to low temperatures and Raynaud’s syndrome, increased hair growth at the cheeks, hypertrichosis lanuginose, and thickening of the eyebrows.

Histologic examination of the skin of patients with chronic renal insufficiency reveals changes in the vessel wall architecture, with basement membrane thickening, endothelial cell activation, and chronic inflammatory infiltrate [3].

Specific cutaneous manifestations in patients on dialysis

Pruritus is the most important skin manifestation during dialysis. Stahle-Backdahl et al. [6] describe a severe pruritus in 8%, moderate pruritus in 24%, and light pruritus in 66% of the examined patients.
However, in this study, containing 29 patients, the effects of duration of dialysis and severity of the pruritus were not considered in the analysis. Altmeyer et al. described a significant improvement of itching in patients who had been on dialysis treatment for long periods of time: of the 23 patients with short-term dialysis (2–3 years), 78% complained of pruritus, of the 28 patients with long-term dialysis (> 8 years) only 43%. Murphy et al., however, could not confirm that pruritus decreased with progressive duration of dialysis treatment. Pruritus may also be a manifestation of allergy against sensitizing compounds in the dialysis set up, e.g. ETO. Ninety-six per cent of the dialysis patients notice xerodermia with decreased sweat and sebaceous gland secretion (Figure 2).

In patients undergoing long-term haemodialysis, peculiar forms of hyperpigmentation develop in > 50% (Figure 3). The pre-existent and clinically prominent ageing of the skin increases. Actinic elastosis (Figure 4) is frequently seen as well as senile lentigines and purpura senilis. Early occurrence of actinic elastoses leads to extensive wrinkling of the skin and to the formation of comedo formation resembling Morbus Favre-Racouchot.

The frequency of malignant skin tumours is increased during dialysis. Tercedor et al. describe carcinomatous skin lesions in 2.6% of the 114 examined patients on chronic haemodialysis. Skin elastosis leads to extensive wrinkling at the neck (cutis rhomboidalis nuchae) and leads to vascular dilatations (teleangectasia). Based on multivariate analysis, the authors came to the conclusion that acceleration of cutaneous ageing is a function of the time on dialysis.

The cutaneous blood flow is significantly reduced in dialysis patients compared with a healthy control group. Lundin et al. found a correlation between the degree of vascular changes and the duration of dialysis. Reduced blood flow does not only explain the increased vulnerability, but also the poor wound healing in dialysis patients. He was not able to show a difference between the two groups with respect to microangiography.

Another characteristic feature is the development of the condition resembling porphyria cutanea with the development of bullae in areas exposed to sunlight,
especially hands and face [13,14] (Figure 5). These blisters are of variable size and may appear even after minimal exposition to sunlight, especially at the dorsal aspect of hands and fingers [15]. The Nikolski II phenomenon is positive. Subsequently, erosions appear with haemorrhagic crusts and atrophic scars. Porphyria can also lead to hyper- and hypopigmentations. After the lesions have healed it is not infrequent that milia occur.

A further feature is increased susceptibility to low temperatures and Raynaud’s syndrome. This tends to become more severe when patients are dialysis-dependent [15,16] (Figure 6).

Less frequent pathologies are Dupuytren’s contracture (14%) [5,15,16]. These symptoms, which resemble progressive systemic sclerosis, are caused by cutaneous calciphylaxia.

A further feature is cutaneous calcifications and perforating folliculitis or rather perforating dermatoses such as reactive perforating collagenoses [17,18].

Skin infections occur more often than in healthy controls [19]. Infections with exotic agents such as pseudomonas or even tuberculosis may occur [19,20]. These infections can be explained as a result of impaired immunity, which is seen even before dialysis is commenced. The immune defect is mainly characterized by lymphopenia, decreased B-cell activity, and alteration of the T-cell subset and activities [20,21].

What changes in the skin are seen by histology? One often finds severe microangiopathy and pericollagenous deposition of amyloid, identified as beta 2-microglobulin amyloidosis [3,12,22,23]. In venules and arterioles, endothelial cell activation and/or necrosis, basement membrane zone thickening, and reduplication of the basal lamina is noted [10]. The changes of the vessel wall architecture seem to be caused by a non-reactive deposition of immunoglobulins, complement components and fibrinogen. These alterations correlate with the duration of dialysis and are dependent on the duration of the uraemia [3,10]. The alteration of the connective tissue mainly presents as actinic elastosis. Atrophy of sweat and sebaceous glands also characterizes the skin of patients with chronic renal failure and presents as xerosis cutis.

**Conclusion**

Skin changes are frequent in patients with renal failure. They cause a high degree of morbidity and tend to be very refractory to treatment. It seems that long periods of pre-existing renal insufficiency, which causes typical skin changes of its own, aggravate the lesions in the dialysed patient. In severe cases only, kidney transplantation can reverse the lesions and overcome the symptoms, thereby improving quality of life.

**References**