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Case Report

Intersecting Endocrine, Metabolic, and Dermatologic Complications in ESRD: A Case of Uremic Pruritus with Bleeding

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Abstract

Chronic Kidney Disease-Associated Pruritus (CKD-aP), also known as uremic pruritus, is a distressing symptom observed in a significant proportion of patients with End-Stage Renal Disease (ESRD). Despite its high prevalence and substantial impact on quality of life, it remains underdiagnosed and inadequately treated. This case report presents a 75-year-old female with ESRD secondary to diabetic nephropathy, who developed severe generalised pruritus associated with bleeding from excoriated lesions, along with metabolic complications including anaemia, hypothyroidism, hypoalbuminemia, and peripheral oedema.

The patient had a longstanding history of hypertension and type 2 diabetes mellitus. Conservative CKD management had delayed dialysis initiation until worsening symptoms necessitated renal replacement therapy. She reported generalised itching over the limbs for one month, bleeding from scratched sites, and progressive lower limb swelling. Laboratory investigations revealed significant elevations in serum urea and creatinine, low haemoglobin and albumin, elevated TSH, and hypocalcemia. She was initiated on maintenance hemodialysis, gabapentin, antihistamines, topical emollients, corticosteroids, levothyroxine, and a renal-specific diet. These interventions led to improvement in her symptoms and functional status.

This case highlights the importance of early recognition of CKD-aP as a marker of worsening renal function. A multidisciplinary approach that incorporates dialysis optimisation, skin care, pharmacological management, and correction of hormonal and nutritional deficits is crucial. CKD-aP should be addressed proactively as part of comprehensive ESRD management to improve patient outcomes and quality of life.

Keywords: Chronic Kidney Disease–Associated Pruritus; End-Stage Renal Disease; Hemodialysis; Uremic Pruritus; Case Report

Introduction

Chronic Kidney Disease (CKD) affects over 10% of the global population and remains a Leading cause of morbidity and mortality, especially among the elderly. The progression of CKD to End-Stage Renal Disease (ESRD) is associated with a wide spectrum of complications involving cardiovascular, dermatological, and endocrine systems. One of the most distressing and underrecognized symptoms of ESRD is uremic pruritus, also known as CKD-Associated Pruritus (CKD-aP).

CKD-aP is estimated to affect approximately 40–50% of patients on maintenance hemodialysis, and its impact on quality of life is profound. It often leads to poor sleep, depression, impaired daily functioning, and in severe cases, skin trauma, secondary infections, and bleeding. Despite its high prevalence, the pathophysiology remains incompletely understood, with proposed mechanisms involving systemic inflammation, imbalance of opioidergic signalling, xerosis, and accumulation of uremic toxins [1,2].

This case report presents an elderly woman with ESRD secondary to diabetic nephropathy who experienced severe ure-

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mic pruritus with cutaneous bleeding. Her case underscores the need for early recognition and management of pruritus in CKD patients and highlights the therapeutic benefit of a comprehensive, multidisciplinary approach.

Presentation

A 75-year-old female presented with the following complaints:

- Severe generalised pruritus involving upper and lower limbs for 1 month
- Bleeding from scratching sites for 2 weeks
- Bilateral lower limb swelling for 1 week
- Difficulty walking due to pain, swelling, and weakness

The patient had a 10-year history of Stage 4 chronic kidney disease, secondary to diabetic nephropathy, managed initially with conservative therapy. Her medication regimen included Furosemide 80 mg once daily, Sevelamer 400 mg once daily, and intermittent darbepoetin injections (100 mcg/0.5 mL). She also had long-standing type 2 diabetes mellitus, initially treated with Metformin 850 mg and Glimepiride 1 mg once daily, later transitioned to Insulin Glargine at 0.2 units/kg subcutaneously once daily. Additionally, she had a history of hypertension, managed with a combination of Telmisartan and Hydrochlorothiazide 40 mg once daily.

Initiation of dialysis was deferred due to a preference for conservative management. In the days leading up to the presentation, she developed symptoms suggestive of hypothyroidism, including cold intolerance, lethargy, and dry skin.

Investigations:

Table 1: Vitals.

Parameter	On Admission
Temperature	98.2 °F
Pulse rate	88 bpm
Blood pressure	130/76 mmHg
Respiratory rate	20/min
SPO_2	97% room air
Sensorium	Alert, Oriented
Skin	Multiple excoriations, bleeding points on limbs
Pedal edema	Pitting, bilateral

Table 2: Complete Blood Count.

Parameter	Value	Reference Range
Hemoglobin	6.5 g/dL	11.5–16.0 g/dL
Packed Cell Volume (PCV)	20.0%	34–48%
RBC Count	2.13 million/cumm	4.2–5.4 million/cumm
Total WBC Count	7960/cumm	4000–11000/cumm
Platelet Count	2.52 lakhs/cumm	1.4–4.4 lakhs/cumm
MCV	94.1 fL	78–100 fL
MCH	30.3 pg	27–32 pg
MCHC	32.2 g/dL	31.5–36 g/dL
RDW-CV	17.5%	11.5–16.0%

Table 3: Iron Profile.

Parameter	Approximate Value	Reference Range
Serum Iron	30 µg/dL	50–170 µg/dL
Total Iron Binding Capacity (TIBC)	220 µg/dL	240–450 µg/dL
Transferrin Saturation (TSAT)	13.6%	20–50%
Serum Ferritin	300 ng/mL	12–150 ng/mL (♀)

Table 4: Urinalysis Report.

Category	Parameter	Value	Reference Range
Physical Examination	Colour	Pale Yellow	Straw to Yellow
	Appearance	Clear	Clear
	pH	5.5	4.6–8.0
	Specific Gravity	1.005	1.003–1.035
Chemical Examination	Protein	Positive	Negative
	Bilirubin	Negative	Negative
	Glucose	Negative	Negative
	Blood	Negative	Negative
	Ketones	Negative	Negative
Microscopic Exam	Pus Cells	1–2 /hpf	2–3 /hpf
	Epithelial Cells	2–3 /hpf	2–5 /hpf
	RBCs	Absent	Absent
	Casts	Occasional hyaline	Occasional hyaline may be seen
	Crystals	Absent	May be seen occasionally

Table 5: Liver Profile.

Parameter	Value	Reference Range
Total Bilirubin	0.38 mg/dL	≤1.2 mg/dL
Direct Bilirubin	0.12 mg/dL	≤0.30 mg/dL
Indirect Bilirubin	0.26 mg/dL	≤1.0 mg/dL
SGPT (ALT)	9 U/L	≤33 U/L
SGOT (AST)	19 U/L	≤32 U/L
ALP	91 U/L	35–104 U/L
Gamma GT	10 U/L	<40 U/L
Total Protein	6.1 g/dL	6.4–8.3 g/dL
Albumin	2.2 g/dL	3.5–5.2 g/dL
Globulin	3.9 g/dL	2.0–3.5 g/dL
A/G Ratio	0.56	1.1–2.5
AST/ALT Ratio	2.11	<1.00

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Table 6: Renal Profile.

Parameter	Day 1	Day 11	Reference Range
Creatinine	6.7 mg/dL	10.09 mg/dL	0.5–1.2 mg/dL
Urea	137 mg/dL	176 mg/dL	17.1–49.2 mg/dL
BUN	64 mg/dL	76 mg/dL	8–23 mg/dL
BUN/Creatinine Ratio	9.6	6.97	12–16
Sodium	137 mmol/L	138 mmol/L	136–145 mmol/L
Potassium	5.7 mmol/L	5.86 mmol/L	3.5–5.1 mmol/L
Calcium (Total)	7.3 mg/dL	6.5 mg/dL	8.8–10.2 mg/dL
Phosphorus	9.1 mg/dL	8.4 mg/dL	2.5–4.5 mg/dL

Table 7: ABG Analysis (Day 11).

Parameter	Result	Unit	Reference Range
ABG (Arterial Blood Gas)			
pH	7.23	-	7.35 - 7.45
pCO_2	21	mm Hg	35 - 48
pO_2	35	mm Hg	83 - 108
HCO_3^- (actual)	8.8	mmol/L	22 - 26
Na^+	137	mmol/L	136 - 145
K^+	5.7	mmol/L	3.5 - 5.1
Ca^{2+} (ionized)	3.69	mg/dL	4.5 - 5.3
Glucose	91	mg/dL	74 - 100
Lactate	0.7	mmol/L	0.5 - 2.2

Table 8: Ultrasound Abdomen & Pelvis.

Parameter	Findings
Kidney Size	Right: 8.2 × 4.5 cm; Left: 8.3 × 4.3 cm Bilaterally reduced size indicating chronic renal disease
Echotexture & Differentiation	- Increased cortical echogenicity bilaterally - Loss of corticomedullary differentiation (CMD) - Lobulated renal margins
Pelvicalyceal System (PCS)	Mild fullness bilaterally, likely due to bladder overdistension
Urinary Bladder	Adequately distended with regular contour; no diverticula or wall irregularities
Post-Void Residual Urine (PVRU)	Within normal limits

Impression:
Ultrasound findings are consistent with bilateral chronic renal parenchymal disease, corresponding to Stage 4 CKD. The post-void residual urine is within normal limits, indicating no significant lower urinary tract obstruction. Continued nephrology evaluation and monitoring are advised.

Table 9: Other Investigations.

Parameter	Value	Reference Range
Uric Acid	7.3 mg/dL	2.4–5.7 mg/dL
TSH	8.57 µIU/mL	0.27–4.20 µIU/mL
Fasting Glucose	76 mg/dL	<100 mg/dL
HbA1c	5.9%	<5.7% (normal)
HIV	Negative	Negative
HBV	Negative	Negative
HCV	Negative	Negative
ANA profile	Negative	Negative
RA Factor	Negative	Negative
Skin Biopsy	It was not done as leisons improve after dialysis	

Treatment And Follow-Up:

1. Dialysis Optimization

- The patient received maintenance haemodialysis sessions three times per week with close monitoring of fluid status, electrolytes, and anaemia parameters.
- Serum potassium levels were regularly assessed, and episodes of hyperkalemia were managed during dialysis as needed.
- Anaemia associated with chronic kidney disease was addressed with intermittent darbepoetin injections (100 mcg/0.5 mL) and transfusion of two units (600 mL) of packed red cells, administered as clinically indicated to improve haemoglobin levels and reduce fatigue.

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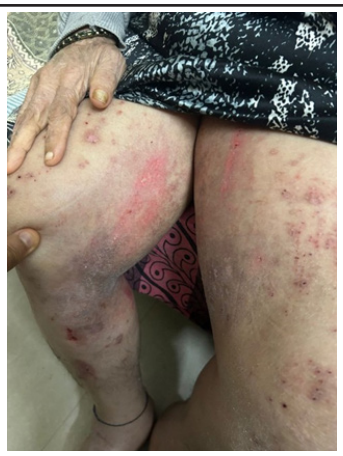

Figure 1: Bilateral thighs showing erythematous plaques with excoriations secondary to scratching in a patient with uremic pruritus. (Multiple excoriated lesions with erythematous plaques over thighs and shins).

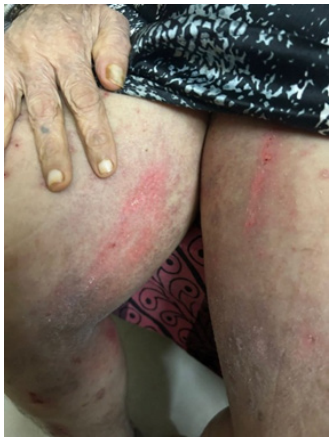

Figure 2: Close-up of inflamed plaques and linear scratch marks along the medial thighs. (Hyperpigmented and crusted papules from chronic scratching).

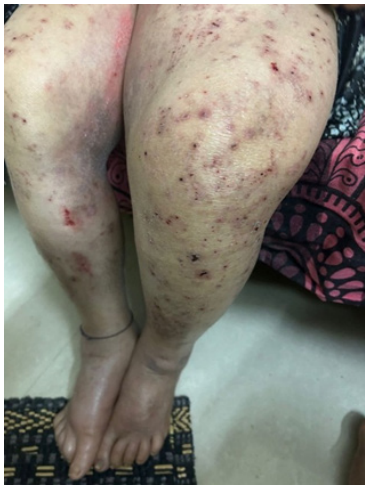

Figure 3: Both legs demonstrating hyperpigmented papules, crusting, and pitting pedal oedema—classic features of chronic CKD-associated pruritus. (Pitting pedal oedema is evident in the lower limbs).

2. Management of Uremic Pruritus and Skin Care

- Gabapentin 100 mg was administered orally at bedtime and titrated gradually up to 300 mg as tolerated for relief from pruritus.
- 10% urea with dexpanthenol cream was applied 3–4 times daily to restore skin hydration and barrier function.
- Hydroxyzine 25 mg was given at night to reduce itching and improve sleep quality.
- 1% hydrocortisone cream was applied to lichenified and inflamed areas to reduce inflammation.
- The patient was advised to keep their nails trimmed short and to use protective measures, such as gloves or mittens, at night to prevent trauma and bleeding.

3. Bleeding Control and Wound Care

- Gentle skin hygiene practices using mild cleansers were maintained to reduce the risk of infection.
- Excoriated and bleeding areas were covered with non-adherent sterile dressings to promote healing.
- NSAIDs were avoided due to the increased risk of bleeding.
- The patient was closely monitored for signs of secondary infection, and prompt treatment was initiated when necessary.

4. Correction of Metabolic and Endocrine Abnormalities

- Levothyroxine 25 mcg was prescribed daily for hypothyroidism, with plans for gradual dose titration and TSH monitoring every 6–8 weeks.
- Calcitriol was given to manage secondary hyperparathyroidism.
- Hypocalcemia was corrected cautiously to avoid rapid calcium shifts that could precipitate vascular or soft tissue calcification.

5. Nutritional and Supportive Care

- The patient was advised on fluid and sodium restriction to aid fluid management.
- A renal-friendly diet low in potassium and phosphorus was recommended.
- Physiotherapy and gradual mobilisation were initiated once oedema and skin lesions improved.

Patient Education and Follow-up

- The patient was educated on the importance of adherence to the dialysis schedule to prevent fluid overload and uremic complications.
- She was counselled on avoiding vigorous scratching and maintaining skin integrity.
- Regular follow-up visits were scheduled for clinical reassessment, laboratory monitoring, and adjustment of medications as required.

Discussion

Uremic pruritus, or CKD-Associated Pruritus (CKD-aP), is a distressing symptom seen in a significant proportion of patients with advanced chronic kidney disease, particularly those undergoing haemodialysis. While often overlooked in routine care, it poses a serious burden due to its effects on physical, psychological, and social well-being. The prevalence of CKD-aP ranges from 20% to 50%, yet it remains underdiagnosed, partly because many patients do not report it unless specifically asked. Its impact on the quality of life is profound, leading to sleep disturbances, depression, anxiety, and even increased mortality due to cardiovascular and infectious complications stemming from chronic inflammation and skin disruption [1,2].

The pathophysiology of uremic pruritus is complex and multifactorial. Contributing mechanisms include the accumulation of poorly cleared toxins, peripheral neuropathy, immune system dysregulation, xerosis (dry skin), secondary hyperparathyroidism, calcium- phosphate imbalance, mast cell activation, and altered expression of opioid receptors [3,4]. Notably, sys-

temic inflammation and increased levels of interleukin-6 (IL-6) and C-Reactive Protein (CRP) are associated with greater itch severity, supporting the inflammatory basis of this condition [5].

Our case presents a 75-year-old woman with ESRD due to diabetic nephropathy who developed severe uremic pruritus with bleeding secondary to intense scratching. Pruritus with bleeding is a clinical marker of poor disease control, reflecting the severity and chronicity of her symptom burden. Her condition was further complicated by hypothyroidism, anaemia, and hypoalbuminemia, all of which contributed to fatigue, skin fragility, and impaired healing. Hypothyroidism can worsen pruritus. The delay in initiating dialysis likely worsened her symptom burden. Delayed dialysis worsens systemic complications. Her pruritus improved with a multifaceted approach—initiation of regular haemodialysis, administration of gabapentin (an alpha-2-delta ligand effective in neuropathic itch), antihistamines, and emollients. Gabapentin and skin care improve quality of life. This combination therapy reflects current best practices recommended in international nephrology guidelines [6,7].

Moreover, the patient's hypothyroidism illustrates the overlap of metabolic and endocrine dysfunctions in ESRD. Hypothyroidism itself can exacerbate fatigue, cognitive dysfunction, and skin dryness. Her low albumin and protein levels indicated poor nutritional status, which required dietary intervention and monitoring. These overlapping morbidities in elderly CKD patients highlight the importance of a tailored, comprehensive approach [8].

Wound care was equally critical in this patient due to excoriations that risked superimposed bacterial infections. The use of non-adherent dressings, gentle skin cleansing, and corticosteroid creams minimised trauma and inflammation. Importantly, the patient was also educated on protective behaviours such as nail trimming and the use of gloves to prevent further skin damage during sleep. Biopsy was not done—while clinical improvement justified not doing a biopsy, histology could have clarified secondary dermatosis.

Multidisciplinary collaboration is indispensable in managing CKD-aP. Nephrologists must work in tandem with dermatologists, nutritionists, endocrinologists, mental health professionals, and physiotherapists. A patient-centric, integrative treatment plan is key not only to symptomatic control but also to improving dialysis adherence and overall prognosis [9].

This case reinforces that pruritus in CKD is not merely a benign dermatologic issue but a systemic, quality-of-life-altering condition. Proactive screening, patient education, and timely intervention are imperative. With an ageing global population and rising CKD prevalence, healthcare systems must prioritise the management of non-traditional CKD symptoms such as pruritus as part of comprehensive renal care [10].

Conclusion

This case highlights the clinical burden of uremic pruritus in elderly patients with ESRD and diabetes. Early recognition, dialysis initiation, and individualised treatment strategies are critical to alleviating symptoms and preventing complications such as infection, anaemia, and immobility.

Comprehensive management involving skin care, pharmacologic therapy, hormonal correction, and nutritional support can greatly enhance the quality of life for CKD patients.

Routine screening for pruritus and addressing it proactively in the treatment plan is essential to ensure patient-centred care in nephrology practice.

Data Availability: The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare that there is no conflict of interest regarding the publication of this article.

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