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From Hallux Necrosis to Atypical Calcinosis Patterns: What is the Underlying Condition? A case report

De la nécrose du gros orteil à des images atypiques de calcinose : de quoi s'agit-il ? Une observation clinique

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Résumé
La calcinose correspond à la formation et à l'accumulation de dépôts de calcium dans la peau et les tissus environnants. Si les petites calcifications peuvent passer inaperçues, elles peuvent toutefois être douloureuses ou entraîner des complications. Nous rapportons un cas à début tardif chez une femme âgée de 76 ans avec antécédent d'hypertension, présentant des images radiologiques inhabituelles de calcinose chez une patiente récemment diagnostiquée de sclérodermie. Malgré les différentes options thérapeutiques, sa prise en charge reste un défi majeur.

Mots-clés : calcification, calcinose, scleroderma
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Summary
Calcinosis is the result of the formation and buildup of calcium deposits in the skin and surrounding tissues. While small calcifications may go unnoticed, they can cause pain or lead to complications. Here, we present a late-onset case involving unusual radiological image of calcinosis in a 76-year-old woman with history of hypertension recently diagnosed with scleroderma. Despite various treatments, managing calcinosis remains a major challenge.

Keywords: calcification, calcinosis, scleroderma

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Introduction

Calcinosis is the result of the formation and buildup of calcium deposits in the skin and surrounding tissues. It can affect up to 20-40% of individuals with scleroderma, with a similar occurrence in both limited and diffuse forms of the disease. Calcinosis often appears on the hands, forearms, elbows, and knees, even when blood calcium levels are normal. Small calcifications may sometimes go unnoticed, but they can also cause pain, impair joint function, or lead to complications such as ulcers, infections, or nerve compression. Here, we present a late-onset case involving unusual radiological image of calcinosis in a patient recently diagnosed with scleroderma.

Case Report

Mrs. F.N, a 76-year-old woman with a history of hypertension managed with monotherapy and being monitored in endocrinology for a multinodular thyroid gland. Our consultation was requested during her hospitalization in vascular surgery, for the management of necrosis of the hallux, in the context of chronic asymmetric inflammatory polyarthralgia affecting both large and small joints, sparing the distal interphalangeal joints, without associated swelling. Extra-articular signs included dyspnea class II of New York Heart Association (NYHA) and a history of Raynaud's phenomenon all evolving in a context of fatigue, and the absence of fever.

Clinical examination revealed a bedridden patient who was stable from a hemodynamic and respiratory standpoint. She was normocardic, normotensive, eupneic and afebrile. Cardiovascular examination revealed a systolic murmur at the aortic focus radiating to the vessels of the neck vessels on auscultation and a decreased distal pulse of the right lower limb.

A vascular-neurological examination showed the following:

Right lower limb: There were necrosis of the great toe, Palpation reveals the femoral, popliteal, and anterior tibial pulses were present, while the posterior tibial pulse was absent.

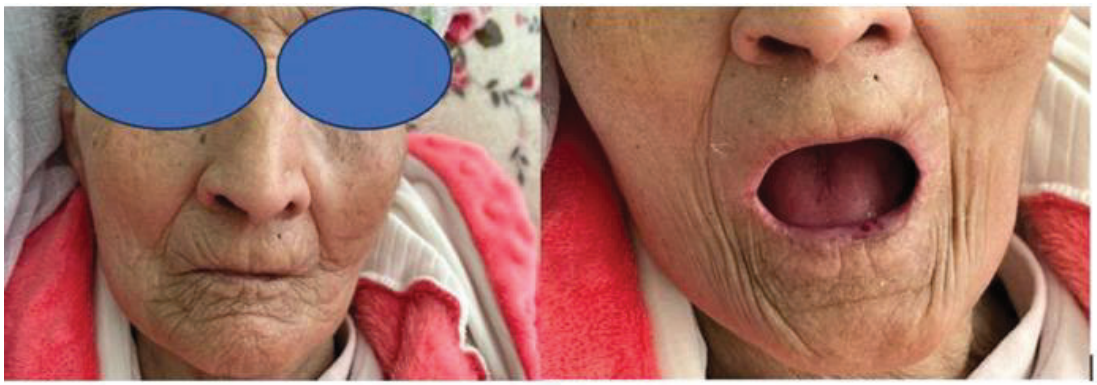
Left lower limb: The femoral, popliteal, anterior tibial, and posterior tibial pulses were present.

The remainder of the vascular examination did not reveal any additional abnormalities.

The pleuropulmonary examination was unremarkable, notably the patient exhibited no signs of orthopnea and there were no crepitant rales.

Osteoarticular examination showed a difficulty standing and walking without assistance, significant atrophy of the interosseous muscle of both hands, , pain on palpation of both shoulders with partial limitation of passive and active ranges of motion, tenderness of both hips with limited external rotation of the right hip, and a hallux valgus of the right foot with a supra-adductus of the second toe overlapping the third toe [Image 1].

Image 1. Clinical images showing thin lips, restricted mouth opening with accentuated perioral radial furrows, and multiple telangiectasias present on the tongue and lower lip [Photos taken at Hassan II University Hospital, Fes]



The dermatological and mucosal examination showed:

Sclerodactyly with flexion contractures of the fingers, thin lips with restricted mouth opening, accentuated perioral radial furrows, and a pinched nose. Punctate telangiectasia on both hands, lips, and tongue [Image 1- 2].

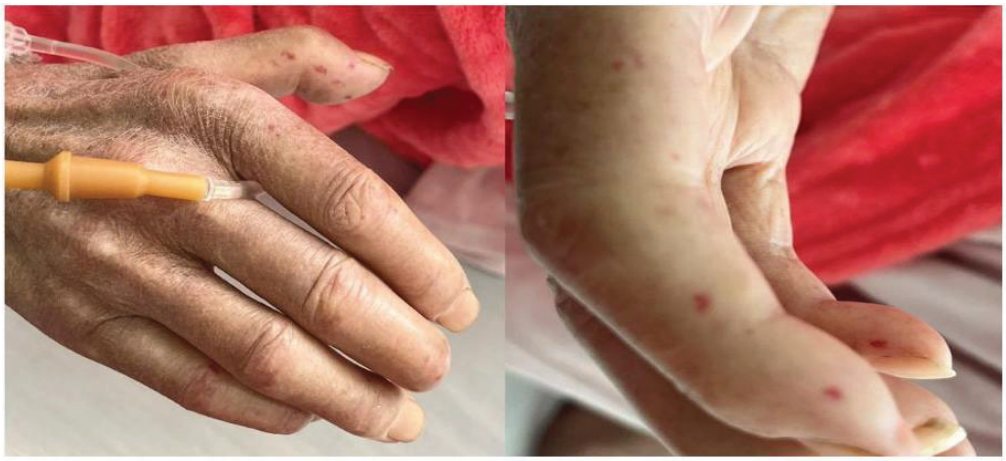


Image 2. Clinical images showing a flexion retraction of fingers with sclerodactyly and presence multiple telangiectasias. [Photos taken at Hassan II University Hospital, Fes]

The presence of subcutaneous calcifications on the medial aspect of both knees, both elbows, the digital extremities, and the fourth right toe [Image 3].

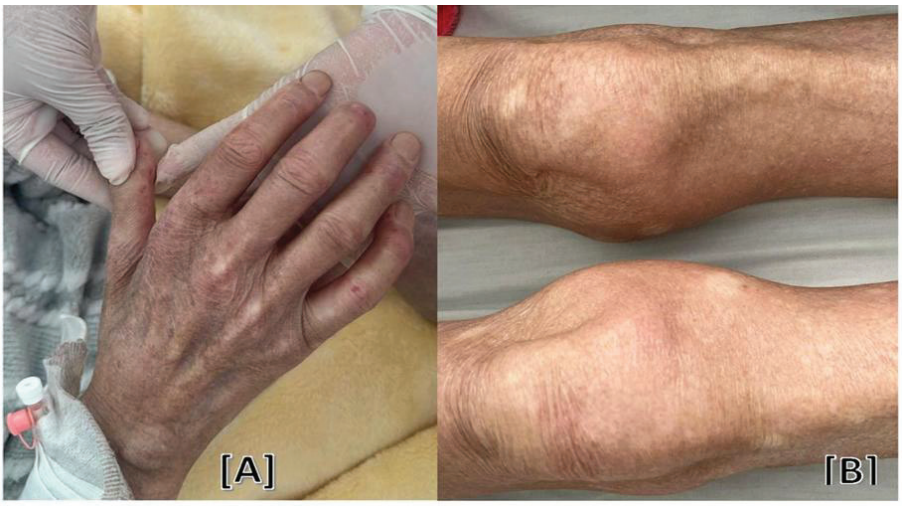


Image 3. Clinical images showing the presence of subcutaneous calcifications on the carp, the digital extremities **(A)** and the medial aspect of both knees **(B).** [Photos taken at Hassan II University Hospital, Fes]

Swollen right toe with shiny skin, associated with necrosis of the first right toe, and bilateral onychomycosis [Image 4].

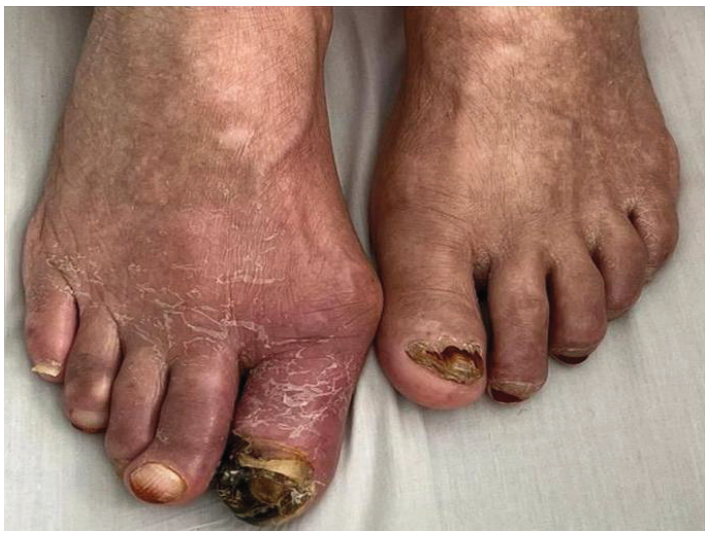


Image 4. Clinical images show a swollen right toe with shiny skin, associated with necrosis of the first right toe and bilateral onychomycosis. [Photos taken at Hassan II University Hospital, Fes]

The rest of the somatic examination was unremarkable.

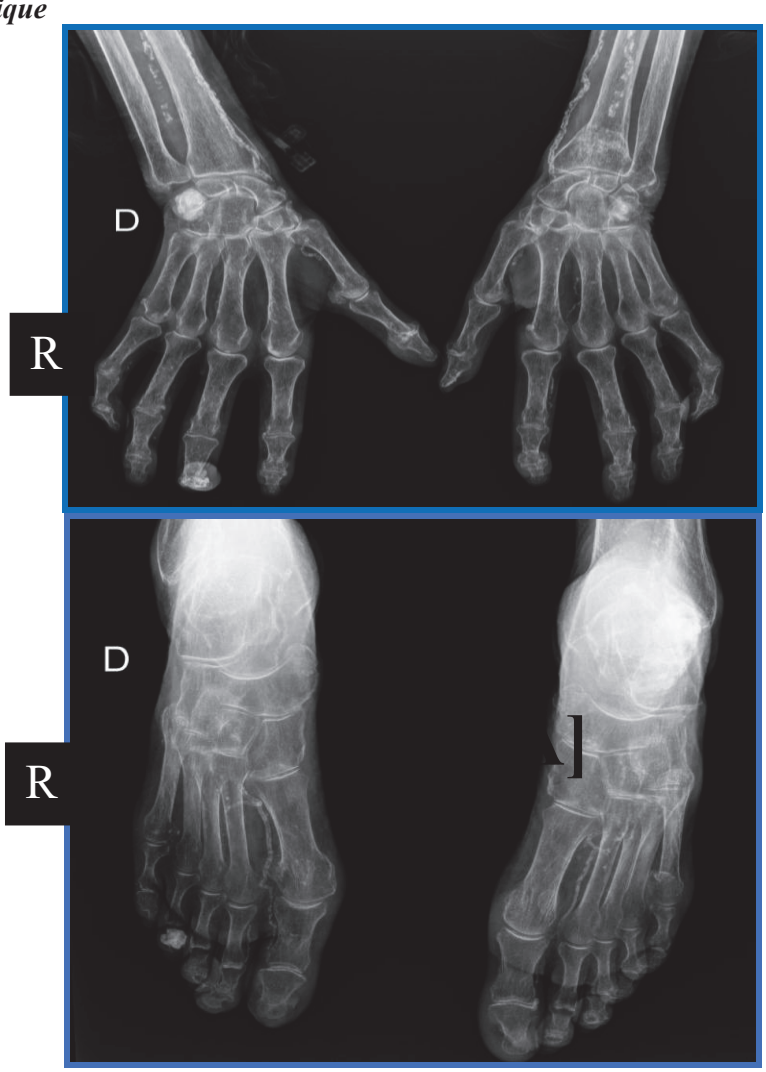
Biological and Radiological Findings

The biological workup revealed the following: a positive rheumatoid factor at 60 UI/ml, negative anti-cyclic citrullinated peptide antibodies, and positive antinuclear antibodies with a titer of 1/640 with a speckled pattern. The polycheck test identified positive anti-CENP B antibodies.

Radiological findings were as follows:

Hand X-ray (face radiography): Diffuse bone demineralization, bilateral joint space narrowing of the proximal interphalangeal joints, calcification adjacent to the right triquetrum and the third right distal interphalangeal joint, with no signs of acro-osteolysis [Figure 1].

Forefoot X-ray: Diffuse bone demineralization, calcification adjacent to the fourth distal phalanx of the right foot [Figure 1].



Figures 1. A: Hand X-ray (face radiography): Diffuse bone demineralization, bilateral joint space narrowing of the proximal interphalangeal joints, calcification adjacent to the right triquetrum and the third right distal interphalangeal joint. **B: Forefoot X-ray:** Diffuse bone demineralization, calcification adjacent to the fourth distal phalanx of the right foot.

Pelvic X-ray: Diffuse bone demineralization with multiple soft tissue calcifications in the proximal femoral regions bilaterally [Figure 2].

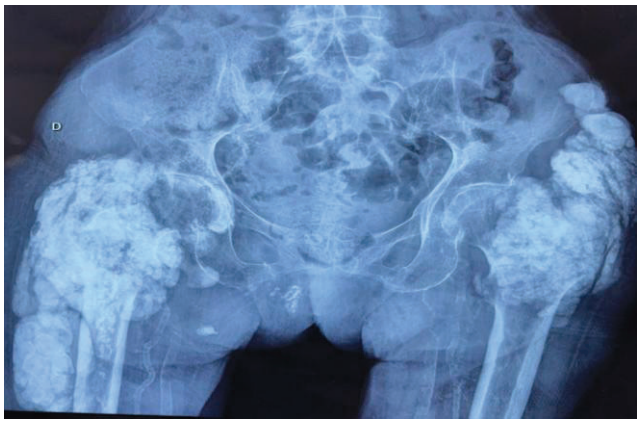
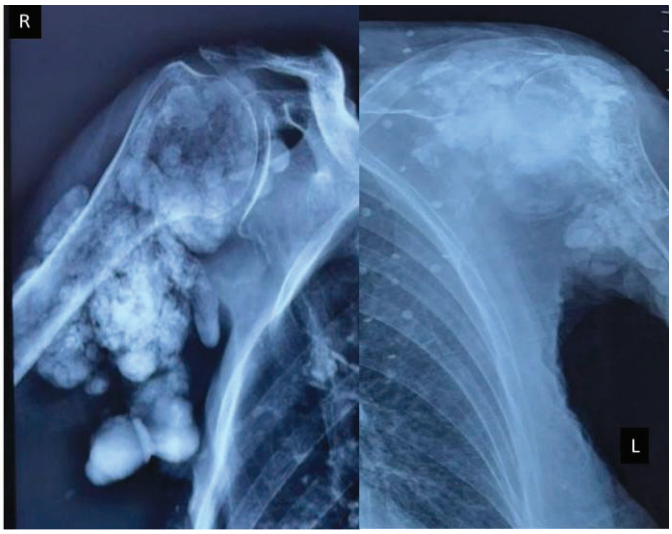


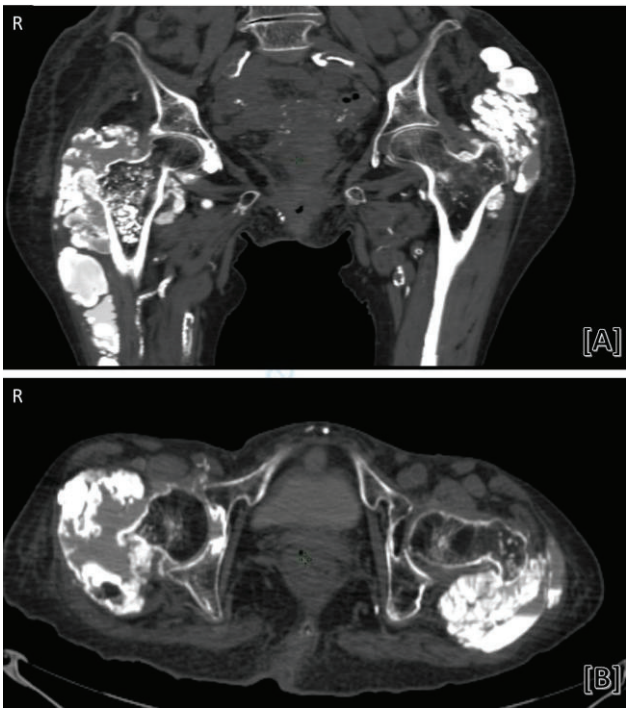
Figure 2. Pelvic X-ray: Diffuse bone demineralization with multiple soft tissue calcifications in the proximal femoral regions bilaterally.

Shoulder X-ray (AP view, neutral rotation): Multiple soft tissue calcifications around the proximal humerus bilaterally [Figure 3].



Figures 3. Shoulder X-ray: Multiple soft tissue calcifications around the proximal humerus bilaterally

An CT scan of the pelvis and femurs was performed showing: Multiple soft tissue calcifications surrounding the proximal femur bilaterally, involving the muscles of the upper third of both thighs and the left gluteal region. There were also extensive calcifications at the proximal femur bilaterally and diffuse bone demineralization. Abdominal cuts revealed significant atherosclerotic calcifications of the abdominal aorta and bilateral iliac arteries [Figure 4].



Figures 4. A CT scan of the pelvis + femurs [A]: frontal section, [B]: axial section

According to the 2013 ACR/EULAR classification criteria for systemic sclerosis, the diagnosis of scleroderma was confirmed.
Multiple soft tissue calcifications surrounding the proximal femur bilaterally, involving the muscles of the upper third of both thighs and the left gluteal region. There were also extensive calcifications at the proximal femur bilaterally and diffuse bone demineralization.

◊ As part of the complementary examinations and visceral assessment**:**

The blood analysis revealed normochromic microcytic anemia, normal renal function, and the phosphocalcic assessment showed normal calcium and phosphate levels.
Chest X-ray (face radiography) was performed showing the absence of pulmonary nodules or micronodules, widening of the thoracic aorta, and global cardiomegaly (cardiothoracic ratio measured at 0.6) [Figure 5].

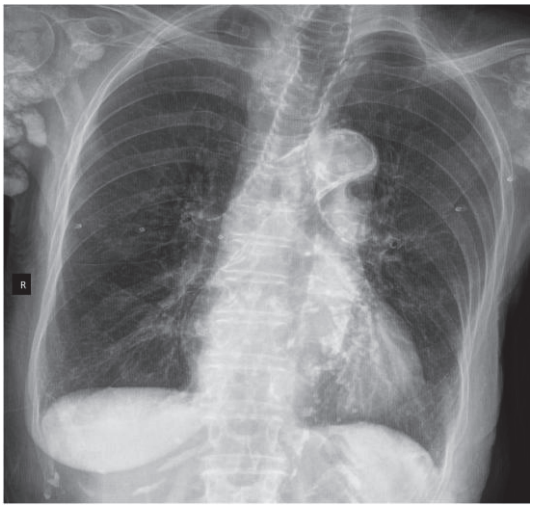


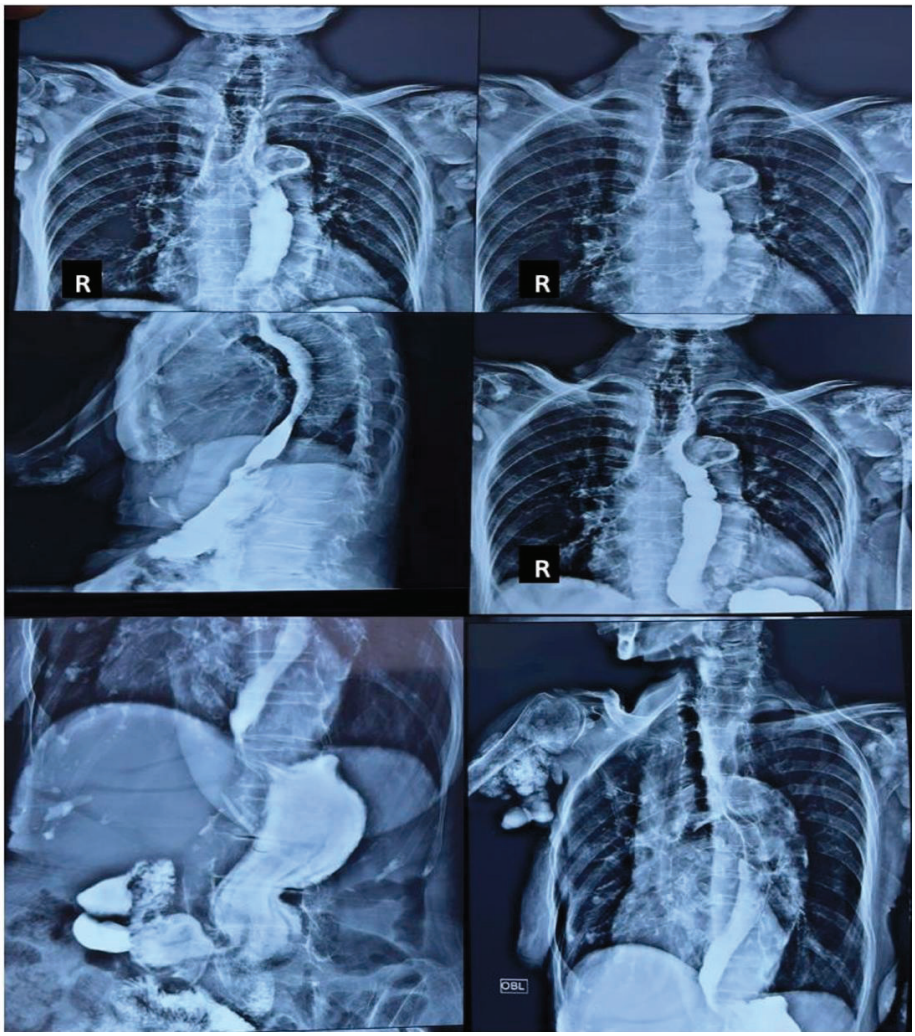
Figure 5. Chest X-ray (face radiography):

Absence of pulmonary nodules or micronodules, widening of the thoracic aorta, and global cardiomegaly (cardiothoracic ratio measured at 0.6)
Electrocardiogram (ECG) revealed a regular sinus rhythm, Heart rate 102 bpm, normal heart axis, incomplete bundle branch block.
A thoracic CT scan was performed, revealing the following findings:
In mediastinal window: There is evidence of an aneurysmal dilatation of the ascending thoracic aorta, measuring 35 mm in the anteroposterior diameter, associated with significant atherosclerotic burden in the aortic arch, which is partially calcified. Global cardiomegaly is noted, with a cardio-thoracic index of 0.6. There is no early cavo-supra-hepatic reflux. The pulmonary artery trunk is not dilated, measuring 28 mm, with a PA/Ao ratio of less than 1. There is no pleural or pericardial effusion. The right heart chambers are not dilated, with a RV/LV ratio of less than 1. A multinodular thyroid gland is observed. There are no signs of dilatation or abnormal images of the systemic or bronchial arteries.
In parenchymal window: No suspicious pulmonary nodules or micronodules are present.
In bone window: Multiple calcifications are noted in the soft tissues of the upper extremity bilaterally, particularly in the proximal humerus, associated with joint effusion and capsular calcification on the left side.
A transthoracic echocardiogram (TTE) was performed revealing severe calcified aortic stenosis. The left atrium was dilated, while the right chambers and the inferior vena cava (IVC) were non-dilated, with the IVC also being compliant. The left ventricle was non-dilated and hypertrophied, with preserved systolic function and homogeneous contractility. The pericardium was dry, and there was no evidence of pulmonary arterial hypertension.

The supra-aortic trunks echo-Doppler revealed extensive atheromatous plaques at the carotid bifurcations bilaterally, partially calcified but non-stenosing and stable in appearance.

The patient also benefited from arteriography which revealed significant atheromatous plaque in the aorta, with a very thin right external iliac artery at its origin, occluded distally, and collateral development to the mid femoropopliteal axis, which remains patent. The anterior tibial artery showed segmental stenoses, while the femoral artery and popliteal artery were occluded; both the anterior tibial artery and the anterior tibial artery were also occluded, but the femoral artery remained patent with segmental stenoses. A TCPO2 assessment showed a normal value of 48 mmHg.

An esophago-gastro-duodenal transit (O.G.D.T.) was performed returning normal [Figure 6].



Figures 6. A normal esophago-gastro-duodenal transit (O.G.D.T.)

The respiratory function tests were unsuccessful because the patient was uncooperative.

The patient benefited from multidisciplinary care, which included:

Interventional Procedures: She underwent arteriography with an attempted recanalization and angioplasty of the external iliac artery, which was unsuccessful. This was followed by an amputation of the big toe, complicated by infection. Subsequently, a revision surgery to regularize the big toe on the right lower limb was performed, and it was successful.

The patient was initiated on curative anticoagulation and statins, with analgesics provided on demand and she was considered a

candidate for treatment with methotrexate after complete wound healing had been achieved and her anemia had been corrected, provided that no other contraindications were identified.
Rigorous blood pressure monitoring was advised, and she was referred to cardiology for close follow-up.
For the cutaneous calcinosis, the patient did not experience any functional impairment or pain, and there was no indication for surgical treatment.
Therapeutic education for the patient and her family was considered in order to initiate the appropriate treatment, ensure adherence to the therapy, facilitate regular follow-up, and prevent potential complications.

Discussion

Our patient had a history of hypertension managed with monotherapy and being monitored in endocrinology for a multinodular thyroid gland. Her consultation was requested during her hospitalization in vascular surgery, for the management of necrosis of the hallux, in the context of chronic asymmetric inflammatory polyarthralgia affecting both large and small joints, sparing the distal interphalangeal joints, without associated swelling. In this context, SSc was suggested. Indeed, SSc is a complex autoimmune connective tissue disease characterised by vascular dysfunction, fibrosis, and immune dysregulation, with calcinosis being a frequent and challenging complication. Calcinosis affects up to 30% of SSc patients and is typically dystrophic, occurring in the setting of normal calcium-phosphate metabolism (1). It predominantly presents in acral sites such as the fingers, elbows, and knees, and may range from asymptomatic to severely painful or disabling lesions. The pathogenesis remains incompletely understood, but chronic ischaemia, repeated trauma, and local tissue hypoxia have been strongly implicated (2). Vascular injury, including ulnar artery occlusion, has been significantly associated with calcinosis, highlighting the role of digital ischaemia in its development (3). Inflammatory mechanisms and overexpression of hypoxia-related proteins, such as GLUT-1, may further promote calcium deposition (4). As shown in our patient, calcinosis may present clinically as nodules, plaques, or tumoral deposits, often becoming painful, ulcerated, or secondarily infected. The lesions are frequently more extensive on imaging than on physical examination, with standard radiography serving as the first-line modality (5). Our patient benefited from multidisciplinary care, including interventional procedures (recanalization and angioplasty of external iliac artery and amputation of the big toe) associated with curative anticoagulation and statins. We know that in this case, management remains difficult, as there is no standardised or universally effective therapy. Various medical treatments have been attempted, including calcium channel blockers, minocycline, colchicine, sodium thiosulfate, and intravenous immunoglobulin, with variable success (6). In refractory cases, options such as extracorporeal shock wave therapy and surgical excision have been considered (7). Some isolated reports have shown potential benefit from biologics like rituximab (8). The impact on quality of life is considerable, particularly in cases with pain, ulceration, or functional impairment. Identifying risk factors such as disease duration, autoantibody profile, and vascular complications may help predict patients at risk (9-10). Further research is needed to understand the mechanisms and develop targeted therapies.

Conclusion

Calcinosis is common in patients with SSc and refers to the deposition of calcium salts in the skin's subepidermal layers. SSc-associated calcinosis is linked to significant morbidity, especially due to skin ulcerations and a heightened risk of infection. Despite the wide range of treatments attempted, managing calcinosis remains a formidable challenge.

Ethics approval and consent to participate

This clinical case report did not require formal ethics committee approval; however, the study was reviewed and approved by the head of Department of rheumatology.
The patient provided informed consent for her case to be published.

Availability of data and materials

The data related to this clinical case are available from the corresponding author upon reasonable request.

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Conflict of interest disclosures

The authors declare no conflict of interest.

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