Case Report

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Systemic sclerosis with interstitial lung disease and myocardial infarction: a case report

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Introduction and importance: Systemic sclerosis (SSc) is a rare autoimmune connective tissue disorder that causes fibrosis due to an accelerated inflammatory response. One of the most frequent co-morbidities with SSc is interstitial lung disease (ILD), which is also one of the biggest killers among SSc patients.

Case presentation: The authors present a rare case of diffuse SSc with ILD and myocardial infarction having a history of Raynaud phenomenon, skin thickening, and shortness of breath. Antinuclear antibody and antitopoisomerase antibody tests were positive. The patient was managed medically and the condition of patient is improving.

Clinical discussion: SSC can affect the skin as well as other organs, with the lungs being the most frequently involved and seriously impacted. SSc patients can have multiple organ involvement like the skin, lungs, heart, kidneys, and gastrointestinal tract. Because ILD is the leading cause of death among people with SSC, early diagnosis and high suspicion of lung involvement can reduce mortality.

Conclusion: The mortality rate for SSC associated with ILD is extremely high. Even though ILD is common in SSc, it might be difficult to identify and detect early for which a high-resolution CT scan can be used. In SSc patients, heart involvement can coexist with ILD.

Keywords: case reports, diffuse, interstitial lung disease, systemic sclerosis

Introduction

Systemic sclerosis (SSc) is a rare autoimmune disease characterized by skin and multiple organ fibrosis, dysregulated immunity, and microvascular injury[1]. Approximately 40% of patients with SSc have interstitial lung disease (ILD), which remains mild in many patients but early identification of the progression of fibrosis towards organ failure, though challenging, is very important as ILD and Pulmonary Arterial Hypertension account for nearly half of all SSc deaths[1].

This case report has been reported in accordance with the Surgical CAse REport (SCARE) criteria[2].

HIGHLIGHTS

- Systemic sclerosis with interstitial lung disease and myocardial infarction is a rare autoimmune disease mostly affecting women.
- According to skin involvement, systemic sclerosis can be a limited or diffuse type.
- Interstitial lung disease is the leading cause of death among systemic sclerosis patients.

Case details

A 34-year-old lady presented to the emergency department with increased shortness of breath for 2 days. She had a history of bluish discolouration of fingers and toes on cold exposure for 20 years, lesions on the face, neck, bilateral forearms, and hand for 10 years, difficulty breathing, and generalized body weakness for 9 months.

Initially, the discolouration was interchangeably whitish or blue and associated with frequent, multiple self-resolving ulcerated lesions on tip of fingers. There was a history of whitish discolouration and thickening of nails with spontaneous fall and regrowth of nails from fingers. The hand and feet became reddish with the application of heat. After 10 years, she developed multiple brownish, rough, scaly patches on bilateral forearms and the proximal part of the dorsum of hands, bilateral ears, forehead, and neck region. Then, 9 months back, she developed shortness of breath whenever she tried to sleep and was relieved by sitting. She also developed progressive difficulty in swallowing and generalized weakness of the body, which limited her working capacity.

She had a history of abortion 15 years back and has had no live birth to date. She had no lesions or nail changes on her toes; and no dryness of the eyes or mouth. Also, she had no history of fever, chest pain, palpitation, photosensitivity, hair fall, oral ulcers, joint pain, or any family history of a similar illness.

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On examination, multiple well-defined to ill-defined, discrete to confluent brownish hyperpigmented macules and papules on bilateral forearms, neck, face, and ears. There was whitish discolouration and thickening of the nails along with tightening of the skin of the fingers and subungual dermis as shown in Figure 1. While presenting, she had a SPo2 of 73% at room air and was given continuous oxygen at 5–7 l per minute and was admitted for further evaluation. On chest auscultation, basal crepitations with decreased air entry on the anterior aspect of the bilateral lung field were present. There was no conjunctival chemosis or ocular involvement.

For evaluation of the disease, routine investigations of blood, liver function tests, and renal function tests were sent, which were within normal limits. Her COVID-19 test was negative. A chest radiography showed bilateral bibasal subpleural reticular infiltrates as shown in Figure 2. Spirometry suggests moderately severe restriction with an FEV1 of 1.42 l and an FVC of 1.55 l with an FEV1/FVC ratio of 0.916. Further investigation, high-resolution computed tomography (HRCT) showed ground glass opacification suggestive of ILD, nonspecific interstitial pneumonia as shown in Figure 3. Also, the antinuclear antibody (ANA) test and antitopoisomerase 1 (Scl-70) antibody test were positive suggestive of SSc-ILD. Likewise, electrocardiography had an abnormal Q wave suggestive of old myocardial infarction. Echocardiography (echo) showed minimal pericardial effusion with normal left ventricular systolic function with a left ventricular ejection fraction of 55%.

She was started with bosentan, nifedipine, and mycophenolate mofetil and also treated under cyclophosphamide and methylprednisolone monthly pulse therapy. The patient was discharged after symptomatic improvement and asked to follow-up regularly. The condition of the patient is improving during follow-up in subsequent visits.

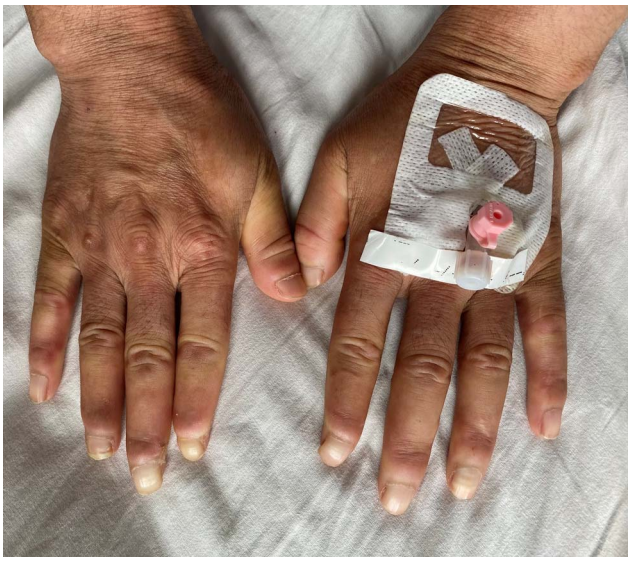

Figure 1. Whitish discolouration and thickening of nails along with tightening of the skin of fingers and subungual dermis.

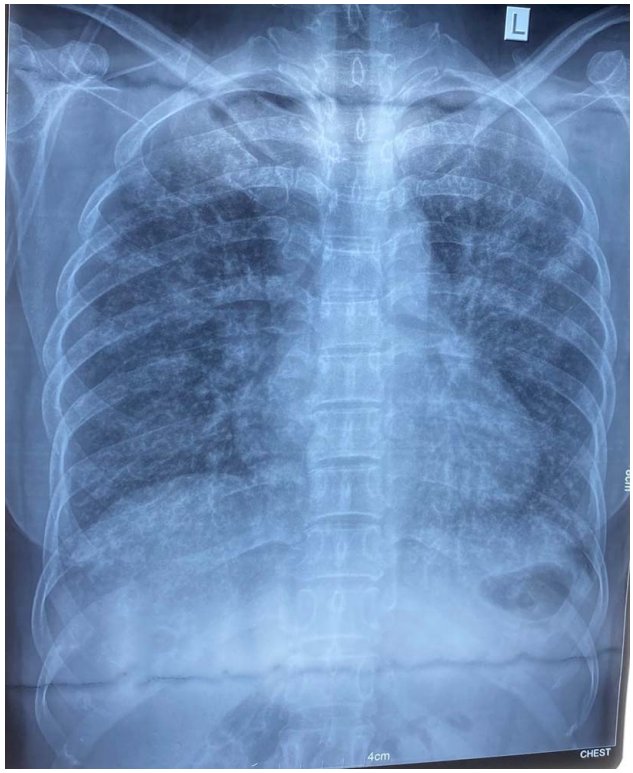

Figure 2. Chest radiography showed bilateral bibasal subpleural reticular infiltrates.

Discussion

SSc shows generalized fibrosis involving the skin, lungs, gastrointestinal tract, kidneys, and heart[1]. According to the extent of skin involvement, SSc is divided into limited systemic sclerosis (lcSSc) confined to the fingers, face, and distal extremities and diffuse cutaneous systemic sclerosis (dcSSc) extending to the trunk and proximal extremities[1]. It is a rare disease with a variable incidence of less than 10–21 per million according to different regions in the world[1]. In our case, the trunk and proximal extremities were also involved.

Genetic factors like single nucleotide polymorphisms and epigenetic abnormalities, environmental factors, and occupational exposures to silica dust, vinyl chloride, and organic solvents can cause or trigger SSc in genetically susceptible individuals[1].

In SSc, the vascular injury causes endothelial activation; production of endothelin and chemokines; increased expression of adhesion molecules; and platelet activation recruiting inflammatory cells[1]. Activated type 2 T helper (TH2) cells and macrophages secrete transforming growth factor-β (TGFβ); B cells produce autoantibodies and IL-6, and dendritic cells secrete interferon-α (IFNα) and platelet-derived growth factor 4 (PDGF4) activating fibroblasts, which generate reactive oxygen species (ROS) and differentiate into myofibroblasts resulting in excessive fibrosis[1].

SSc patients can have multiple organ involvements, like the lungs causing pulmonary fibrosis, the heart causing congestive heart failure or cardiomyopathy, the kidneys causing rapidly progressive renal failure, and gastrointestinal tract causing malabsorption, pseudoobstruction, or diarrhea[3]. In our case,

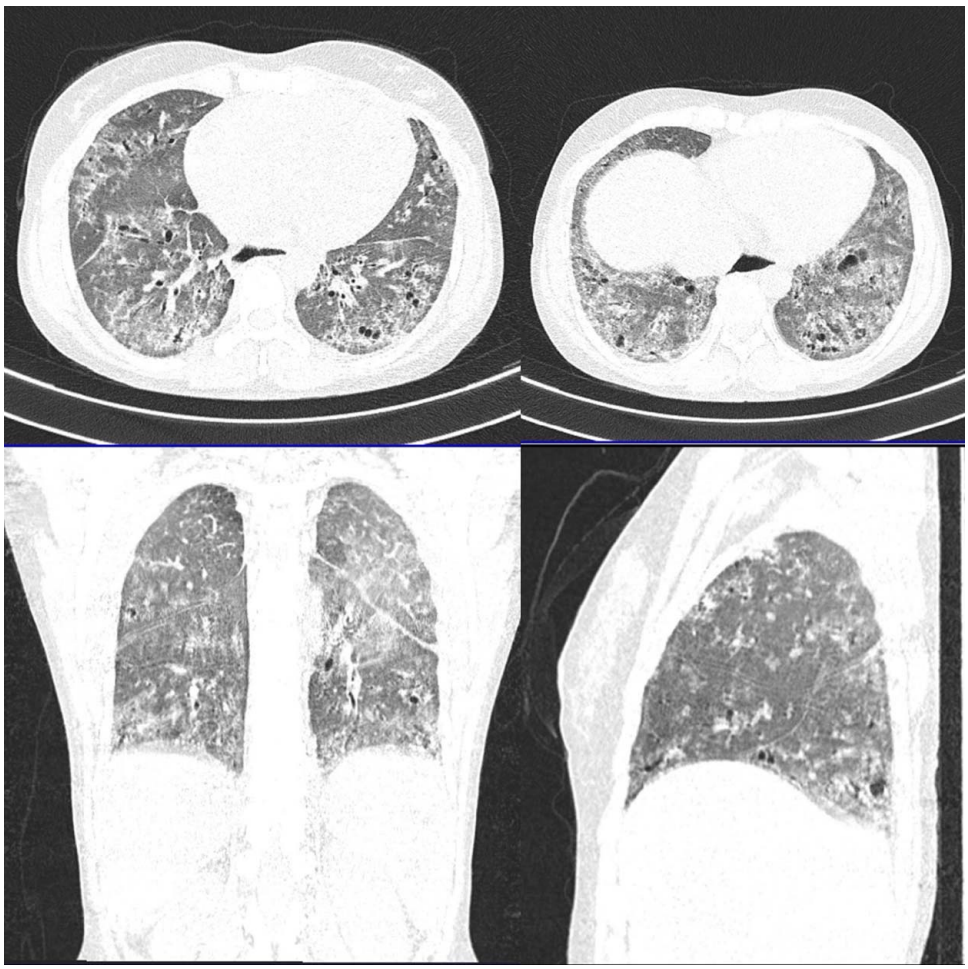

Figure 3. High Resolution computed tomography showing ground glass opacification.

pulmonary fibrosis, anteroseptal and anterior myocardial infarction, and minimal pericardial effusion were present. The patient had normal left ventricular systolic function with a left ventricular ejection fraction of 65% and a normal kidney function.

Likewise, one study showed that 21% of scleroderma patients had never been pregnant, while fetal deaths occurred in 14% of pregnancies, primarily owing to spontaneous abortions and perinatal deaths[4]. Our case also has a history of abortion as well. So, large-scale studies are necessary to evaluate the pregnancy outcomes, abortion, and management of those patients.

Among Ssc patients, the development of ILD is higher in dcSSc, older age at disease onset, and the presence of anti-Scl-70 /anti-topoisomerase I antibody[5]. Lung involvement causing ILD is common in SSc and is a leading cause of mortality[5]. According to a study, the mortality due to SSc-ILD has increased from 6 to 33% over the 30-year time frame making ILD the most frequent cause of SSc-related death[6].

According to ACR-EULAR criteria, skin thickening of the fingers of both hands extending proximal to the metacarpophalangeal joints is a sufficient criterion to diagnose SSc with a score of 9[1]. A score of more than or equal to nine calculated by the features like skin thickening of the fingers (puffy fingers and sclerodactyly), fingertip lesions including digital tip ulcers and fingertip pitting scars, telangiectasia, abnormal nailfold capillaries, lung involvement, Raynaud phenomenon, and lastly, scleroderma-related autoantibodies can also be used to diagnose SSc[1]. SSc-ILD presents with shortness of breath and cough along with the above-mentioned features[7]. In our case, the Raynaud phenomenon, lesions on the face, neck, bilateral forearms, and hand, difficulty breathing, and generalized body weakness were present.

ILD can occur in patients with both lSSc and dSSc[5]. SSc-ILD can even occur without any respiratory symptoms urging high suspicion and comprehensive assessment with chest HRCT and spirometry for ILD in SSc patients[5]. Fibrotic features on chest radiography or HRCT with or without velcro crepitation suggest SSc-ILD[5]. Likewise, spirometry showing a restrictive pattern with decreased forced vital capacity (FVC) and diffusion capacity of the lung for carbon monoxide (DLCO) also suggest SSc-ILD[5]. The most common imaging pattern on HRCT is a nonspecific interstitial pneumonia pattern with a minority of usual interstitial pneumonia[7]. In our case, HRCT showed ground glass opacification suggestive of ILD, Nonspecific interstitial pneumonia and spirometry suggest moderately severe restriction with a FEV1 of 1.42 l and a FVC of 1.55 l with an FEV1/FVC ratio of 0.916.

Also, patients with SSc frequently have positive results for ANA and anti-Scl-70 (antitopoisomerase I) antibodies[8]. In SSc-ILD,

anti-Scl-70 antibodies are present in about 45% of the cases[8]. Anti-Scl-70 antibodies are detected in around 40% of patients with diffuse cutaneous systemic sclerosis (dcSSc) and lower than 10% of patients with limited cutaneous systemic sclerosis (lcSSc[8]. In our case, both ANA and anti-Scl-70 were positive.

According to a study among patients with diffuse SSc, 15 percent developed severe heart disease, 16 percent developed severe pulmonary fibrosis and 24 percent developed severe skin thickening[3]. Among those with severe sin thickening, severe lung and heart involvement were present on 15 and 24 percent, respectively[3].

For the management of SSc-ILD, immunosuppression and immunomodulation are under clinical trials where patients are treated with intravenous cyclophosphamide followed by monthly pulse therapy or hematopoietic stem cell (HSC) transplantation[1]. Other drugs for SSc-ILD are mycophenolate mofetil (immunosuppressive), pirfenidone, and palmolidomide (antifibrotic)[1].

Conclusion

SSc is a rare autoimmune connective tissue disease having a wide spectrum of clinical features involving many organs with fibrotic, vascular, and immune manifestations. Association of ILD is the leading cause of death in such patients. So, early diagnosis with proper assessment of lung and other vital organs like the heart involvement is very crucial in such patients. Such female patients can also have a high risk for abortion. So, proper risk assessment and large-scale studies on the management of such cases are really needed in this era.

Ethical approval

As the case report contains information on the retrospective period, we obtained an exemption for ethical approval from the Institutional ethical committee.

Consent

Informed written consent was taken from the case in this case report. We also ensured none of the identifying characteristics are included in the case report.

Written informed consent was obtained from the patient for the publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Author contribution

S.A.: clinical management, patient care, manuscript editing; P.P.: manuscript writing and editing; S.P.: manuscript writing and editing.

Conflicts of interest disclosure

There are no conflicts of interest.

Research registration unique identifying number (UIN)

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Guarantor

The Guarantor is the one or more people who accept full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

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Availability of supporting data

All supporting documents are submitted along with the case report.

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References

[1] Allanore Y, Simms R, Distler O, *et al*. Systemic sclerosis. Nat Rev Dis Primers 2015;1:15002.
[2] Agha RA, Franchi T, Sohrabi C, *et al*. The SCARE 2020 guideline: updating consensus Surgical CAse REport (SCARE) guidelines. Int J Surg 2020;84:226–30.
[3] Steen VD, Medsger TA Jr. Severe organ involvement in systemic sclerosis with diffuse scleroderma. Arthritis Rheumatism 2000;43(11):2437–44.
[4] Sampaio-Barros PD, Samara AM, Marques Neto JF. Gynaecologic history in systemic sclerosis. Clin Rheumatol 2000;19:184–7.
[5] Cottin V, Brown KK. Interstitial lung disease associated with systemic sclerosis (SSc-ILD). Respir Res 2019;20:13.
[6] Steen VD, Medsger TA. Changes in causes of death in systemic sclerosis, 1972-2002. Ann Rheum Dis 2007;66:940–4.
[7] Perelas A, Silver RM, Arrossi AV, *et al*. Systemic sclerosis-associated interstitial lung disease. Lancet Respir Med 2020;8:304–20.
[8] Ho KT, Reveille JD. The clinical relevance of autoantibodies in scleroderma. Arthritis Res Ther 2003;5:1–14.