INTENSIVE CARE MANAGEMENT OF PATIENTS WITH SCLERODERMA: A CASE SERIES

Dorina Ruci[1], Krisli Serani[2], Vilson Ruci[3], Arsel Dizdari[4], Entela Shkodrani[5]
[1] Rheumatology Department, University Hospital Center "Mother Teresa", Tirana, Albania
[2] Anesthesia and Intensive Care Department, University Hospital Center "Mother Teresa", Tirana, Albania
[3] Orthopedics Department, University Hospital of Trauma, Tirana, Albania
[4] Orthopedics Department, Regional Memorial Hospital, Fier, Albania
[5] Dermatology Department, University Hospital Center "Mother Teresa", Tirana, Albania
Corresponding E-mail: dorinaruci25@gmail.com

ABSTRACT

Background. Systemic sclerosis (scleroderma) is a chronic autoimmune disease characterized by immune activation, vasculopathy, and progressive fibrosis, frequently leading to multi-organ involvement. Pulmonary, renal, and cardiac complications are associated with high mortality, particularly in intensive care settings.
Aim. To present three clinical cases of advanced systemic sclerosis managed in the intensive care unit (ICU) and to analyze the therapeutic strategies applied, clinical challenges encountered, and the role of a multidisciplinary approach in improving outcomes.
Methods. We conducted a retrospective analysis of three patients with severe systemic sclerosis complications treated in a tertiary ICU over 18 months. Data was obtained from medical records, laboratory and imaging findings, and multidisciplinary consultation reports.
Results. Case 1 involved severe pulmonary hypertension with acute respiratory failure, successfully managed with mechanical ventilation, inhaled Iloprost, and cyclophosphamide. Case 2 presented with scleroderma renal crisis requiring high-dose ACE inhibitors and emergency dialysis, resulting in partial renal recovery. Case 3 developed malignant ventricular arrhythmias managed with ICD implantation and antiarrhythmic therapy, leading to rhythm stabilization. Early aggressive intervention, invasive monitoring, and coordinated multidisciplinary management were decisive in all cases. All three patients survived the critical phase and were successfully transferred to the ward.
Conclusions. Intensive management of systemic sclerosis complications requires prompt recognition, individualized therapy, and close multidisciplinary collaboration. Early aggressive intervention in the ICU may significantly improve short-term survival and clinical stabilization in patients with life-threatening organ involvement.
Keywords. systemic sclerosis, scleroderma, intensive care, pulmonary hypertension, renal crisis, ventricular arrhythmia, multidisciplinary management.

MENAXHIMI NË TERAPI INTENSIVE I PACIENTËVE ME SKLEROZË SISTEMIKE: SERI RASTESH

ABSTRAKT

Hyrje. Skleroderma (skleroza sistemike) është një sëmundje autoimune kronike e karakterizuar nga aktivizimi imunitar, vaskulopatia dhe fibroza progresive, që shpesh çon në përfshirje multiorganike. Komplikacionet pulmonare, renale dhe kardiake shoqërohen me mortalitet të lartë, veçanërisht në kushtet e terapisë intensive.
Qëllimi. Të paraqiten tre raste klinike me sklerozë sistemike të avancuar të trajtuara në njësinë e terapisë intensive dhe të analizohet strategjia terapeutike, sfidat klinike dhe roli i bashkëpunimit multidisiplinar në përmirësimin e rezultateve.
Metoda. U realizua një analizë retrospektive e tre pacientëve me komplikacione të rënda nga skleroza sistemike, të trajtuar në një qendër terciare gjatë një periudhe 18-mujore. Të dhënat u morën nga kartelat mjekësore, ekzaminimet laboratorike dhe imazherike, si dhe nga raportet e konsultave multidisiplinare.
Rezultate. Rasti i parë paraqiti hipertension pulmonar të rëndë me insuficiencë respiratore akute, i menaxhuar me ventilim mekanik, iloprost inhalator dhe ciklofosfamid. Rasti i dytë zhvilloi krizë renale nga skleroderma, e trajtuar me inhibitorë ACE në doza të larta dhe dializë emergjente, me rikuperim parcial të funksionit renal. Rasti i tretë u paraqit me aritmi ventrikulare malinje dhe u trajtua me implantim ICD dhe terapi antiaritmike, duke arritur stabilizim ritmik. Ndërhyrja e hershme agresive, monitorimi invaziv dhe bashkëpunimi multidisiplinar ishin vendimtare në të tre rastet. Të gjithë pacientët mbijetuan fazën kritike dhe u transferuan në repart.
Përfundime. Menaxhimi intensiv i komplikacioneve të sklerozës sistemike kërkon diagnostikim të hershëm, terapi të individualizuar dhe bashkëpunim të ngushtë multidisiplinar. Ndërhyrja e hershme në terapi intensive mund të përmirësojë ndjeshëm mbijetesën afatshkurtër dhe stabilizimin klinik te pacientët me përfshirje të rrezikshme multiorganike.

Fjalë kyçe. skleroza sistemike, skleroderma, terapi intensive, hipertension pulmonar, krizë renale, aritmi ventrikulare, qasje multidisiplinare.

INTRODUCTION

Scleroderma (systemic sclerosis) is a chronic, progressive, systemic autoimmune disease characterized by three main pathological mechanisms: immune activation, vasculopathy, and progressive fibrosis of the skin and internal organs (1). Its prevalence ranges from 50 to 300 cases per million population, with a marked female predominance (female-to- male ratio 3-5:1). The peak incidence typically occurs between the fourth and sixth decades of life. Pathogenesis involves a complex interaction between genetic, immunologic, and environmental factors. Activation of T and B lymphocytes, production of specific autoantibodies (such as anti-Scl-70 and anti-centromere), endothelial dysfunction, and excessive collagen deposition by fibroblasts are key elements in disease development (1).

The result is a combination of progressive fibrosis, vascular damage, and chronic inflammation, leading to multi-organ dysfunction.
Clinically, scleroderma is classified into limited, diffuse, and sine scleroderma forms, depending on the extent of skin involvement and internal organ involvement (1).
Pulmonary involvement (interstitial lung disease and pulmonary hypertension), cardiac involvement (arrhythmias and heart failure), and renal involvement (scleroderma renal crisis) are associated with high mortality, particularly in intensive care settings (1). In intensive care units (ICUs), patients with scleroderma often present with life-threatening complications.
Management represents a major challenge due to the complexity of the disease, clinical heterogeneity, and lack of standardized treatment protocols (2,3). Early intervention, invasive monitoring, and a multidisciplinary approach among rheumatologists, anesthesiologists, cardiologists, nephrologists, and pulmonologists are crucial for improving survival and quality of life (5).
This article aimed to present three clinical cases of patients with advanced systemic scleroderma treated in the intensive care unit over 18 months and to analyze the therapeutic approach used for each patient and the clinical challenges encountered during treatment, as well as the decisive role of a multidisciplinary approach in improving clinical outcomes. These case series also aimed to contribute to existing literature by providing practical experience in the intensive management of patients with scleroderma and by emphasizing the importance of early diagnosis and intervention.

MATERIALS AND METHODS

This is a retrospective study including three patients with advanced systemic scleroderma who were treated in the intensive care unit of a tertiary hospital center, over 18 months. Case selection was based on the presence of severe complications requiring immediate multidisciplinary intervention. Data was obtained from medical records, intensive monitoring reports, laboratory and imaging examinations, and daily multidisciplinary consultation assessments.
Case 1: *Severe Pulmonary Involvement*
Patient: Female, 47 years old.
Clinical presentation: Severe pulmonary hypertension, acute respiratory failure, profound hypoxemia, and elevated coagulation markers (D-dimer).
Treatment: Invasive mechanical ventilation with parameters adapted according to ARDS protocols. Administration of inhaled Iloprost as vasodilator therapy. Intravenous cyclophosphamide was administered to suppress the autoimmune process. Gradual oxygen support and continuous monitoring of arterial blood gases.
Clinical course: The patient showed gradual improvement in oxygenation following mechanical ventilation and immunomodulatory therapy with cyclophosphamide. Transfer to the ward was carried out after respiratory stabilization, demonstrating the effectiveness of early intensive intervention.

Case 2:*Scleroderma Renal Crisis*
Patient: Male, 52 years old.

Clinical presentation: Scleroderma renal crisis with anuria, severe and refractory hypertension, uremia, and progressively increasing azotemia.
Treatment: Immediate initiation of high-dose ACE inhibitors as standard therapy for scleroderma renal crisis. Emergency dialysis for correction of metabolic disturbances and management of hypervolemia. Invasive monitoring of fluid balance and renal function.
Clinical course: Despite the immediate initiation of ACE inhibitors and emergency dialysis, the patient exhibited a slow clinical course; however, partial recovery of diuresis and reduction of blood pressure after several days demonstrated the vital role of invasive monitoring and multidisciplinary therapy.

Case 3:*Cardiac Involvement - Ventricular Arrhythmias*
Patient: Female, 39 years old.
Clinical presentation: Recurrent ventricular arrhythmias, palpitations, and syncope. Echocardiography showed myocardial fibrosis.
Treatment: Implantation of an ICD (Implantable Cardioverter Defibrillator) for the prevention of sudden death due to malignant arrhythmias. Initiation of antiarrhythmic therapy with amiodarone. Electrolyte correction and strict balance monitoring.
Clinical course: ICD implantation and antiarrhythmic therapy led to rapid stabilization of cardiac rhythm, with no recurrence of arrhythmia during the ICU stay.

Shared Clinical Features
Early intervention was decisive in all three cases. Patients who received aggressive and multidisciplinary treatment in the first hours had a more favorable clinical course. Continuous invasive monitoring (arterial blood gases, pulmonary pressure, fluid balance, cardiac parameters) proved essential in preventing further complications.
The multidisciplinary approach emerged as a key factor: each therapeutic decision was made collaboratively among the rheumatologist, intensivist, cardiologist, and nephrologist, ensuring safer and more individualized management. Immunomodulatory and supportive therapy (Cyclophosphamide, Iloprost, ACE inhibitors, antiarrhythmics) had positive effects in all three cases, highlighting the importance of integrating targeted treatments with intensive care measures.
Survival and Quality of Care: All three patients survived the critical period and were transferred from the ICU to the ward for further treatment. This outcome reinforces the concept that early diagnosis and coordinated intervention can significantly improve the prognosis of patients with advanced systemic sclerosis.

DISCUSSION

Systemic sclerosis remains one of the most complex diseases within the group of rheumatologic disorders, with high mortality when vital organs are involved (5). Pulmonary, cardiac, and renal involvement are determining factors for clinical outcomes and often necessitate intensive therapy. Our cases clearly illustrate that managing patients with such complications requires rapid intervention and close multidisciplinary coordination (3).
Pulmonary Involvement

Pulmonary hypertension and interstitial fibrosis represent the most frequent and severe pulmonary complications in systemic sclerosis (4). Previous studies have shown that mortality among patients with pulmonary hypertension reaches up to 40–50% within five years (2). In our case, the 47-year-old patient benefited from the combination of mechanical ventilation and targeted therapy with Iloprost, supported by immunotherapy with cyclophosphamide. The literature suggests that early intervention with vasodilator agents, in accordance with current ESC/ERS pulmonary hypertension guidelines, and immunosuppressive therapy may improve oxygenation and long-term prognosis (4,9).

Scleroderma Renal Crisis

Renal crisis occurs in approximately 5–10% of patients with diffuse systemic sclerosis and is characterized by sudden-onset hypertension, acute renal failure, and often high mortality (3). ACE inhibitors have revolutionized the treatment of this condition and remain the first-line therapy according to current international guidelines, significantly reducing mortality (7,10). In our case, the immediate administration of ACE inhibitors and initiation of emergency dialysis resulted in partial recovery of renal function (7).

Cardiac Involvement

Ventricular arrhythmias and myocardial fibrosis pose a major challenge. ICD implantation in patients with malignant arrhythmias is a life-saving intervention (2).

Antiarrhythmic therapy and electrolyte correction are essential components of short-term stabilization (5).

Importance of the Multidisciplinary Approach

Therapeutic decisions were made in close collaboration among rheumatologists, anesthesiologists, cardiologists, and nephrologists. This coordination reflects the benefits of a multidisciplinary approach (3). International literature supports this model, suggesting that structured interdisciplinary collaboration improves survival and quality of life in patients with systemic autoimmune diseases (4).

Meta-analytic studies have shown that patients with connective tissue diseases treated in the ICU have an average mortality rate of 40–50%, particularly in the presence of multi-organ complications (5). In our cases, all three patients survived the critical period and were transferred from the ICU to the ward, suggesting that early diagnosis, aggressive intervention, and a multidisciplinary approach may significantly reduce this mortality rate (2). These findings emphasize that structured ICU protocols and early targeted therapy may alter the traditionally poor prognosis associated with systemic sclerosis-related multi-organ failure.

Clinical Challenges

Based on our experience and literature, several major challenges emerge:

- Early diagnosis is often delayed due to the clinical variability of the disease.
- Hidden comorbidities (e.g., hypertension, subclinical heart failure) may worsen prognosis.
- Short-term versus long-term management: intensive intervention saves lives but does not always address the progression of fibrosis and chronic organ involvement.
- The use of immunotherapy in critically ill patients remains an area with many uncertainties, requiring careful individualization.

This article has several limitations that should be considered when interpreting the results. First, the sample size is small (only three cases), making it impossible to draw general conclusions about the entire scleroderma population. Second, the retrospective nature of the analysis limits control over clinical and therapeutic variables. Third, long-term follow-up after ICU discharge was not fully included in this report, limiting the assessment of therapy effects on quality of life and long-term survival. Nevertheless, despite these limitations, case presentations provide valuable insight into the challenges and strategies of intensive management in patients with scleroderma.

FUTURE PERSPECTIVES

Based on our experience and international literature, future efforts should focus on:

- Developing prospective studies with larger patient cohorts to more systematically evaluate the impact of multidisciplinary care on survival.
- Establishing ICU-specific clinical guidelines based on scientific evidence regarding immunotherapy and targeted treatments.
- Integrating new technologies such as non-invasive hemodynamic monitoring, serological biomarkers, and advanced imaging for earlier detection of organ involvement.
- Promoting international collaboration among major academic centers to create shared registries and clinical databases for patients with scleroderma in the ICU.

CONCLUSIONS

Systemic sclerosis with severe organ involvement remains a life-threatening condition requiring prompt recognition and aggressive management. Our case series highlights that early admission to the intensive care unit, rapid initiation of targeted therapy, and continuous invasive monitoring are critical for short-term survival in patients with pulmonary, renal, and cardiac complications.

A coordinated multidisciplinary approach involving rheumatologists, intensivists, cardiologists, and nephrologists plays a decisive role in optimizing clinical outcomes. Although limited by the small number of cases, our experience supports the concept that early aggressive and individualized intensive care management can significantly improve stabilization and survival in critically ill patients with systemic sclerosis.

Conflict of interest: The authors declare no conflicts of interest.

Patient Consent: Written informed consent was obtained from the patients (or their legal guardians) for publication of the clinical data and identifiable clinical images.

Author Contributions: All authors contributed to the preparation of the manuscript and approved the final version.

REFERENCES

1. Pope JE, Denton CP, Johnson SR, Fernandez-Codina A, Hudson M, Nevskaya T. State- of-the-art evidence in the treatment of systemic sclerosis. Nat Rev Rheumatol. 2023 Apr;19(4):212-226. doi:10.1038/s41584-023-00909-5.
2. Dumas G, Arabi YM, Bartz R, Ranzani O, Scheibe F, Darmon M, Helms J. Diagnosis and management of autoimmune diseases in the ICU. Intensive Care Med. 2024 Jan;50(1):17–35. doi:10.1007/s00134-023-07266-7.
3. Drosos GC, Vedder D, Houben E, et al. EULAR recommendations for cardiovascular risk management in rheumatic and musculoskeletal diseases, including systemic lupus erythematosus and antiphospholipid syndrome. Ann Rheum Dis. 2022 Jun;81(6):768–779. doi:10.1136/annrheumdis-2021-221733.
4. Spierings J, de Bresser CJ, van Rhijn-Brouwer FC, et al. From “being at war” to “getting back on your feet”: A qualitative study on experiences of patients with systemic sclerosis treated with hematopoietic stem cell transplantation. J Scleroderma Relat Disord. 2020 Oct;5(3):202–209. doi:10.1177/2397198320920436.
5. Kouchit Y, Morand L, Martis N. Mortality and its risk factors in critically ill patients with connective tissue diseases: A meta-analysis. Eur J Intern Med. 2022 Apr; 98:83–92. doi: 10.1016/j.ejim.2022.02.006.
6. Aziz R, Lo C, Denstedt JT, Hurley B. Working under pressure: Scleroderma presenting with bilateral exudative retinal detachment in the context of scleroderma renal crisis: A case report. Case Rep Ophthalmol. 2024 Oct 2;15(1):710–716. doi:10.1159/000530973.
7. Farber HW, Simms RW, Lafyatis R. Care of patients with scleroderma in the intensive care setting. J Intensive Care Med. 2010 Sep;25(5):247-58. doi: 10.1177/0885066610371181.
8. Valenzi E, Bulik M, Tabib T, Morse C, Sembrat J, Trejo Bittar H, Rojas M, Lafyatis R. Single-cell analysis reveals fibroblast heterogeneity and myofibroblasts in systemic sclerosis-associated interstitial lung disease. Ann Rheum Dis. 2019 Oct;78(10):1379-1387. doi:10.1136/annrheumdis-2018-214865.
9. Humbert M, Kovacs G, Hoeper MM, Badagliacca R, Berger RMF, et al., ESC/ERS Scientific Document Group. 2022 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension. Eur Respir J. 2023 Jan 6;61(1):2200879. doi: 10.1183/13993003.00879-2022.
10. Kidney Disease: Improving Global Outcomes (KDIGO) Glomerular Diseases Work Group. KDIGO 2021 Clinical Practice Guideline for the Management of Glomerular Diseases. Kidney Int. 2021 Oct;100(4S):S1-S276. doi:10.1016/j.kint.2021.05.021.