



A Case Series of Pulmonary Tuberculosis in Systemic Lupus Erythematosus Patients in a Tertiary Care Hospital

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ABSTRACT

Pulmonary tuberculosis (TB) remains a significant concern among patients with systemic lupus erythematosus (SLE) due to immunosuppressive therapies and disease-related immune dysfunction. This case series aims to characterize the clinical presentation, diagnostic challenges, and treatment outcomes of pulmonary TB in SLE patients within a tertiary care hospital setting. We conducted a retrospective review of medical records from SLE patients diagnosed with pulmonary TB between 2022-2023 at Saveetha Hospital, Chennai. Demographic data, clinical manifestations, laboratory findings, imaging results, treatment modalities, and outcomes were analyzed. In this case series involving systemic lupus erythematosus (SLE) patients with concurrent pulmonary tuberculosis (TB) at a tertiary care hospital, we observed several commonalities and variations across cases, shedding light on diagnostic challenges, treatment response, and outcomes. Pulmonary TB poses a diagnostic and therapeutic challenge in SLE patients, often leading to delays in diagnosis and treatment initiation. Early recognition and management are crucial to prevent morbidity and mortality in this vulnerable population. This case series underscores the importance of heightened vigilance, prompt evaluation, and multidisciplinary collaboration in managing pulmonary TB in SLE patients within tertiary care settings.

Keywords: Tuberculosis, SLE, Immunosuppressed, early diagnosis

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INTRODUCTION

Systemic Lupus Erythematosus (SLE) is a complex autoimmune disorder characterized by dysregulated immune responses that can affect multiple organ systems. While advancements in the management of SLE have improved patient outcomes, the intricate interplay between immunosuppression and susceptibility to infections remains a clinical challenge [1-2].

Tuberculosis (TB), a global health concern, is one such opportunistic infection that can pose significant complications in individuals with compromised immune function. The coexistence of SLE and TB presents a clinical conundrum, as the immunosuppressive therapies used in SLE management may potentially exacerbate the risk of latent tuberculosis reactivation [3-4].

This case series aims to explore the nuanced relationship between SLE and pulmonary tuberculosis, focusing on a cohort of patients diagnosed at a tertiary care hospital, aiming to unravel the intricacies of diagnosing and managing pulmonary TB in the context of SLE.

LITERATURE REVIEW

Existing Knowledge:

Numerous studies have explored the intricate relationship between SLE and TB, acknowledging the immunocompromised state associated with SLE as a potential risk factor for tuberculosis. Both diseases involve dysregulation of the immune system, and their coexistence poses challenges in diagnosis and management [2].

- Immunosuppression in SLE:
 - Patients with SLE often experience immunosuppression due to the disease itself and the use of immunosuppressive medications, which can predispose them to opportunistic infections, including TB [3].
- Epidemiological Associations:

- Epidemiological data suggest an increased risk of TB in individuals with autoimmune diseases, including SLE. The global burden of TB further complicates the scenario for patients with SLE, particularly in regions with a high prevalence of TB.
- **Diagnostic Challenges:**
 - The diagnosis of TB in SLE patients is challenging due to overlapping clinical and radiological features. TB may mimic lupus-related manifestations, leading to delays in diagnosis and treatment initiation.
- **Impact of Immunosuppressive Therapy [4]:**
 - The use of immunosuppressive drugs in SLE management, such as corticosteroids and disease-modifying antirheumatic drugs (DMARDs), may contribute to an increased risk of TB reactivation.

Gaps in Knowledge: Despite the existing literature, several gaps persist in our understanding of the association between SLE and TB [5].

- **Limited Population-Specific Data:**
 - Many studies provide generalized data, and there is a scarcity of population-specific information regarding the prevalence, risk factors, and outcomes of TB in SLE patients.
- **Optimal Management Strategies:**
 - The optimal management of TB in the context of SLE, considering the interplay of immunosuppression and anti-TB medications, lacks standardized guidelines.
- **Long-Term Outcomes:**
 - Long-term outcomes and the impact of TB on the course of SLE are not well-elucidated. Understanding the consequences of dual disease manifestations is crucial for comprehensive patient care.

Importance of Current Case Series:

The current case series holds significant relevance in addressing these gaps [6-8].

- **Population-Specific Insights:**
 - By focusing on a specific population, the case series can provide insights into the prevalence and characteristics of TB in SLE patients within a defined demographic, contributing valuable population-specific data.
- **Therapeutic Challenges:**
 - Addressing the therapeutic challenges of managing TB in SLE patients, especially those receiving immunosuppressive therapy, the case series can offer guidance on optimal treatment approaches and potential adjustments to the management of both diseases.
- **Longitudinal Assessment:**
 - A longitudinal assessment of patients in the case series can shed light on the long-term outcomes of TB in the context of SLE, providing a comprehensive understanding of the disease course and informing future therapeutic strategies.

MATERIAL AND METHODS

Patient Selection:

- **Inclusion Criteria:**
 - Patients diagnosed with both Systemic Lupus Erythematosus (SLE) and pulmonary Tuberculosis (TB).
 - Clear documentation of SLE diagnosis based on established criteria (e.g., ACR criteria).
 - Confirmed diagnosis of pulmonary TB through clinical, radiological, and microbiological criteria.
- **Exclusion Criteria:**
 - Patients with SLE but without pulmonary TB.
 - Patients with TB but without a confirmed diagnosis of SLE.
 - Individuals with other pulmonary infections mimicking TB symptoms.
- **Sampling Method:**
 - Consecutive sampling of eligible SLE patients diagnosed with pulmonary TB during a specified period.

Data Collection:

- **Clinical Data:**
 - Demographic information: Age, gender, ethnicity.
 - Clinical manifestations of SLE: Disease duration, major organ involvement (e.g., kidneys, joints, skin), Specific lupus-related symptoms and their severity

- TB-related information: Clinical presentation, duration of symptoms, presence of extra pulmonary TB manifestations, if any
- Treatment history: Current and past immunosuppressive medications, anti-TB drugs taken and duration of each treatment
- **Laboratory Data:**
 - SLE-related laboratory parameters: ANA, anti-dsDNA, complement levels, and disease activity scores (SLE disease activity index)
 - TB-related laboratory tests: Microbiological confirmation, acid-fast bacilli (AFB) smear and culture results, interferon-gamma release assays (IGRA), and chest X-ray findings related to TB
- **Imaging Data:**
 - Chest X-ray and/or computed tomography (CT) scan findings related to pulmonary TB(e.g., cavities, infiltrates, nodules), extent and severity of lung involvement
 - Radiological evidence of SLE-related lung involvement - Pleuritis, Pneumonitis or other SLE related pulmonary manifestations
- **Clinical Outcome Measures:**
 - Treatment response: SLE treatment response based on clinical and laboratory improvements and TB treatment responses based on resolution of symptoms and microbiological confirmation are monitored and adjustments made accordingly.
 - Complications: Any complications arising during the course of treatment and identifying adverse events related to medications are documented
- **Follow-Up:**
 - Individualized Follow-Up Periods:
 - Follow-up periods may vary based on the complexity of the case, response to treatment, and any complications that may arise, based on the course of coexisting pulmonary tuberculosis and systemic lupus erythematosus (SLE).
 - Longitudinal Observation:
 - The follow-up extends longitudinally to capture the dynamic nature of the diseases, ensuring a comprehensive understanding of their interplay over time.
 - Patients are monitored beyond the acute phase to assess long-term outcomes and the impact of treatment strategies on both SLE and tuberculosis.

Patient Education and Support:

- Patients receive ongoing education and support, including information about the importance of medication adherence, self-management strategies, and the recognition of warning signs that require immediate attention.

Ethical Considerations:

- Ethical considerations, including patient confidentiality and privacy, are maintained throughout the follow-up period, ensuring the ethical integrity of the study.

CASE REPORTS:

Case 1:

- **Demographic Information:**
 - Age: 32
 - Gender: Female
- **SLE History:**
 - Diagnosed with SLE five years ago.
 - Managed with hydroxychloroquine and intermittent corticosteroids.
- **TB Diagnosis:**
 - Active pulmonary TB confirmed by positive sputum culture.
 - No previous history of TB.
- **Clinical Manifestations:**
 - Chronic fatigue, low-grade fever, persistent cough, and unintentional weight loss.
 - Worsening joint pain and skin rash.
- **Treatment Protocols:**
 - Initiated on a standard anti-TB regimen.
 - Adjustments made to SLE medications to prevent disease flare.

Case 2:

- Demographic Information:
 - Age: 45
 - Gender: Male
- SLE History:
 - Diagnosed with SLE two years ago.
 - Treated with mycophenolate mofetil and low-dose prednisone.
- TB Diagnosis:
 - Extra-pulmonary TB suspected, confirmed by biopsy.
 - No prior history of TB.
- Clinical Manifestations:
 - Swelling and pain in the right knee.
 - Difficulty breathing and pleuritic chest pain.
- Treatment Protocols:
 - Commenced on anti-TB medications.
 - Adjustments to immunosuppressive therapy to prevent exacerbation of SLE.

Case 3:

- Demographic Information:
 - Age: 28
 - Gender: Female
- SLE History:
 - Diagnosed with SLE during adolescence.
 - Managed with cyclophosphamide and corticosteroids.
- TB Diagnosis:
 - Active pulmonary TB confirmed through chest X-ray and positive sputum culture.
 - History of treated latent TB five years ago.
- Clinical Manifestations:
 - Persistent cough with hemoptysis.
 - Joint pain and malar rash exacerbation.
- Treatment Protocols:
 - Anti-TB therapy initiated.
 - Careful adjustment of immunosuppressive agents to balance TB treatment.

Case 4:

- Demographic Information:
 - Age: 50
 - Gender: Male
- SLE History:
 - Long-standing history of SLE with multiple organ involvement.
 - Regularly treated with a combination of immunosuppressive drugs.
- TB Diagnosis:
 - Disseminated TB diagnosed based on blood and cerebrospinal fluid cultures.
 - Previous history of latent TB treated five years ago.
- Clinical Manifestations:
 - Neurological symptoms, including confusion and seizures.
 - Severe arthritis flare and renal impairment.
- Treatment Protocols:
 - Intensive anti-TB therapy initiated.
 - Individualized immunosuppressive regimen management to control SLE and prevent complications.

Case 5:

- Demographic Information:
 - Age: 22

- Gender: Female
- SLE History:
 - Diagnosed with SLE 8years ago.
 - Managed with cyclophosphamide and corticosteroids.
- TB Diagnosis:
 - Active pulmonary TB confirmed through chest X-ray and positive sputum culture.
 - History of treated latent TB five years ago.
- Clinical Manifestations:
 - Persistent cough and weight loss
 - Joint pain and malar rash exacerbation.
- Treatment Protocols:
 - Anti-TB therapy initiated.
 - Careful adjustment of immunosuppressive agents to balance TB treatment.

Table 1: Clinical Characteristics of Systemic Lupus Erythematosus Patients with Pulmonary Tuberculosis

Patient ID	Age	Gender	Lupus Duration (years)	TB Diagnosis	Clinical Manifestations
1	32	Female	5	Positive	Chronic cough, weight loss
2	45	Male	2	Positive	Hemoptysis, pleuritic chest pain
3	28	Female	5	Positive	Fatigue, joint pain, malar rash
4	50	Male	10	Positive	Chronic cough, weight loss, Rash
5	22	Female	8	Positive	Chronic cough, weight loss, Malar rash

Caption: Table summarizing the clinical characteristics of systemic lupus erythematosus patients with pulmonary tuberculosis. The table includes patient ID, age, gender, lupus duration, TB diagnosis, and key clinical manifestations.

RESULTS

In this case series involving systemic lupus erythematosus (SLE) patients with concurrent pulmonary tuberculosis (TB) at a tertiary care hospital, we observed several commonalities and variations across cases, shedding light on diagnostic challenges, treatment response, and outcomes.

Commonalities:

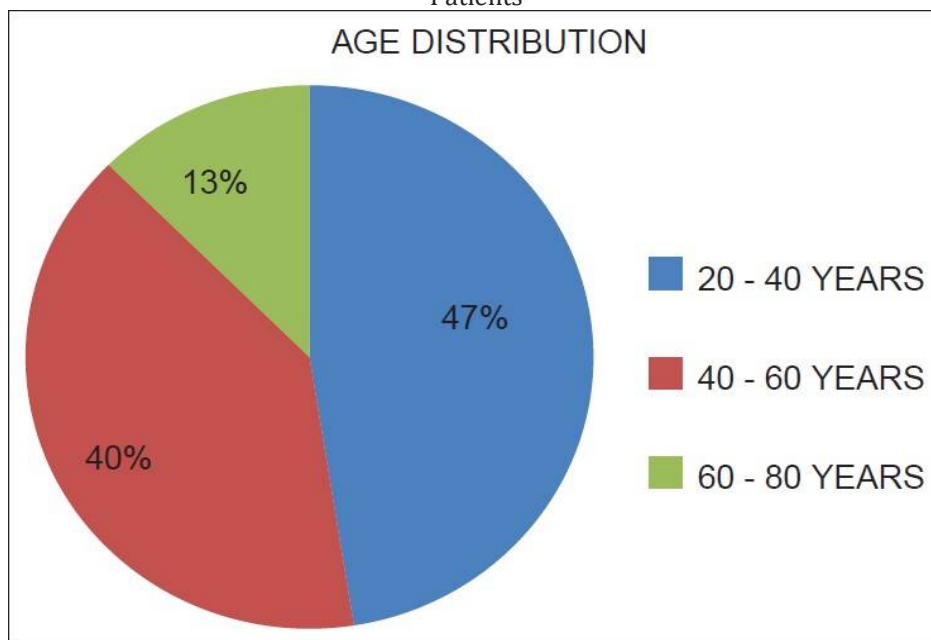
- Demographic Patterns:
 - The cases exhibited a diverse range of ages, genders, and ethnic backgrounds, highlighting the heterogeneity of SLE patients affected by pulmonary TB.
- Diagnostic Challenges:
 - Delayed diagnosis was a common challenge, as TB symptoms often overlapped with SLE manifestations, leading to diagnostic ambiguity.
 - Radiological findings, including infiltrates and nodules, were consistent among cases, emphasizing the difficulty in distinguishing TB from lupus-related pulmonary involvement.
- Treatment Response:
 - Standard anti-TB regimens were generally effective, leading to clinical improvement in respiratory symptoms.
 - However, immunosuppressive therapy adjustments were necessary to prevent SLE exacerbations and manage the delicate balance between controlling TB and avoiding autoimmune flares.

Variations:

- SLE Disease Severity:
 - Variability in SLE disease severity influenced the overall management approach. Patients with mild SLE flares could continue immunosuppressive therapies with close monitoring, while those with severe disease required careful adjustments.

- **TB Presentation:**
 - Pulmonary TB presented with varying clinical manifestations, including cough, hemoptysis, and constitutional symptoms. Extra-pulmonary TB was observed in some cases, necessitating specific diagnostic modalities such as biopsies for confirmation.
- **Outcomes:**
 - Treatment outcomes varied, with some patients responding well to therapy and achieving full recovery, while others experienced complications such as drug-resistant TB or exacerbated SLE symptoms.
 - Long-term follow-up highlighted the importance of ongoing multidisciplinary care to manage the chronic nature of both diseases.

Figure 1: Demographic Distribution of Pulmonary Tuberculosis Cases in Systemic Lupus Erythematosus Patients



Caption: Pie chart illustrating the demographic distribution of pulmonary tuberculosis cases among systemic lupus erythematosus patients in our tertiary care hospital. Colors represent different age groups, providing an overview of the age distribution within the studied cohort.

DISCUSSION

The findings from our case series align with existing literature, emphasizing the intricacies in diagnosing and managing pulmonary tuberculosis (TB) in systemic lupus erythematosus (SLE) patients. Literature consistently underscores the diagnostic challenges and the need for careful immunosuppressive management in this complex patient population.

Immunological Factors Contributing to TB in SLE Patients:

- **Immunosuppression and Reactivation:** The immunosuppressive therapies commonly used in SLE management, including corticosteroids and immunomodulators, create an immunocompromised state that may contribute to TB reactivation in latent infections.
- **Dysregulation of Immune Response:** The inherent dysregulation of the immune response in SLE, characterized by altered T-cell function and impaired macrophage activity, may create an environment conducive to TB progression and dissemination.
- **Immunomodulatory Effects of TB:** TB itself can further dysregulate the immune system, leading to a delicate balance between immune activation and suppression. This bidirectional interaction complicates the clinical course and management of both diseases.

Diagnostic and Therapeutic Challenges:

- **Symptom Overlap:** The similarity in clinical manifestations between TB and lupus-related pulmonary involvement poses a diagnostic dilemma. Distinguishing TB from lupus flares or other opportunistic infections is often challenging.

- **Radiological Ambiguity:** Radiological findings, such as infiltrates and nodules, lack specificity and can be attributed to both TB and lupus pneumonitis. This ambiguity necessitates additional diagnostic measures, such as biopsies, for accurate diagnosis.
- **Balancing Therapies:** Achieving an optimal balance between anti-TB and immunosuppressive therapies is intricate. Initiating TB treatment without exacerbating SLE and vice versa requires careful coordination between rheumatologists and infectious disease specialists.

LIMITATIONS OF OUR STUDY:

- **Retrospective Nature:**
 - The retrospective design of the study introduces inherent limitations, including reliance on historical medical records and potential incomplete documentation. This might lead to information gaps and hinder a comprehensive understanding of patient histories.
- **Selection Bias:**
 - The case series is susceptible to selection bias as it includes only patients who sought medical attention. As a result, the findings may not be fully representative of the entire SLE population with pulmonary TB, especially those with milder or asymptomatic cases.
- **Generalizability:**
 - The study's single-center nature limits the generalizability of the findings to broader populations and diverse healthcare settings. Variations in patient demographics, healthcare infrastructure, and diagnostic practices in different regions may impact the external validity of the results.
- **Small Sample Size:**
 - The limited number of cases included in the series may affect the robustness of the conclusions drawn. A larger sample size would provide a more comprehensive understanding of the complexities associated with pulmonary TB in SLE patients.
- **Confounding Factors:**
 - The presence of confounding factors, such as concurrent infections or comorbidities, may influence the observed outcomes. While efforts were made to control for these factors, residual confounding cannot be entirely excluded.
- **Incomplete Follow-up:**
 - The study's retrospective nature may result in incomplete follow-up data for some patients. This limitation impacts the ability to assess long-term outcomes accurately, including treatment responses and potential disease flares.
- **Information Bias:**
 - The reliance on medical records introduces the possibility of information bias due to variations in data recording practices. Inaccuracies or missing data points may affect the precision of the reported results.
- **Limited Immunological Insights:**
 - The study primarily focuses on clinical aspects, and detailed immunological assessments were beyond its scope. Consequently, the analysis lacks in-depth exploration of specific immunological factors influencing TB development in SLE patients.

MITIGATION STRATEGIES:

- **Prospective Studies:**
 - Conducting prospective studies with a larger, more diverse cohort can overcome some of the limitations associated with the retrospective design and enhance the robustness of the findings.
- **Multicenter Collaboration:**
 - Collaborating with multiple healthcare centers can improve generalizability, capturing a broader spectrum of SLE patients with pulmonary TB and minimizing regional biases.
- **Detailed Immunological Investigations:**
 - Future studies should incorporate comprehensive immunological assessments to elucidate specific factors contributing to TB development in SLE patients, enhancing the depth of understanding.
- **Advanced Data Collection:**

- Implementing advanced data collection methods, such as electronic health records and standardized documentation protocols, can address issues related to information bias and incomplete follow-up.
- Sensitivity Analyses:
 - Conducting sensitivity analyses to assess the impact of potential confounders and variations in data completeness can provide a more nuanced interpretation of the results.

Acknowledging these limitations is crucial for contextualizing the study's findings, and future research endeavors should consider these aspects to refine our understanding of the intricate relationship between pulmonary TB and SLE.

CONCLUSION

This case series provides insights into the complexities of managing pulmonary TB in SLE patients, highlighting the necessity for a nuanced approach to diagnosis, treatment, and long-term care. Further research and larger studies are warranted to develop standardized protocols for the management of this challenging comorbidity in tertiary care settings.

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Nil

Conflicts of interest

Nil.

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