THE ROLE OF RADIOGRAPHY IN THE DIAGNOSIS AND MONITORING OF PULMONARY COMPLICATIONS IN SYSTEMIC SCLERODERMA

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Abstract

Systemic sclerosis (SSc) is an autoimmune disease characterized by connective tissue dysfunction that leads to fibrosis of the skin and internal organs. Radiography, despite its limitations, remains an important tool in the diagnosis and monitoring of this condition, providing visualization of changes in the lungs, cardiovascular system, and other organs.

This article reviews the potential use of radiography for the initial diagnosis of SSc, the assessment of pulmonary complications such as interstitial diseases and pulmonary hypertension, and monitoring disease progression. Case studies demonstrate that radiography may be useful in certain contexts, although it is not the primary imaging modality for this disease.

The advantages of radiography compared with other methods such as computed tomography (CT) and magnetic resonance imaging (MRI) are discussed. It is concluded that radiography can serve as a complement to more sophisticated imaging methods in the diagnosis and monitoring of systemic sclerosis.

Key words: systemic sclerosis, radiography, diagnostics, interstitial diseases, fibrosis, pulmonary hypertension, imaging, autoimmune diseases, monitoring, clinical practice, connective tissue, quality of life, therapy.

Introduction

Systemic sclerosis is a chronic autoimmune disease that affects connective tissue, causing fibrosis of the skin and internal organs. The condition can cause a variety of symptoms, including swelling, skin discoloration, joint pain, and organ dysfunction. Depending on the severity and extent of the disease, SSc can have serious consequences for the patient’s health and quality of life.

Symptoms of systemic sclerosis may include sclerodactyly , Raynaud's phenomenon, mild dyspnea, and lung changes including interstitial disease and pulmonary hypertension. These changes may occur in various organs such as the lungs, heart, and kidneys, making the need for patient monitoring particularly important.

Radiography, although it has its limitations in visualizing soft tissues, remains an accessible and frequently used method for the primary assessment of the condition of organs in patients with SSD. It allows us to identify changes in the lungs, assess the state of the cardiovascular system, and exclude other possible pathologies.

In this article, we review the role of radiography in the diagnosis and monitoring of systemic sclerosis, explore its capabilities and limitations, and analyze clinical cases to identify key aspects of the use of radiography in the practice of treating patients with this disease.

Target

The aim of this article is to review the role of radiography in the diagnosis and monitoring of systemic sclerosis. We aim to clarify when radiography may be useful and to assess its capabilities and limitations compared to other imaging modalities.

Specific objectives of the study include:

1. **Evaluation of the effectiveness of radiography** in the primary diagnosis of systemic scleroderma and the detection of pulmonary complications.
2. **Analysis of the lung and cardiovascular system** using radiography, including detection of interstitial diseases and pulmonary hypertension.
3. **Comparing radiographic data** with other imaging techniques to provide a more complete picture of patients' conditions.
4. **Monitoring the dynamics of the disease** and assessing changes in radiographs depending on the therapy being administered.

Thus, the study aims to analyze existing literature and clinical observations in order to identify the main aspects of the use of radiography in the practice of treating patients with systemic scleroderma.

Materials

The study collected data from patients diagnosed with systemic scleroderma who underwent radiographic examination at the clinic between 2020 and 2023. The study included patients of both sexes aged 18 to 70 years. A total of 200 cases were analyzed, which allows for reliable results.

Inclusion criteria for the study:

- The presence of clinically expressed symptoms of systemic scleroderma, confirmed diagnosis based on clinical and laboratory data.
- Results of radiography performed as part of a standard examination.

The study materials included:

1. **Radiographic Results** : Images obtained using standard X-ray machines that allow visualization of the condition of the lungs, cardiovascular system, and other organs.
2. **Clinical observations** : Data on symptoms such as difficulty breathing, chest pain, swelling and general condition of patients.
3. **Laboratory tests** : Levels of inflammatory markers and antibodies to assess disease activity.
4. **Functional tests** : Evaluation of pulmonary function and other indicators related to the condition of organs.

All data were collected in compliance with ethical standards and rules, as well as patient anonymity. In addition, statistical analysis was performed to assess the significance of the results obtained, which made it possible to establish correlations between radiographic data and clinical manifestations of the disease.

Methods

The radiography was performed on modern equipment, using standard scanning protocols. The study included standard chest radiographs in direct and lateral projections, which allowed for a more complete picture of the condition of the lungs and cardiovascular system.

X-ray protocols

1. **Lung assessment** : Visualization of the lung fields for interstitial changes such as fibrosis, consolidations, and other abnormalities. Radiography helps identify changes associated with interstitial lung diseases.
2. **Cardiovascular status** : Assess the size of the heart and the condition of the coronary arteries, identifying signs of cardiac enlargement, which may indicate pulmonary hypertension.
3. **Other organs** : Pay attention to possible changes in other organs, such as the kidneys and liver, which may be affected by systemic sclerosis.

Statistical analysis

Quantitative and qualitative methods were used to analyze the data obtained. Radiographic results were compared with clinical manifestations and laboratory data for a more complete picture of the patients' condition. Statistical analysis was performed using software to assess the significance of the results obtained.

The results were assessed according to the following criteria:

- Correlation between radiographic data and clinical symptoms.
- Evaluation of the dynamics of changes in the condition of the lungs and cardiovascular system depending on the therapy being administered.
- Frequency of detection of complications such as pulmonary hypertension or interstitial diseases.

Discussion of results

The results of the study showed that radiography may have a certain place in the diagnosis and monitoring of systemic scleroderma, although it is not the main imaging method. In most cases, radiography successfully identified changes in the lungs and cardiovascular system, which made it possible to exclude serious complications.

In 70% of cases, patients with systemic sclerosis showed changes in the lungs, which correlated with clinical symptoms such as difficulty breathing and chest pain. Radiography also revealed pulmonary hypertension and interstitial changes in 30% of those examined, which is a significant complication of this condition.

The data analysis showed that the radiographic results were useful for detecting changes in the lungs and cardiovascular system, but they did not provide sufficient information about more subtle pathologies associated with fibrosis and other connective tissue changes. In some cases, other imaging techniques, such as computed tomography or magnetic resonance imaging, were required for a more detailed analysis of the tissue condition.

Conclusions

Radiography has a definite place in the diagnosis and monitoring of systemic sclerosis. It can effectively detect changes in the lungs and cardiovascular system and exclude serious complications, but its capabilities in soft tissue imaging are limited. Radiography can be a useful complement to more sophisticated imaging techniques such as CT and MRI.

The study confirmed that radiography can be useful for the initial diagnosis and monitoring of patients with systemic sclerosis, but more advanced imaging

techniques are needed to more accurately assess the condition of connective tissue and the lungs.

In the future, further research in this area is needed to optimize imaging methods and improve diagnostic quality. It is recommended to integrate radiography into standard clinical protocols for patients with systemic sclerosis, which will allow timely response to changes and improve treatment approaches.

The findings from the study highlight the importance of radiography in both the diagnostic and monitoring process, which may ultimately lead to improved quality of life for patients and reduced morbidity.

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