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THE ROLE OF LABORATORY AND INSTRUMENTAL METHODS IN THE DIAGNOSIS AND ASSESSMENT OF THE CLINICAL COURSE OF TUBERCULOSIS

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Introduction

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis*, predominantly affecting the lung tissue, and remains one of the leading causes of mortality from infectious diseases worldwide. According to the World Health Organization (WHO), approximately 10 million people develop tuberculosis annually, and more than 1.5 million patients die as a result of this disease each year.

The high prevalence of tuberculosis, its prolonged clinical course, social significance, and severe complications necessitate continuous improvement of diagnostic and therapeutic approaches. Early diagnosis and targeted treatment play a crucial role in the effective control of any infectious disease; however, tuberculosis is often diagnosed at advanced stages due to nonspecific clinical manifestations.

In recent years, the introduction of laboratory biomarkers, molecular genetic techniques, and advanced imaging methods has significantly expanded diagnostic capabilities. In particular, inflammatory and coagulation biomarkers, polymerase chain reaction (PCR), interferon-gamma release assays (IGRA), and computed tomography (CT) have demonstrated high clinical value in assessing disease severity and identifying complications at an early stage. This study analyzes the clinical significance of modern diagnostic methods in patients with tuberculosis.

Keywords: tuberculosis, mycobacterium tuberculosis, polymerase chain reaction, interferon-gamma release tests, biomarkers, blood coagulation, computed tomography, early diagnosis.

Aim of the Study

To evaluate the clinical course of tuberculosis and assess the diagnostic value of laboratory, molecular, and instrumental methods, as well as to determine the association between inflammatory and coagulation biomarkers and disease severity.

Materials and Methods

The study analyzed data from 150 patients treated for tuberculosis between 2022 and 2024. Patients were divided into two groups according to clinical form:

- 90 patients with destructive tuberculosis (DTB);
- 60 patients with infiltrative tuberculosis (ITB).

All patients underwent comprehensive diagnostic evaluation.

Laboratory Investigations

Inflammatory and coagulation parameters were assessed, including:

- Procalcitonin (PCT);
- C-reactive protein (CRP);
- Coagulation system markers: D-dimer, fibrinogen, activated partial thromboplastin time (APTT), prothrombin time (PT), and international normalized ratio (INR).

Microbiological and Molecular Diagnostics

- Ziehl–Neelsen staining;
- Identification of mycobacteria;
- Polymerase chain reaction (PCR);
- Interferon-gamma release assays (IGRA).

Instrumental Methods

- Chest radiography;

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- Computed tomography (CT);
- Echocardiography.

Clinical data, disease history, symptoms, and treatment course were also analyzed.

Results and Discussion: The study revealed significant alterations in inflammatory and coagulation biomarkers among patients with tuberculosis, particularly in the destructive form. In the DTB group, D-dimer levels increased to 0.84±0.12 µg/mL ($p<0.05$), fibrinogen levels reached 4.8±0.7 g/L ($p<0.05$), and procalcitonin levels in severe cases were 1.2±0.3 ng/mL ($p<0.01$). These findings indicate a strong association between disease severity and hypercoagulable states.

Comparative analysis of diagnostic methods demonstrated high sensitivity of PCR and IGRA tests. PCR showed a sensitivity of 88.5% and specificity of 95.2%, while IGRA tests demonstrated 20–30% higher sensitivity compared to conventional bacteriological methods. The sensitivity of bacteriological examination ranged from 65% to 70%.

Instrumental diagnostics confirmed the superiority of computed tomography, which detected pulmonary destructive changes in 90% of cases. Additionally, 35% of patients developed exudative pleuritis, and 40% showed signs of pulmonary hypertension. Echocardiographic findings were useful for evaluating pulmonary circulation disorders.

These results confirm that combined use of laboratory, molecular, and instrumental diagnostic methods improves early detection, severity assessment, and prognostic evaluation of tuberculosis.

Conclusion: PCR and IGRA tests demonstrate high sensitivity and diagnostic accuracy and are more effective than conventional bacteriological methods in tuberculosis diagnosis. Procalcitonin, D-dimer, and coagulation system parameters serve as important biomarkers for assessing disease severity and complications. Computed tomography remains the most informative imaging modality for detecting pulmonary destructive processes.

A comprehensive diagnostic approach enhances early detection of tuberculosis, optimizes treatment strategies, and reduces disease-related complications. The implementation of modern diagnostic and therapeutic technologies plays a crucial role in reducing tuberculosis transmission and improving patient outcomes.

REFERENCES:

1. Abdukarimov M. U., Kh U. I. The study of the prognostic value of procalcitonin and changes in the blood coagulation system in the course of pulmonary tuberculosis //Journal of Survey in Fisheries Sciences. – 2023. – T. 10. – №. 1S. – C. 3217-3247.
2. Abdukarimov M. U., Usmonov I. K. Changes in the blood coagulation system in destructive tuberculosis //Central Asian Journal of Medicine. – 2024. – №. 3. – C. 111-117.
3. Abdukarimov M. U., Kh U. I. 67-7 (69) 2024-Abdukarimov MU, Usmonov I. Kh.-pathogenesis of the origin of destructive forms of pulmonary tuberculosis: review of scientific sources.
4. Usmonov I., Shukurov U. Features of the clinical course, the state of diagnosis and treatment of HIV-associated pulmonary tuberculosis in modern conditions literature review //Annals of the Romanian Society for Cell Biology. – 2021. – T. 25. – №. 4. – C. 1809-1828.
5. Usmonov I. K., Muazzamov B. R., Jumaev M. F. Features of Diagnostics and Treatment of Drug-Resistant Forms of Pulmonary Tuberculosis //International Journal of Pharmaceutical Research (09752366). – 2020. – T. 12. – №. 3.
6. Парпиева Н. Н. и др. Особенности диагностики и лечении при генерализированных формах туберкулёза //Новый день в медицине. Бухара,(2). – 2020. – С. 424-428.
7. Khaydarovich U. I., Khodgamovich N. P. Technique of use of titanium mesh cylinder of exemplary cage tubercular spondylitis //European science review. – 2018. – №. 9-10-2. – C. 178-184.
8. Назиров П. Х. и др. Преимущество и недостатки боковых хирургических доступов при радикально-восстановительных опеpatsiях туберкулёзного спондилита поясничного и

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пояснично-крестцового отдела позвоночника //Новый день в медицине. – 2020. – №. 2. – С. 453-458.
9. Usmonov I. X., Iskandarova I. M. Xavfli o‘smalar va o‘pka tuberkulyozini davolashda klinik va diagnostik xususiyatlar hamda qiyinchiliklar //Журнал гуманитарных и естественных наук. – 2024. – №. 8. – С. 113-117.
10. Усмонов И. Х., Гобилов Н. Ю. Особенности лечения при генерализированных формах туберкулёза //Молодой ученый. – 2020. – №. 29. – С. 65-68.
11. Назиров П. Х., Усмонов И. Х., Зайиров М. Х. Состояние очагов туберкулезной инфекции в современных условиях //Вестник Ассоциатsii Пульмонологов Центральной Азии. – 2025. – Т. 14. – №. 9. – С. 362-366.
12. Усмонов И. Х. и др. Особенности пост лечебных морфологических изменений мульти резистентных формах туберкулёза легких и оценка его прогностической значимости //Ta'limning zamonaviy transformatsiyasi. – 2025. – Т. 19. – №. 1. – С. 202-206.
13. Аслонов Ф. И., Усмонов И. Х. Влияние гендерных и клинических факторов на исходы лечения туберкулёза: сравнительный анализ первичных и вторичных patsientов //International Conference on Modern Science and Scientific Studies. – 2025. – С. 51-53.
14. Усмонов И. Х., Умурова Д. О. Особенности клинического течения туберкулезного спондилита у больных с сердечной потологией //Наука и инноватsiя. – 2024. – Т. 2. – №. 32. – С. 62-64.
15. Ливерко И. В., Абдуганиева Э. А. Связь патогенетических механизмов развития инфаркта миокарда с хронической обструктивной болезнью легких: причины и факторы риска (обзор) //Georgian medical. – 2019. – С. 66.
16. Абдуганиева Э. А., Халмухаммедова С. М., Дадабаева Р. К. Влияние изменения образа жизни и характера питания на качество жизни patsientов с ХОБЛ //В сборнике: Особенности формирования здорового образа жизни: факторы и условия. – 2015.
17. Fatullayevich J. M. Biological characteristics of the causative agent of tuberculosis in patients with pulmonary tuberculosis //World Bulletin of Public Health. – 2021. – Т. 5. – С. 27-32.
18. Jumayev M. F. Characteristics and shortcomings of clinical and medical diagnostics of pulmonary tuberculosis // Barqarorlik va Yetakchi Tadqiqotlar Online Scientific Journal. – 2022. – Vol. 2. – No. 10. – Pp. 367–372.