American Journal of Medicine and Medical Sciences 2024, 14(9): 2171-2176
DOI: 10.5923/j.ajmms.20241409.10

Features of the Clinical Course of the Osteo-Articular Form of Tuberculosis

Khamdamov Bakhtiyor Zarifovich*, Bozorov Shuhrat Istamovich

Bukhara State Medical Institute, Uzbekistan

Abstract According to WHO data, which controls the fight against tuberculosis worldwide, there are 20-30 million patients with active tuberculosis on Earth. Every year, about 9 million people get sick again, and more than 3 million people die. Osteoarticular tuberculosis accounts for 3-5% of all tuberculosis patients. This disease develops slowly and is often associated with irreversible destruction and deformation of bones and joints. The study aims to investigate the clinical and functional features of the osteoarticular form of tuberculosis.

Keywords Osteoarticular tuberculosis, Clinic, Laboratory tests

1. Relevance

According to WHO, which controls the fight against tuberculosis in the world, there are currently 20-30 million patients with active tuberculosis of all localizations on Earth. Every year, up to 9 million people get sick again, and more than 3 million people die. There is no visible trend towards stabilization or improvement of these indicators in the world [1,5,7,14]. Osteoarticular tuberculosis accounts for up to 3-5% of all patients suffering from tuberculosis, which amounts to 270-450 thousand people suffering from osteoarticular tuberculosis per year. Of the tuberculosis patients on the planet, from 300 to 900 thousand people have specific osteoarticular lesions [2,4,9,16].

The level of diagnosis of CST using modern methods is extremely low, which is associated not only with the complexity of identifying the pathology, but also with the difficulty of its bacteriological and histological verification, which does not exceed 60% [3,6,8,13]. A feature of CST is the high degree of disability of patients (up to 70%), even despite the possibility of its complete cure with modern surgical and conservative methods [8,10,13,18]. The complexity of the situation is explained by the fact that the disease develops slowly, flows with periods of relative well-being, and the need to confirm tuberculosis is thought about only when irreversible destruction and deformation of bones and joints develops or complications develop, which often confine people to bed [11,15,20].

For practical healthcare, it remains relevant to determine the immunological and molecular genetic aspects, study the processes of development of antibiotic resistance to Mycobacterium tuberculosis, optimize the diagnosis, treatment and prevention of the osteoarticular form of tuberculosis.

* Corresponding author:
salimdavlatov@sammi.uz (Khamdamov Bakhtiyor Zarifovich)
Received: Jul. 30, 2024; Accepted: Aug. 20, 2024; Published: Sep. 10, 2024
Published online at http://journal.sapub.org/ajmms

2. Purpose of the Study

Study of clinical and functional features of the osteoarticular form of tuberculosis.

3. Materials and Research Methods

To solve this problem, a comprehensive examination was carried out on 223 patients aged 18-87 years with osteoarticular forms of tuberculosis, who were examined and treated in the period 2022 - 2024 at the Bukhara Regional Center for Phthisiology and Pulmonology. The diagnosis was made based on clinical and functional data in accordance with the international consensus on the diagnosis and treatment of bronchopulmonary diseases. Diagnoses were verified based on a thorough history, clinical, laboratory (general blood count, urine), biochemical blood test, bacteriological examination of sputum, instrumental (chest x-ray, electrocardiography, spirography, picfluometry). Particular attention was paid to the duration of the pathological process, previous and concomitant diseases.

4. Research Results

When analyzing the data obtained by age of patients with CST, we obtained the following results: patients from 18 to 30 years old accounted for 5.39% (n=12), from 30 to 59 years old – 53.8% (n=120), from 60 years and older were 40.8% (n=91). (Fig. 1.)

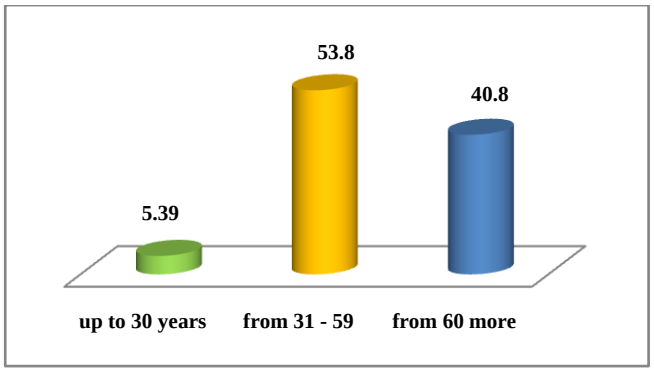

Figure 1. Age distribution of patients with CST (%), (P<0.05)

When analyzing gender, a slight predominance of females (52.1%) than males (47.9%) was revealed. (Fig. 2.)

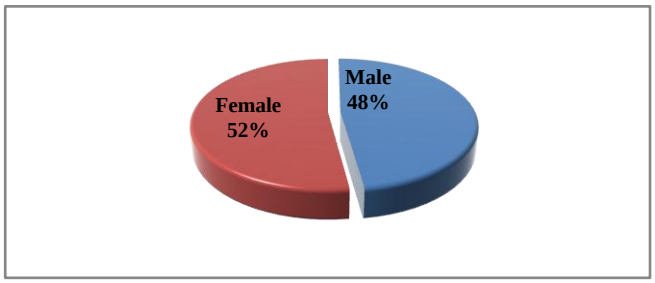

Figure 2. Distribution of groups by gender of patients with CST (%), (P<0.05)

On average, joint pain was detected in 40.8% of patients with CST. Lameness occurred in 73.1% of patients. Signs of intoxication (fever, general weakness, loss of appetite, weight loss, sweating) were observed in an average of 41.9%. Neurological disorders (insomnia, headaches) were present in an average of 75.3% of patients with CST. (Fig. 3.)

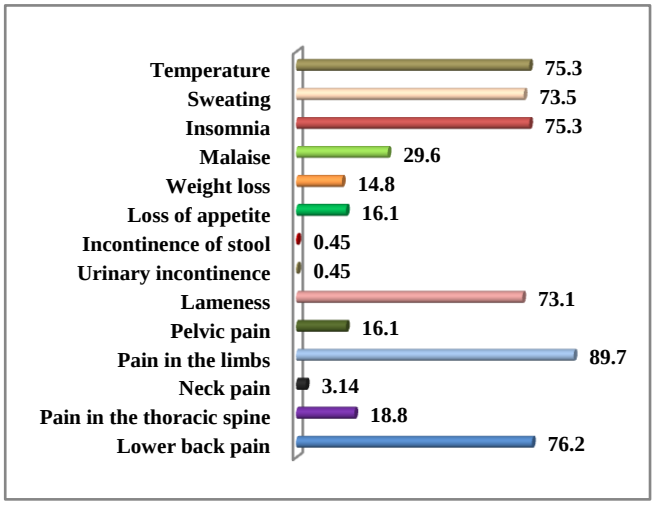

Figure 3. Main complaints of the examined patients (%), (P<0.05)

Analysis of somatic diseases revealed that in patients with CST, diseases of the ENT organs (88.3%) and gastrointestinal tract were more common (77.5%). Diseases of the cardiovascular system were in 63.7%. Anemia was detected in 64.1% of patients with CST. The incidence of nervous system diseases was 26.5%.

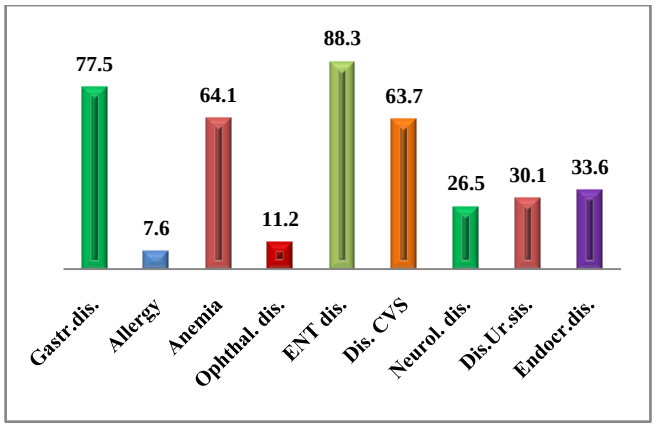

Figure 4. Concomitant pathology inpatients with CST (%), (P<0.05)

Diseases of the urinary system were also detected in 30.1%, endocrine diseases in 33.6%. Ophthalmological disorders and allergic diseases were detected in an average of 9.4%. (Fig. 4.)

Based on the results of the analysis of laboratory data, changes were detected in the level of leukocytes in the peripheral blood, which may be associated with the activity of the immune system in the fight against mycobacteria. The detected increase in erythrocyte sedimentation rate (21.6) indicates the presence of an inflammatory reaction in the body. It is important to note that no statistically significant changes were found in the remaining parameters, which requires further study and analysis to fully understand the patient's condition (Fig. 5.).

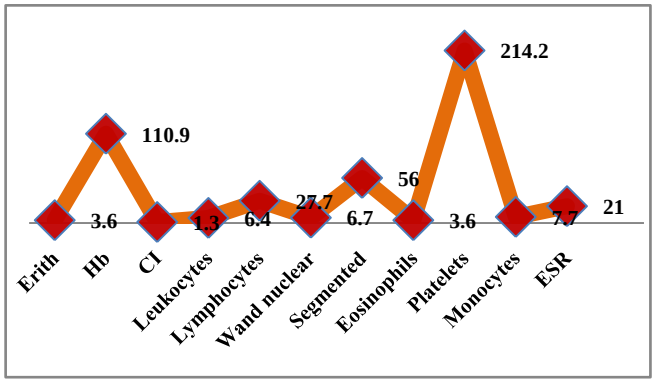

Figure 5. Parameters of general blood test in patients with CST, (P<0.05)

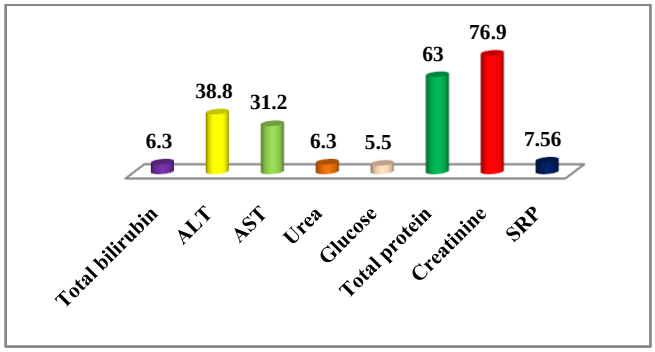

Figure 6. Biochemical blood test parametersin the examined patients, (P<0.05)

The biochemical analysis of the blood of patients with CST did not reveal any significant changes. (Fig. 6.)

To study the role of innate immune parameters in the development of CST, we studied acute phase proteins.

The main function of the acute phase protein system is the removal (elimination) of foreign cells and regulation of the immune response.

One of them is C-reactive protein (CRP), an acute phase protein related to nonspecific protective factors produced by liver cells [17,19].

When analyzing the results of C reactive protein in patients with CST, an increase in its level was revealed in 24.4%, with an average value of 7.56 ± 0.82 pg/ml.

The discovery of vitamins is a breakthrough in understanding the relationship between disease and health. Vitamin D, also known as the sunshine vitamin, was first identified in the early 20th century and associated with research into rickets [4,5,20]. In addition to its effects on calcium and phosphorus homeostasis, vitamin D is also involved in providing immunity against microbial pathogens. Proved itparticipation in the formation of local immunity of the musculoskeletal system, through an active influence on the biological functions of bone cells, cartilage tissue and joint capsule, various processes and regulatory systems, including inflammation, immunity and response to therapy [3,16].

Vitamin D has direct and indirect mechanisms of influence in rheumatism. Serum vitamin D levels vary significantly between populations and are influenced by many geographic and cultural factors [7,19]. Although people living in Uzbekistan are more likely to be exposed to sunlight; which is the main source of vitamin D, rheumatic pathologies continue to be one of the main causes of morbidity and mortality in the country. Since the osteoarticular form of tuberculosis is a controversial and multifaceted pathological process, studying the concentration of vitamin D as one of the factors leading to the development of a vicious circle is relevant.

In all patients in the study group, the vitamin content in the blood serum was determined (Table 1).

Table 1. Vitamin D level in the examined patients, ng/ml (p<0.05)

Options	Vitamin D levels (international standards)
Severe deficiency < 10	33.6% (75)
Shortage 10 - 20	56.1% (125)
Failure 10 - 30	10.3% (23)

Our data show that all patients with CST have a lack of vitamin D and its lowest level is observed in 33.6% (n=75). This may be due to long-term use of antibacterial, anti-inflammatory and glucocorticoid drugs, as well as the duration of the process.

When collecting anamnesis, it was revealed that 165 of those examined were taking medications containing vitamin D. But Unfortunately, most patients find it difficult to achieve recommended levels of vitamin D intake, even if they consume a healthy and balanced diet, because rich dietary sources of vitamin D are rare.

Analysis of data on ultrasound examination of the abdominal organs in patients with CST revealed inflammatory changes in the liver in 28.04%, in the gall bladder in 45.66%, as well as inflammatory changes in the kidneys in 35.7% and disorders of water-salt metabolism in the kidneys at 13.77%. Inflammatory changes in the liver may be associated with the iatrogenic effects of previously received therapy. (Fig. 7.).

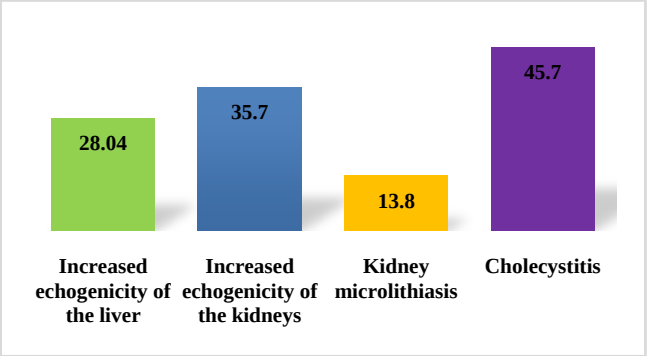

Figure 7. Ultrasound diagnostics of organs abdominal cavity, (%), P≥0.05

Next, we analyzed the electrocardiographic diagnostic data. The phenomenon of impaired cardiac repolarization was detected in 19.4%, Hiss bundle block in 37.2%, hypertraphy and sinus tachycardia in 61.3% of the examined patients (Fig. 8).

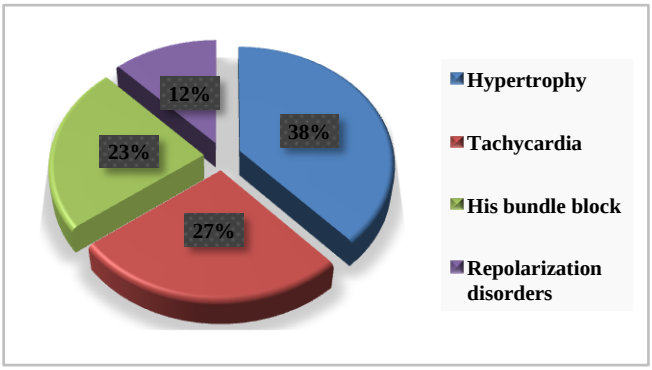

Figure 8. ECG changes in patients with CST, (%), P≥0.05

When analyzing the results obtained from radiography in patients with the osteoarticular form of tuberculosis, it was revealed that the most common pathologies are spinal osteochondrosis (54.3%), vertebral spondylitis (58.3%), disc herniation (56.1%), and joint erosion (10.8%) and vertebral protrusion (11.2%). A smaller proportion of patients showed the presence of osteoporosis (3.59%), vertebral hemangioma (3.59%), vertebral abscesses (6.73%), vertebral fractures (9.42%), avascular necrosis of the spine (2.69%), vertebral retrolisthesis (2.69%) and vertebral epiduritis (1.35%). There is also a small number of cases of formation in bones (1.35%). The latter may be due to a sedentary lifestyle, vitamin D deficiency, incorrectly selected and incorrect dosage of basic medications (Fig. 9.)

When interpreting operations performed in patients with the osteoarticular form of tuberculosis, the following main

points can be highlighted: The most frequently performed operation was abscess necrectomy in the lumbar spine, accounting for 31.4% of cases. This is followed by abscess necrectomy in the thoracic spine with 10.8% of cases. Installation of a total endoprosthesis in the area of the left hip joint (4.48%) and abscessonecrectomy in the lumbosacral region (13.5%) are also common.

A smaller proportion of operations are observed for right-sided pelvic tuberculous sacroilitis (0.45%), formation on the left buttock (0.44%), installation of a total endoprosthesis in the knee joint (0.89%), as well as for arthritis of both hip joints with installation total endoprosthesis (0.45%), revision and sanitation of total endoprosthesis of the right and left hip joints (0.448%). (Table 2.)

Taking into account scientific knowledge on the osteoarticular form of tuberculosis, it can be noted that operations such as abscess necrectomy and installation of a total endoprosthesis can be performed repeatedly with the development of associated complications in the bones and joints, which consequently leads to invasion of patients. Studying the causes of the above events and their elimination is an urgent problem in phthisiology today.

Table 2. Surgeries performed for osteoarticular forms of tuberculosis (M±m, %)

Operation name	Patients with CST %	Patients with CST (n=223)
Absesonecrectomy in the cervical spine	3.14	7
Absesonecrectomy in the thoracic spine	10.8	24
Puncture due to swelling in the chest area	0.45	1
Absesonecrectomy in the lumbar spine	31.4	70
Absesonecrectomy, lumbosacral	13.5	13
Installation of a total endoprosthesis in the hip joint area	3.59	8
Right-sided pelvic tuberculous sacroilitis	0.45	1
Installation of a total endoprosthesis in the area of the left hip joint	4.45	10
Mass on the left buttock	0.45	1
Installation of a total endoprosthesis in the knee joint area	0.89	2
Installation of a total endoprosthesis in the area of the left knee joint	0.89	2
Arthritis of both hip joints, total endoprosthesis	0.45	1
Revision, sanitation of the total endoprosthesis of the right hip joint	0.45	1
Revision, sanitation of the total endoprosthesis of the left hip joint	0.45	1

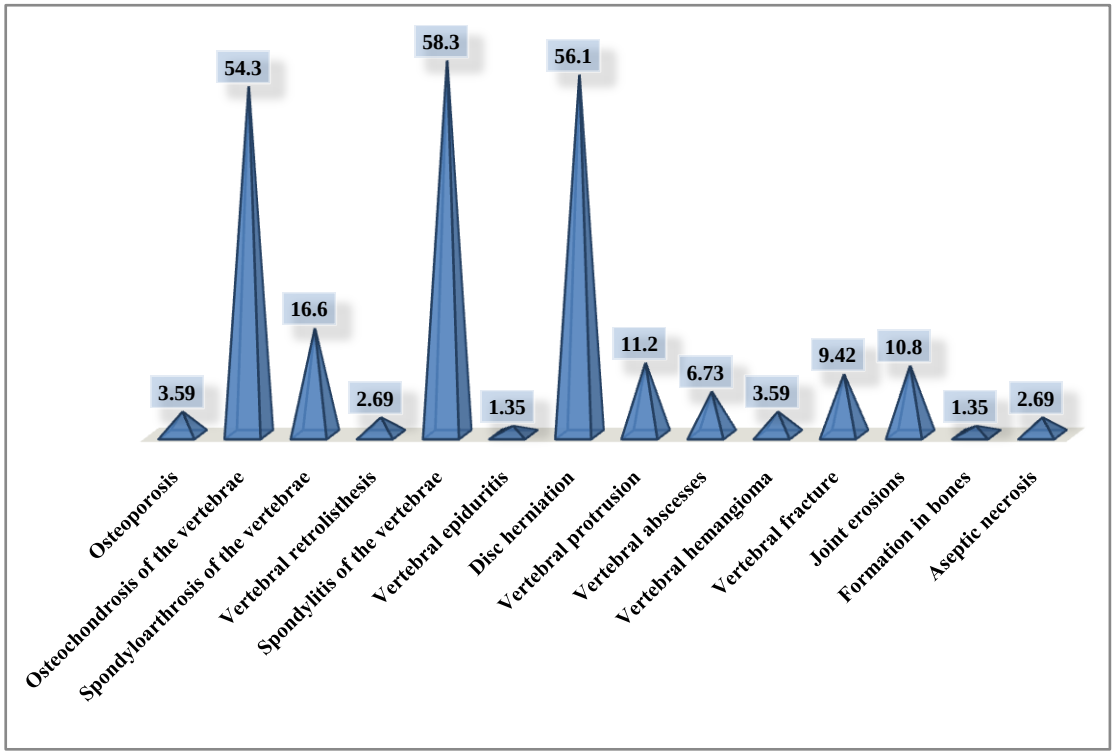

Figure 9. X-ray signs examined with CST, (%)

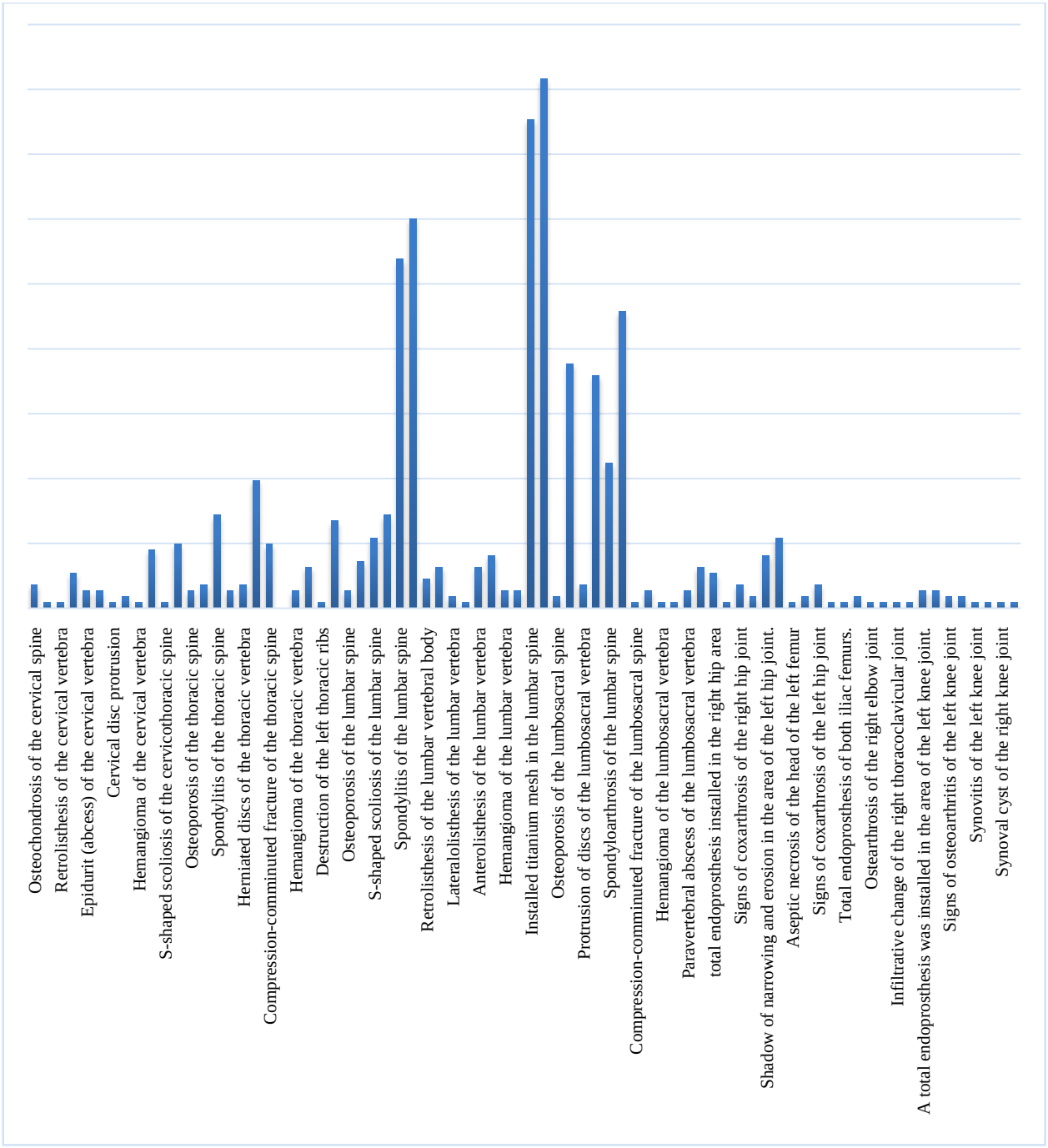

Figure 10. Histology of tissue after surgery in patients with CST, %

Next, we analyzed the histology of the surgical tissue. When interpreting histology analysis in patients with CST, the following was revealed:

The most common pathology is fibrocartilaginous tissue with destructive changes, noted in 8.52% of patients. Other identified pathologies include fibro-connective tissue with inflammatory infiltrate (0.90%), cartilaginous tissue with destrophic changes (3.59%), osteochondral tissue with destructive changes (4.04%), as well as necrotic cartilaginous tissue (1.35%). (Fig. 10.)

Taking into account scientific knowledge on the osteoarticular form of tuberculosis, it can be assumed that some of these changes may be associated with manifestations of tuberculosis. For example, destructive changes in bones and cartilage, inflammatory infiltrates and tissue necrosis may be the result of a chronic inflammatory process characteristic of tuberculosis. In addition, some pathological changes, such as granuloma with caseous necrosis, may be specific signs of tuberculosis infection.

5. Conclusions

Thus, our studies allowed us to draw the following conclusions: patients with CST were characterized by the

prevalence of such complaints as pain in the joints of the arms and legs and restrictions on their movement; Frequent diseases of the ENT organ and cardiovascular system and minor damage to the organs of vision and the genitourinary system; The analysis of laboratory data was characterized by moderate leukocytosis and increased ESR, as well as CRP; Instrumental studies revealed slight damage to the parenchymal organs, disturbances in the rhythm and conductivity of the heart and moderate osteoporosis with the phenomena of narrowing of the interarticular spaces and focal changes.

REFERENCES

[1] Azimov S.I., Mukhtarov Sh.T., Khamdamov B.Z. Monitoring Symptoms of Lover urinari tract and other features of benign hyperplasia of prostate in patients with tubercuiosis. European Journal of Molecular & Clinical Medicine ISSN 2515-8260. Volume 07, Issue 03, 2020. P-1534-1540.

[2] Kirilova I.A. Replacement of bone tissue defects with allograft in benign tumors and tumor-like diseases / E.A. Anastasieva, E.V. Gubina, L.A. Cherdantseva - Novosibirsk: Federal State Budgetary Institution “Novosibirsk Research Institute of Traumatology and Orthopedics named after. Ya.L. Tsivyan" of the Ministry of Health of the Russian Federation, 2021. - pp. 60-66.

[3] Kiryukhina, O.S. Pulse oscillometry in the diagnosis of obstructive ventilation disorders in patients with pulmonary tuberculosis / L.D. Kiryukhina, O.S. Volodich, N.V. Denisova. // Tuberculosis and lung diseases. - 2019. -T. 97, No. 11. - pp. 34-40.

[4] Lysov A.V. Immunological skin tests in the differential diagnosis of tuberculosis in adults / A.V. Kazakov, S.V. Sitnikova, A.S. Bezukladova // Tuberculosis and socially significant diseases. - 2020. - No. 1. -S. 14-19.

[5] Parpieva N.N. Non-tuberculous mycobacteria in phthisiopulmonological practice in the Republic of Uzbekistan / N. N. Parpieva, S. A. Sultanov, M. Kh. Dzhurabaeva, E. V. Anvarova // Tuberculosis and lung diseases - 2021. - T. 99 - No. 4 - C 52-56.

[6] Pasechnik, O. A. Approaches to improving the system of epidemiological surveillance of tuberculosis infection in modern conditions / O. A. Pasechnik, V. L. Stasenko // Medical almanac. -2019. - No. 1 (58). - P. 28-32.

[7] Petrov I.V. Microbiological and epidemiological features of mycobacteriosis / I. V. Petrov, T. Kh. Amirova, L. V. Petrova, F. S. Petrova, E. V. Sevastyanova, R. I. Valiev // Epidemiology and Vaccine Prevention -2020. - T. 19 - No. 3 - P. 89-94.

[8] Uryasev, O. M. Comorbid pathology in chronic obstructive pulmonary disease / O. M. Uryasev et al. // Bulletin of VolSMU. -2020. - No. 2 (74). - pp. 174-177.

[9] Filinyuk, O. V. HIV infection and multidrug-resistant tuberculosis: frequency of combination, treatment effectiveness / O. V. Filinyuk et al. // Tuberculosis and lung diseases. - 2021. - T. 99, No. 2. -S. 45-51.

[10] Brassington K. New frontiers in the treatment of comorbid cardiovascular disease in chronic obstructive pulmonary disease / S. Selemidis, S. Bozinovski [et al.] // Clin. Sci. (Lond). - 2019. - Vol. 133, No. 7. -P. 885-904.

[11] Burke A. Clinical Pharmacokinetic and Pharmacodynamic Considerations in the Drug Treatment of Non-Tuberculous Mycobacteria in Cystic Fibrosis / A. Burke, D. Smith, C. Coulter, SC Bell, R. Thomson, JA Roberts // Clin. Pharmacokinet. - 2021. - T. 60 - No. 9 - P. 1081-1102.

[12] Fukushima K. The impact of adjuvant surgical treatment of nontuberculous mycobacterial pulmonary disease on prognosis and outcome / K. Fukushima, M. Miki, Y. Matsumoto, E. Uda, Y. Yamamoto, Y. Kogita, Y. Kagawa, T. Matsuki, H. Kagawa, Y. Oshitani, D. Motooka, K. Tsujino, K. Yoshimura, K. Miki, A. Hayashi, S. Nakamura, S. Kitada, Y. Takeuchi, H. Kida // Respir. Res. - 2020. - T. 21 - No. 1 - P. 153-160.

[13] Giller DB Surgical Treatment of Nontuberculous Mycobacterial Pulmonary Disease and a Combination of Nontuberculous Mycobacterium Pulmonary Disease and Pulmonary Tuberculosis / DB Giller, GV Shcherbakova, AN Gerasimov, SV Smerdin, II Martel, OS Kesaev, VV Koroev, LP Severova // Int. J. Infect. Dis. - 2022. - T. 120 - P. 12-21.

[14] Ladero-Aunon I. Bovine neutrophils release extracellular traps and cooperate with macrophages in Mycobacterium avium subsp. paratuberculosis clearance in vitro / I. Ladero-Aunon, E. Molina, A. Holder [et al.] // Front. Immunol. - 2021. - Vol. 12. - P. 645-650.

[15] Lansell A. Impact of antibiotic pretreatment on cultures in children with osteomyelitis and septic arthritis: a retrospective review / Y. Vasili, PS Suchdev et al. // BMC Pediatrics. - 2021. - Vol. 21. - No. 1. - P. 342-347.

[16] Khamdamov B.Z. Morphological changes when using photodynamic therapy in the treatment of wound infection in an experiment. Journal of Morphology. Saint Petersburg. 2020. Volume 157 (2-3). -WITH. 223-224.

[17] Khamdamov B.Z., Azimov S.I., Rashidov Z.R., Mukhtarov Sh.T. Current international standards for monitoring lower urinary tract symptoms and sings of benign prostatic hyperplasia and tuberculosis patients // Journal of Natural Remedies Vol. 22, №.1(2), (2021) pp. 117-123 [https://jnronline.com/ojs/index.php/about/article/view/908].

[18] Retamal P. Vaccination of Holstein heifers with Mycobacterium bovis BCG strain induces protection against bovine tuberculosis and higher milk production yields in a natural transmission setting / P. Retamal, P. Abalo s, R. Alegria-Moran [et al.] // Transbound. Emerg. Dis. - 2022. - Vol. 69. - P. 1419-1425.

[19] Seisa MO A Systematic Review Supporting the Endocrine Society Clinical Practice Guideline on the Treatment of Hypercalcemia of Malignancy in Adults /, T. Nayfeh, B. Hasan et al. // The Journal of Clinical Endocrinology & Metabolism. - 2023.

[20] Wang, EY The impact of smoking on tuberculosis treatment outcomes: a meta-analysis / EY Wang, RA Arrazola, B. Mathema [et al.] // Int J Tubercul Lung Dis. - 2020. - Vol. 24. - P. 170-175.