

## Clinical and radiological diagnosis of tuberculous arthritis taking into account its localization

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Recently, there has been a tendency to increase tuberculosis of various localizations. One of the manifestations of tuberculosis in the musculoskeletal system is arthritis. The process has an initial chronic course, it goes on for a long time without any symptoms. Clinical signs appear late and develop slowly. Its clinical and radiological signs depend on a specific location in a certain joint. Therefore, the features of tuberculous arthritis depending on its location are considered in the lecture.

Osteoarticular tuberculosis develops as a general disease, the causative agent of which is mycobacterium tuberculosis and is characterized by local changes in the bone system. Along with a secondary lesion, in which Mycobacterium tuberculosis penetrate into the bone system from the lungs and lymphatic glands by the lymphohematogenous route, occasionally osteoarticular tuberculosis can develop primarily. Lymphohematogenous introduction of infection from the primary source is insufficient for the development of bone tuberculosis. It appears only under the condition of a decrease in general and local immunity, which can occur under the influence of exogenous (virulence of the pathogen, previous infections, injuries) and endogenous (immunobiological body properties, age, blood supply of a certain bone organ, etc.) factors.

Bone and joint tuberculosis begins with a specific tuberculous osteomyelitis. A tuberculous granuloma (tubercles) occurs in the bone marrow — a cluster of epithelioid and Langhans multinucleated giant cells. Serous inflammation appears around it. Over time, adjacent tubercles merge, forming small centers of necrosis and caseous disintegration in the center of the granuloma. Gradually, this process spreads to bone trabeculae (trabecula

ossea) destroying them. Bone necrosis and sequestrations may form.

According to the development, two types of tuberculous process are distinguished: mainly productive (fungal), characterized by the appearance of granulations and tubercles, and mainly exudative, when widespread caseous necrosis is detected. These phenomena can be observed simultaneously and manifest in different degrees. The reverse development of tuberculosis of bones and joints occurs through the formation of fibrous tissue around the bone center and subsequent calcification of caseous masses or metaplasia of fibrous tissue into bone tissue.

Tuberculosis can develop in any bone, but bones that have a spongy structure and contain a significant amount of red bone marrow are mostly affected. These are metaepiphysis of long bones, vertebral bodies, other short, less often flat, bones.

*The frequency of occurrence* of tuberculosis of bones and joints decreases in the following order: spondylitis, arthritis of the lower limb (coxitis, gonitis, arthritis of the ankle-foot and tarsometatarsal joints), arthritis of the upper limb (ulnar, radiocarpal, intercarpal, humeral joints). In the last place is diaphyseal tuberculosis. The first three localizations (spondylitis, coxitis and gonitis) account for up to 80% of all cases of bone tuberculosis. Usually, the process develops in one bone, and then spreads through the joint to another by contact.

Recently, the age range of bone tuberculosis patients has changed. If earlier children were more often sick, now middle-aged and elderly people are. This is explained by the weakening of immunity.

*Clinically* the tuberculous process begins gradually and has a chronic course.

First, general signs of intoxication appear: weakness, lassitude, rapid fatigue, increased body temperature, decreased appetite, pale skin, weight loss. Local symptoms develop several weeks or months after the appearance of general symptoms. They are caused by the growth of destruction, the development of a perifocal reactive non-specific process around the tubercular center and the occurrence of neurotrophic disorders. It is accompanied by pain and tenderness. The functions of the affected part of the skeleton are impaired. Other local signs vary depending on the localization and phase of the development of the process.

Secondary anemia, normal or reduced leukocytosis with lymphocytosis (in severe cases – increased neutrophilia), acceleration of ESR are observed in the blood.

**Classification of bone and joint tuberculosis:** focal tuberculous osteitis; synovial (if it is proven that there is no osteitis) tuberculosis; destructive (limited or widespread); with three phases of development (initial, peak, subsidence); old recurrent tuberculosis.

#### **Tuberculous Osteitis**

Focal tuberculosis of the bones — osteitis is *clinically* manifested by local symptoms (pain, tenderness, swelling), in the absence of pronounced general symptoms or with signs of tuberculosis intoxication.

*Radiologically*, this pathology is recognized after the spread of destruction from the bone marrow to the bone tissue. Tuberculosis focus (cell) is localized in the spongy substance. It is solitary, isolated, lies centrally or closer to one of the surfaces of the bone. The bone structure is impaired, which is caused by the destruction of bone trabeculae and beams. The shape of the cell is round, oval, less often polygonal or wedge-shaped. The sizes vary and are mostly 0.5-2 cm in diameter. There are small cells (up to 0.3 in diameter), medium (up to 0.9 cm) and large cells (from 1.0 to 2.5-2 cm). Small cells will be detected during a tomographic examination. However, in the case of a superficial location, it can be detected in the region-forming section on an X-ray. At the same time, even large cells that are not demarcated by sclerosis and lie

in the central parts of bones and are covered by a large array of soft tissues (hip joint) are poorly differentiated on radiographs and even on longitudinal tomograms. Therefore, CT is used to determine destruction. MRI allows early detection of bone marrow lesions.

During the development of the productive fungal form of tuberculosis, the destruction centers are limited by a slight sclerotic corolla. With the exudative form, they are indistinct and jagged.

As tuberculous osteitis has a long favorable development, in the phase of subsidence the area of destruction is gradually surrounded by a corolla of reactive sclerosis. Caseous masses, which formed during the disintegration of granulations are calcified, and the area of destruction is replaced by sclerosed bone tissue. A compact small insula is formed, which persists for several years.

Under unfavorable conditions, as a result of progressive destruction of bone beams and caseous disintegration of granulations, cavities (bone caverns) are formed. Small additional cavities are often formed around them. Sequestrations occur due to necrosis, intensive growth of granulations and disruption of blood supply. Caverns contain granulations and pus. The contents of the cavities often drain into the adjacent soft tissues and infect them.

The shadow of the sequestra on the radiograph resembles a lump of melting sugar because of low intensity and jagged contours. Against the background of areas of destruction and local osteoporosis, its shadow is well recognized. Under the influence of treatment, the tuberculous sequestration can dissolve or grow through the connective tissue, in other words, get organized. When the cavity is evident, the process subsides by fibrous transformation of granulations and encapsulation of the focus.

It is radiographically characterized by the absence of an increase in the phenomena of destruction, the alignment of the edges of the bone cavity, the reduction of signs of osteoporosis around it, and later the corolla formation of mild sclerosis. Small cells can be completely replaced by bone substance. In the case of a long remission, functional

reconstruction of the newly formed bone tissue occurs. Its beams gradually thicken and are located along the lines of force, renewing the bone structure. If the residual cavity is preserved, then the beams are located perpendicular to its sclerosed edge. However, even well-walled and isolated cells remain active for many years. For this reason, under the influence of adverse conditions, the process may become more acute.

The changes that occur in tuberculous osteitis thus are similar to the changes that occur in tuberculosis of other organs. These are centers of destruction, cavities (caverns), perifocal reactions and repair.

The state of reparative processes in the bones has great prognostic value and is therefore subject to a detailed X-ray study, in particular with the help of CT.

**Tuberculosis arthritis.** If the tuberculous focus is located near the joint, the process can spread to the joint by contact. Therefore, tuberculous osteitis of such localization is considered as a pre-arthritis stage of tuberculous primary bone damage of the joints.

*In the pre-arthritis stage*, you see only limited osteoporosis around the focus of destruction, which increases the blurring of its contours. Widespread osteoporosis and bone atrophy join after the transition of the process to the joint. Their occurrence is caused by disturbances in the functional activity and nervous trophism of the joint. The development of bone atrophy is typical only for children. If the process is localized in the depth of the epiphysis or in the joint, periostitis is not a typical.

Tuberculosis of the joints is called **the arthritis stage**. It mainly affects the epiphyses and capsule, which are part of the joints. More often, granulations grow into the joint under the cartilage from the bone epiphysis, spreading to the places of attachment of the joint capsule and ligaments. Rarely, it breaks directly into the joint and, as an exception, lymphohematogenic lesion of the synovial membrane is observed. Therefore, morphologically and clinically, at the beginning of the arthritis stage, lesions of the capsule of the joint or articular part of

the bone are distinguished and, accordingly, primary synovial and primary osseous forms of tuberculous arthritis.

The primary synovial form of tuberculous arthritis is extremely rare. At the same time, the tuberculous granuloma spreads from the synovial to the fibrous outer layer of the joint capsule, later – to the ligaments and bone tissue of the joint, above all in the areas of attachment of the capsule. Predominantly, a primary bone lesion is observed.

Regardless of primary synovial or primary bone lesion, the cartilaginous elements of the joint are destroyed later, since the tubercle bacillus does not produce active chondrolytic enzymes. Cartilaginous tissue is destroyed as tuberculous granuloma grows between it and bone. Due to trophic disorders, the cartilage is necrotized and resorbed.

There are such forms of joint tuberculosis: dropsy, proliferative (fungal) and destructive.

**Joint edema** is an exudative synovitis that can have a subacute or chronic course. It is caused by a tuberculous lesion of the synovial membrane.

Pain, effusion in the joint with restriction of movement, decreased tone, and later – muscle atrophy and edema of the subcutaneous base are *clinically* noted.

Uniform *regional* osteoporosis is *radiographically* visualized. X-ray joint space is widened due to the accumulation of effusion or is unchanged. Later, after lesion of the cartilage, it narrows. Areas of physiological clarification are darkened.

**Fungal form** of joint tuberculosis is especially rare. It is caused by the gradual filling of the joint cavity with fungal masses — tuberculous granulations which are located on the synovial membrane. The fibrous layer of the shell gets thicker. Tuberculous granuloma destroys bone tissue (mainly in the areas of capsule attachment) and articular cartilage.

*Clinical signs:* pain, significant swelling and dysfunction of the joint. The stretched skin over the joint becomes white (“white tumor”).

*X-rays* determines areas shading of areas of physiological clarification of the joint, osteoporosis, widening of the joint space

with its subsequent gradual narrowing (as in dropsy). From the latter, the fungal form of tuberculosis of the joint differs only in the presence of marginal defects (erosions) in the places of attachment of the capsule and “white tumor”. In the case of progression of the tubercular process, the closing articular plates are destroyed, the joint gap gradually narrows, pathological subluxations and dislocations occur.

Effusion in the joint differs from fungal growths by the intensity of the MR signal. The latter in the case of effusion becomes high on T2-weighted images, while the MR signal of fungous masses has an average intensity on both T1 and T2-weighted images.

***Destructive or primary bone form.***

Destructive form of joint tuberculosis occurs most often. The focus of destruction is located in one of the bones that form the joint, even before the breakthrough or contact transition of the tubercular process to the synovial membrane and other soft tissues of the joint. The articular cartilage become thinner as a result of the development of dystrophic processes, Fluid accumulates in the joint space or fungal masses are formed.

*Clinical signs:* pain, limited mobility, contractures, muscle atrophy, edema of the subcutaneous base, increase in joint volume.

*Radiologically,* at the beginning of the development of the primary bone lesion, an isolated tuberculous focus with a wedge-shaped, rounded or oval shape and unclear contours is revealed in one of the articular end parts. The progression of *destructive arthritis* is characterized by the same signs as the development of the primary synovial fungal process. However, with destructive arthritis, more characteristic changes and a predominance of destruction are observed in the part of the joint ends, where the tuberculous focus initially arose. The height of the joint space gradually decreases, the closing plate becomes serrated. Along with degeneration, an acute uniform osteoporosis grows, bone tissue is destroyed. In the areas of the transition from the bone to the joint, foci of destruction are formed, mainly in the form of marginal defects (erosions). Most often, marginal defects are formed in the areas

of attachment of the capsule and ligaments. The contours of these foci are mainly uneven, jagged, without a clear border they turn into an osteoporotic structure of the epiphysis. At the beginning of the development of the disease, they are formed in the bone affected by tuberculous osteitis, and then in the opposite articular end part. Later, the spongy substance of the pineal gland (epiphysis) becomes necrotic. The favorite localization of the necrotic process is the most functionally loaded parts of the joint ends. Sequesters are completely separated from the parent bone by a granulation shaft, which in the X-ray image has the appearance of an uneven light corolla. Significant destruction of bone tissue, formation of spongy bone sequestrations and marginal defects occur in the articular ends of bones. The small spongy bones of the distal parts of the limbs can be completely destroyed. In this connection, subluxations and dislocations occur. The appearance of effusion in the joint is accompanied not only by its volume increase and darkening of the physiological clarifications, but also by an expansion of the joint space. As a result of infiltration, swelling and the soft tissue compaction of the joint, the contours of the joint capsule can also be determined on the X-ray.

If *neurotrophic disorders* are evident, the osteoporosis may precede destructive changes. It has a regional and often widespread character. In the midst of the tuberculosis process, the manifestations of osteoporosis increase, and it acquires a vitreous form. In this case, the cortical substance thins sharply, but it is clearly visible.

During the development of tuberculous arthritis in children, bone atrophy first occurs in the diaphysis. As a result of neurotrophic disorders, subperiosteal resorption and retardation of bone growth in thickness occur. The thinning of the diaphyses is more visible, the earlier the child fell ill, the more severe the course of the disease, and the later specific treatment was started.

*In the acute phase* of the disease, manifestations of atrophy increase, and it develops along with manifested, often vitreous osteoporosis.

*When the process subsides*, it is radiologically characterized by a decrease in the manifestations of osteoporosis, the resorption of sequestrations, the absence of progression and sclerotic delimitation of areas of destruction. The consequences of local subsidence process are different — from the complete renewal of the structure and bone shape to the formation of an incorrect position of the articular ends, fibrous and incomplete bone ankylosis with impaired joint function.

Indirect signs of tuberculosis of the joints are acceleration of growth (lengthening) of the limb, increase in size (aging) of epiphyses. This is due to toxic irritation of growth zones. In case of destruction of growth zones and epiphyses, the affected limb is shortened. With uniform destruction of the growth zone, uniform shortening of the bone occurs, and in the presence of a partial one, curvature is observed along with the shortening. The indicated indirect signs are not pathognomonic. They can occur in the case of other chronic infections, as well as after trauma.

Tuberculosis arthritis differs from other infectious lesions of the joints by its imperceptible onset, slow course, absence of periosteal reactions, and distinct phenomena of osteoporosis and atrophy. Process usually occurs secondarily. Therefore, it is necessary to take into account the presence of tuberculous lesions of the lungs. They are treated with antibacterial drugs and by strengthening the body's immune forces. Features of the course of tuberculous arthritis largely depend on localization in a certain joint.

**Tuberculosis of the hip joint** (tuberculous coxitis) is the most frequent localization of tuberculous arthritis. According to the classification of bone and joint tuberculosis, a destructive (limited or widespread) form of the disease occurs most often with three phases of development: initial, peak (intensification), and subsidence.

Pathological focus usually appears in the form of destruction foci in the -bodies of the iliac, buttock, pubic bone or neck of the femur. The head of the -femur is affected secondarily due to the extension of the process from its neck through the growth zone or capsule. The

primary sinovial form of coxitis with damage to periarticular soft tissues develops much less often.

Tuberculous coxitis clinically is characterized by a long-term chronic course, exacerbations. Subfebrile body temperature, weakness, rapid fatigue, lameness are observed. Pain occurs in the hip or knee joint, that makes diagnosis difficult. The gluteal fold is smoothed, the skin fold of the thigh is thickened (swelling of the skin base is Alexandrov's symptom), the muscle tone of the limb is reduced. Various movements in the joint are limited. A significant impairment of function is often observed due to the slow progression of flexion contracture. At the height of the disease, swelling is observed in the joint area, enlarged regional lymph nodes are palpated, a periarticular abscess may form with time.

The growing bone atrophy is usually radiologically detected during phase of intensification in childhood.

At any age, regional uniform osteoporosis occurs, which can gradually reach the vitreous type. Characteristic manifestations of focal destruction in one of the bones forming the hip joint. Most often, they appear in the body of the iliac bone, which initially look like one or several small (4-5-6 mm) destruction foci with indistinct contours (fig. 1). Against the background of osteoporotic bone, they are difficult to recognize. Much less often, such centers of destruction arise for the first time in the body of the ischial or pubic bone, which form the lower part of the acetabulum.

With tuberculous coxitis, the first signs of bone destruction can be detected in the neck of the femur, which, when enlarged, spread to the head of the bone and can lead to its complete destruction. It is known that with tuberculous coxitis, the head of the femur is never affected for the first time, its destruction is always secondary: when the neck destruction foci of the femur spread to the head or when the joint is significantly damaged, the destruction from the bones forming the acetabulum to the head. These features of tuberculous coxitis are quite important for the differential diagnosis of early manifestations of the disease in children with Perthes disease (aseptic necrosis of the

femoral head), in which the femoral head is primarily affected.

X-ray joint space gradually narrows. The progressive destruction of the articular surfaces leads to internal subluxation of the femur, which, in case of the body destruction of the hip bone, shifts inwards and upwards. The destruction of the ischium body is accompanied by the protrusion of the depression with the deepening of the femur head into the pelvic cavity. An indirect sign of protrusion can be the location of the shadow of a paraarticular abscess on the inner surface of the pelvic cavity. Coxitis without protrusion is characterized by the presence of an abscess in the soft tissues on the inner surface of the thigh. Calcification of a para-articular abscess, which has the appearance of globular shadows, occurs within 2-4 years (fig. 2). During the -remission phase of the disease, the areas of destruction do not increase. A sclerotic corolla forms around them. Sequestrations are resorbed or organized with the renewal of the bone structure. Manifestations of osteoporosis decrease, which changes from vitreous to coarse trabecular. The cortical layer of the



**Fig. 1.** Tuberculous coxitis in a child. Bone-destructive form, peak phase. The radiograph of the right hip joint shows a focus of destruction in the body of the ilium with partial destruction of its articular surface. X-ray joint space is narrowed, periarticular soft tissues are slightly enlarged. There is an increase in the epiphysis of the femur and the ilium body diameter (a symptom of aging of the epiphyses), widespread osteoporosis, slight atrophy of the bones of the right half of the pelvis and the femur.

diaphysis from the endosteum side thickens, fibrous or incomplete bone ankylosis is formed.

With effective treatment, stabilization begins after 6-8 months, and a stable effect is achieved after 2-3 years. The function of the joint is preserved in the case of timely and successful antibacterial and orthopedic treatment [6].

**Knee joint tuberculosis** (tuberculous gonitis) takes second place among tuberculosis of the joints. It can be in the form of bone-destructive or primary synovial form. The bone-destructive form begins with the appearance of bone destruction in the corresponding metaphyses of the femur or tibia (fig. 3).

In cases of tuberculous lesion, the cartilages of the knee joint are destroyed late. Menisci and ligaments can remain undamaged for a long time, therefore, in the presence of tuberculous gonitis, one half or one segment of the knee joint is often affected.

Subfebrile body temperature, fatigue, lameness, pain that increases during exercise, thickening of the skin fold, swelling of the



**Fig. 2.** Tuberculous coxitis from a protrusion of the left acetabulum with displacement of the destroyed femur, destruction of all the bones of half of the pelvis, several small spongy sequestrations against the background of the appearance of new destruction foci, a triangular periarticular abscess with calcifications at the level of the middle third of the femur. The peak phase at the relapse of the process.

joint, limitation of its function are clinically observed. In the case of significant destruction, subluxations and sprains occur over time, and during exacerbation – a flexion contracture. A fistula may form in the area of the upper turn of the joint or in the popliteal fossa. If the process subsides, fibrous and sometimes incomplete bone ankylosis is formed [5].

Radiologically, bone atrophy is most noticeable in children and occurs earlier in the fibula than in the tibia and femur. Regardless of the age of the patients, uniform osteoporosis is observed, which gradually increases, up to vitreous.

With accelerated growth of the epiphysis and metaphysis (a symptom of the aging of the epiphyses), an increase in their size in children leads to a lengthening of the bones by 1-2 cm, which is an indirect sign of gonitis, that can appear 1-2 years earlier than focal bone destruction (fig. 4). Destructure extends from the metaphysis to the epiphysis. The joint space narrows slowly. Areas of physiological clarification of the joint are darkened or not defined. In children, repeated exacerbations cause premature synostosis in the growth zone. Together with the destruction of the epiphyses, this leads to a change in length —



**Fig. 3.** Tuberculous gonitis on the left, primary synovial form, peak phase. An X-ray of the left knee joint shows the increase in the joint because of the increase in the periarticular soft tissues as well as the epiphyses of the femur and tibia (a symptom of aging of the epiphyses). The joint space is slightly narrowed. The bone destruction is absent.

lengthening is replaced by shortening of the affected limb [4]. As the process subsides, the osteoporosis becomes hypertrophic, coarse-trabecular. Bone atrophy, which occurred in childhood, persists throughout life. Atrophy does not occur if the disease began after the completion of the formation of the skeleton [2,7].

In case of **ankle joint tuberculosis**, focus of destruction is mainly -localized in the body of the supracalcaneus, less often — in its neck, head, distal metaphysis of the tibia, or in its ossicle. In approximately half of the patients, the ankle joint is affected in isolation, less often the posterior -supracalcaneal and supracalcaneal-scapoid joints are involved. The bone-destructive form of the process prevails.

Arthritis of the ankle joint occurs mainly in childhood. It develops asymptotically for a long time. The pain gradually increases. It is observed atrophy of the calf muscle, swelling of the periarticular soft tissues, which leads to lameness, foot drop. At the height of the disease, the body temperature rises, swelling of the tissue around the joint occurs. As a result of progressive destruction, paraarticular abscesses and fistulas may form.

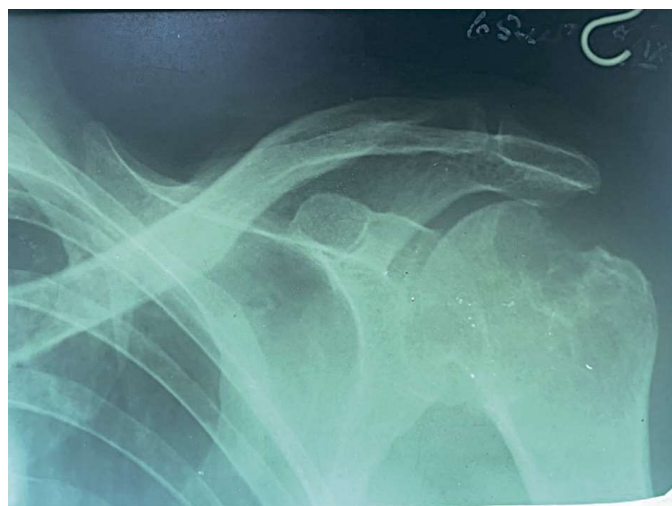


**Fig. 4.** Tuberculous gonitis, bone-destructive form, peak phase. An X-ray of the knee joint shows a focus of destruction with the presence of spongy sequestration in the distal epiphysis of the femur, destruction of the articular surfaces of the femur and tibia. X-ray joint space is not visualized, periarticular soft tissues are enlarged, shading of the physiological illumination of the joint.

The subsidence of the process most often leads to the formation of fibrous or incomplete bone ankylosis.

X-rays reveal atrophy of tibia bones in children. Uniform osteoporosis develops at any age. Destruction is most often localized in the supracalcaneal bone. Less often, destruction primarily occurs in the distal metaphysis of the tibia. At the beginning of the process, a limited focus of destruction (sometimes with sequestration) is detected. Gradually, the destruction spreads to the articular surfaces. Narrowing of the X-ray joint space occurs slowly. Destruction of the articular surfaces and narrowing of the X-ray joint spaces of the supracalcaneal-calcaneal and, less often, supracalcaneal-scaphoid joints are often revealed. In case of unfavorable development of the process, all the small bones of the tarsus can be destroyed. The development of arthritis is accompanied by an increase in the volume of soft tissues, a disorder of their structure, and the darkening of areas of periarticular physiological changes [3].

**Tuberculosis of the shoulder joint** is rare. It mainly develops in mature or elderly people. In children, the focus is primarily localized in the metaphysis, in adults – in the head, near the large or small tubercles, the anatomical



**Fig. 5.** *Tuberculosis of the shoulder joint. Bone-destructive form, peak phase. On the radiograph of the shoulder joint, a focus of destruction with unclear contours is observed in the area of the anatomical neck of the humerus with its spread to the large tubercle of the bone as well as to the articular surface of the scapula.*

neck of the humerus, occasionally – in the acromion, awn or neck of the scapula.

Fungal form (dry costoid) occurs more often. A large number of granulations fills the cavity of the joint with its eversions. The process proceeds without visible caseous decay, abscesses and fistulas. Articular cartilage peels off and deteriorates. The capsule is scarred and wrinkled. The areas of its attachment are eroded. Gradually, the destruction spreads to the pineal gland.

Clinical signs: pain radiating to the elbow joint, weakness of the upper extremity, atony and atrophy of the muscles (deltoid, pectoral, back), thickening of the skin fold, limitation of function, and later – adducton contracture.

Radiologically, a clearly delineated section of the structure on the border of the head and the big tubercle appears or on the anatomical neck of the humerus, according to the attachment of the joint capsule. If the process progresses, the destruction spreads to the head, and later to the hollow (socket) of the joint, mainly to the neck of the scapula (fig. 5). Predominance of destruction in the head can lead to its complete damage [4].

In the case of elbow joint tuberculosis pain, swelling on the joint back surface, muscle atony and atrophy, and functional impairment are clinically observed. Fistulas may form.

X-rays reveal bone atrophy in children. Osteoporosis develops in patients of any age during the acute phase. The focus of destruction is located in the ulnar process of the elbow bone. The destruction spreads to the block-shaped notch, later – to the epiphysis of the humerus (fig. 6). Sequestrations may form. A feature of this localization is the formation of multi-layered periostitis on the ulna, resembling “spina ventosa”. If the process subsides, periosteums are assimilated, areas of destruction are demarcated.

**Tuberculosis of the radiocarpal joint** is rare. Clinical signs: pain, -swelling (mainly on the back of the hand), atrophy of the muscles of the forearm, local increase in temperature, function limitation. In the midst of the process, a flexion contracture may occur. Frequent exacerbations are observed, fistulas are formed.

Osteoporosis can be detected radiologically.

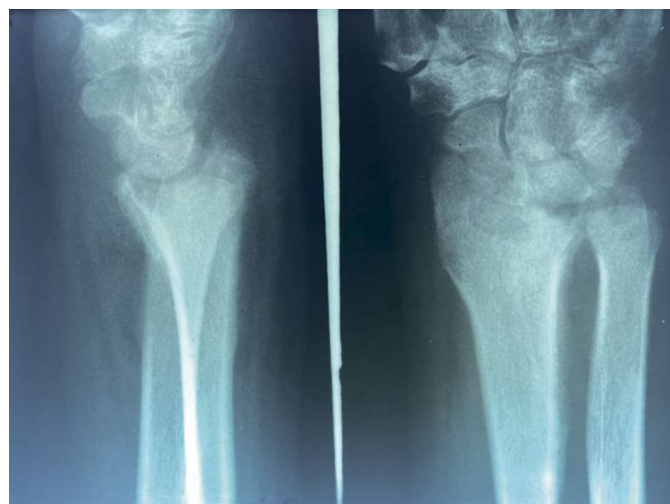




**Fig. 6.** Tuberculosis of the elbow joint. Bone-destructive form, peak phase. An X-ray of the elbow joint shows a focus of destruction in the area of the block-shaped notch with spongy sequestration, destruction of the articular surfaces of all bones forming the elbow joint, and an increase in periarticular soft tissues.

The focus of destruction can be localized in one of the bones of the wrist (capitate, lunare, scaphoid) or in the distal epiphysis of the radius (Fig. 7). In the exacerbation phase, the manifestations of osteoporosis increase, small sequestrations are formed, the process spreads to the joint surfaces. They are rapidly destroyed, and X-ray joint spaces of radiocarpal and intercarpal joints are narrowing. Destruction can also extend to the proximal epiphyses of II-V metacarpal bones. After the process subsides, fibrous ankylosis occurs.

Thus, tuberculosis of the joints has a primary-chronic course, which is accompanied by insignificant pain and gradual impairment of the function of the affected joint. In the course of the disease, several phases are distinguished: the beginning – initial phase, the intensification phase, the subsidence phase. The first X-ray signs in the form of a focus of destruction are found in the area of the metaphysis, epimetaphysis of the bone, with subsequent spread to the articular surface of the bones forming the joint, as well as to the adjacent soft tissues. Roentgenologic signs of



**Fig. 7.** Tuberculosis of the radiocarpal joint. Bone-destructive form, peak phase. An X-ray of the radiocarpal joint shows destruction with the presence of spongy sequestration in the distal epiphysis of the radius with destruction of its articular surface, destruction of the articular surfaces of all the bones of the proximal row of the wrist, X-ray joint spaces of the radiocarpal and intercarpal joints are narrowed.

tuberculous arthritis are foci of destruction, spongy sequestrations, spread of the pathological process to adjacent soft tissues with the formation of an abscess, widespread osteoporosis, in children – atrophy of bones and soft tissues of the affected limb.

Features of the course of tuberculous arthritis largely depend on localization in a certain joint.

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### **CLINICAL AND RADIOLOGICAL DIAGNOSIS OF TUBERCULOUS ARTHRITIS TAKING INTO ACCOUNT ITS LOCALIZATION**

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The lecture presents data on the peculiarities of the course of tuberculous arthritis depending on its localization in a certain joint. Demonstrated capabilities of x-ray diagnostics and differential diagnosis of tuberculosis with other joint diseases, dynamic support of the process.

Key words: tuberculosis, tuberculous arthritis, tuberculous coxitis, tuberculous gonitis, destruction, radiography.

### **КЛІНІКО-РЕНТГЕНОЛОГІЧНА ДІАГНОСТИКА ТУБЕРКУЛЬОЗНОГО АРТРИТУ З УРАХУВАННЯМ ЙОГО ЛОКАЛІЗАЦІЇ**

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В лекції наведені дані про особливості перебігу туберкульозного артриту в залежності від локалізації в певному суглобі. Продемонстровані можливості рентгенодіагностики та диференційної діагностики туберкульозу з іншими захворюваннями суглобів, динамічний супровід процесу.

Ключові слова: туберкульоз, туберкульозний артрит, туберкульозний коксит, туберкульозний гоніт, деструкція, рентгенографія.