

# MRI Study in Patients with Idiopathic Coxarthrosis of the Hip Joint

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**Abstract**— MRI is the optimal method for diagnosing hip lesions in patients with idiopathic coxarthrosis. Magnetic resonance imaging (MRI) is a safe and painless research method with which you can get a detailed image of various organs and other body structures. The advantage of this method is the ability to study various soft tissues and organs, much more accurately than when using other methods. In some cases, the method makes it possible to assess the function of organs, allows us to ascertain the presence of damage in the early stages of the disease.

**Keywords**— idiopathic coxarthrosis, magnetic resonance imaging,

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## I. INTRODUCTION

MRI is the optimal method for diagnosing hip lesions in patients with idiopathic coxarthrosis. Magnetic resonance imaging (MRI) is a safe and painless research method with which you can get a detailed image of various organs and other body structures. The advantage of this method is the ability to study various soft tissues and organs, much more accurately than when using other methods. In some cases, the method makes it possible to assess the function of organs, allows us to ascertain the presence of damage in the early stages of the disease. This method allows you to accurately assess the presence of the degree of damage to the joint. The specificity, sensitivity and accuracy of this method reaches up to 100%. Incredibly high diagnostic efficiency, incomparable with other clinical diagnostic tests, harmlessness of the examination (lack of radiation exposure, in contrast to computed tomography (CT) and X-ray diagnostics), high placement ability (the ability to distinguish objects up to several millimeters in size and to obtain an image in any projection), give MRI a well-deserved first place in the diagnosis of patients with idiopathic coxarthrosis of the hip joint

**The aim of our study** was to evaluate the performance of MRI, which allows us to objectively judge the state of the soft tissue apparatus of the joint and bone tissue with idiopathic coxarthrosis of the hip joint

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## II. MATERIALS AND METHODS

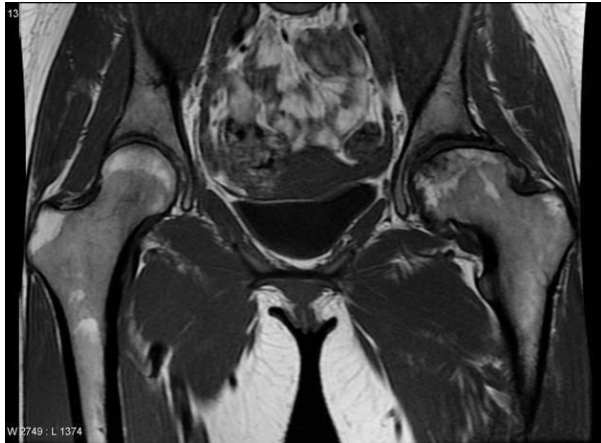
Under our supervision, in the Department of Orthopedics and Trauma Consequences of the Bukhara Regional Multidisciplinary Center and Clinical Hospital No 1, the Department of Traumatology in Tashkent from 2011 to 2019 there were 55 patients with idiopathic coxarthrosis of the hip joint. According to the age divider of patients aged 20-30 years old, there were 6 (10.9 ..%), from 31-40 years old -12 (21.9%), from 41-50 years old 13 (23.6%), from 51 and more than 24 (43.6%), of which 20 men (36.4%), women 35 (53.6%). All patients underwent an MRI scan of the hip area. The main number of patients was of working age. On the basis of MRI studies revealed a lesion of the hip joint which was divided into 4 stages. In stage I with aseptic necrosis of the femoral head, according to MRI, we identified deformation of the joint space in the anteroposterior joint sector due to uneven narrowing of the height of the hyaline cartilage of the femur. The cartilage structure was not homogeneous due to the inclusion of MRI signals of increased intensity. MRI provides a vivid image of the cartilage while maintaining a clear contract between the cartilage and other tissues. A clear differentiation of the cartilage of the synovial membrane and articular effusion with aseptic necrosis of the femoral head is achieved in 3D gradient echo mode with suppression of the adipose tissue signal in T1 - weighted images without requiring contrast. The MRI method showed that during the day, the thickness of the femoral articular cartilage in healthy adults at a young age decreases by 0.6 mm. In other areas experiencing lower biochemical loads, the thickness of the cartilage does not change. The three-dimensional organization of collagen in hyaline cartilage has a strong effect on the MRI image, due to the limited mobility of water, which leads to changes in the signal intensity correlated with the thickness of the test sample. Measurement of the cartilage thickness by MRI in the gradient echo mode with a three-dimensional signal collection method gives good correction with anatomical data except for the hip region, where the discrepancy reaches 0.41 mm, indicating the need to improve the method for all cases where the cartilage thickness is of clinical importance.

Examples of patients: Patient F.A. 1985: Idiopathic coxarthrosis of the I-stage hip joint.



In stage II, with idiopathic coxarthrosis of the hip joint, we determined in MRI the flattening and changes in the shape of the femoral head, chondromolyates of hyaline cartilage, and local minor calcification of the ligament-capsular apparatus. Using the MRI method, it is possible to evaluate the femoral groove both at the level of the subchondral bone and at the level of the articular cartilage with high accuracy and reproducibility of measurements.

Examples of patients: Patient F.A. 1972: Idiopathic coxarthrosis of the hip joint of the II stage.



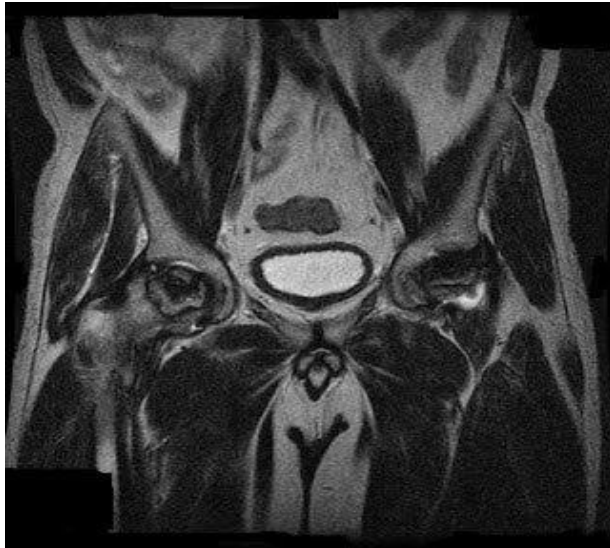
According to the index of MRI in stage III with idiopathic coxarthrosis of the hip joint, deformation, cystic changes in the femoral head and weak calcification of the ligament-capsular apparatus were revealed.

Examples of patients: Patient M.T. 1975. Idiopathic coxarthrosis of the hip joint stage III



In stage IV with idiopathic coxarthrosis, osteoarthritis of the hip joint revealed a densification of the core of the femoral head into a spotted structure. Fragmentation is noted - the pineal gland is destroyed, at the beginning the deformation of the pineal gland in the lateral part of the cartilage, and then the bone islets that merge with the pineal gland. Metaphysial changes are observed in the form of small and large-large-cystic structural disorders of leaf-shaped enlightenment. At this stage, decentration of the femoral head is also noted; lateral displacement of the femoral head is noted. In the absence of joint decompression are noted, the extension of the femoral neck gradually becomes wide and short. The roof of the acetabulum is beveled., The upper edges of its marginal sharpening are also noted. The soft tissues of the steam are articular pronounced calcifications of the ligament-capsular apparatus.

Examples of patients: Patient S.I. 1965 year. Idiopathic coxarthrosis of the hip joint stage IV.



Thus, MRI examination of the hip joint with idiopathic coxarthrosis of the hip joint allows an objective assessment of the condition of the ligamentous apparatus of the joint, cartilage surfaces and to observe the effectiveness of the conservative and surgical therapy.

### III. DISCUSSION

The author Trotsenko V.V. (2001) described that in patients who have had purulent diseases in the past, the areas of the hip joint should be complex, since conventional radiography is not enough to fully characterize it. When examining with a disease of the hip joint, it is necessary (layer-by-layer radiography). Especially when there are destructive changes, with them, tomography helps to clarify the spread of pathological changes in bone tissue, identifies areas of emerging osteonecrosis, the presence of sequestrs, the length and depth of the lesion.

According to Nikitin G.D. (1990) in chronic osteomyelitis, a characteristic radiological sign is a thickening of the bone with the formation of one or more cavities, while the bone cavities are surrounded by a zone of sclerosis, as a rule, the bone marrow cavity is narrowed. The bone rarefaction zone alternates with areas of osteosclerosis.

This research method allows you to get rid of the total effect "look" into the layer-by-layer structure of bone tissue. However, this method cannot show changes in the surrounding soft tissues.

Author Sitko L.A. et al. successfully uses computed tomography (CT) to assess the state of anatomical formations of the hip joint region, the change in their topographic relationships, thereby the authors described individually select surgical access for surgical intervention.

According to Todua F.I. et al. (1988), computed tomography provides opportunities not only for a detailed study of the state of soft tissues, but also for densitometric studies. The authors also described that computed tomography allows you to diagnose the presence of free fragments (sequestrs) located in the cavity of the hip joint.

In the diagnosis of degenerative and dystrophic lesions of the hip joint, with the exception of pathology caused by acetabular fractures. According to N.V. Kornilov, fractures without displacement are characterized by the formation of diastasis between fragments from 0.5 to 2 cm, such fractures are not always detected with standard radiography.

According to Grimm et al. (1989) magnetic resonance imaging (MRI) has undeniable indications in the diagnosis of the preclinical stage of aseptic necrosis of the femoral head, when the sensitivity of this method reaches 96%

Anisimov A.I., Karptsov V.I. (1993) .The main signs of aseptic necrosis were described as heterogeneity of the femoral head, a decrease in the intensity of the signal coming from it, loss of clarity of the cortical layer, prolongation of T1 and T2

Research performed at RosNIITO them. P.P. Damaged (Shokova O.O., Kazemirsky V.E., 1992), the recorded signal was more differentially characterized depending on the stage of the process. The authors described in detail each stage of aseptic necrosis of the femoral head. At the zero and first stages, it comes from necrotic adipose bone marrow in the bone marrow structures of the femoral head, at the second, the presence of not only necrotic bone marrow, but also blood is noted. With subchondral fractures, a low signal appears in T1 mode, which indicates the ingress of synovial fluid into the affected area. In the third and fourth stages, mainly fibrous and, to a lesser extent, adipose tissue is detected. Changes were found not only from the central zone, but also on the periphery.

An X-ray examination of people who have had purulent diseases of the hip joint area in the past, in our opinion, should be comprehensive, since the usual radiography data is not enough to fully characterize possible radiological changes. Therefore, at a study of the hip joint in this category of patients, tomography (layered radiography) is required. It becomes especially important in case of doubt about the presence or absence of destructive changes; when they are detected, tomography helps to clarify the distribution of pathological changes in bone tissue, to identify areas of apparent osteonecrosis, the presence of sequestration, the length and depth of the osteomyelitis focus. According to GD Nikitin et al. (1990), a characteristic radiological sign of chronic osteomyelitis is a thickening of the bone with the formation of one or more cavities in which sequestration can be detected. In this case, the bone cavities are usually surrounded by a significant area of sclerosis. The bone marrow cavity is narrowed or not detected on conventional radiographs. Areas of osteosclerosis, often alternate with areas of bone rarefaction.

Obviously, this research method allows you to get rid of the total effect and "look" into the layer-by-layer structure of bone tissue, but this method cannot show changes in the surrounding soft tissues. In these cases, we have successfully used computed tomography (CG). According to L.A. Sitko et al. (1990), computed tomography makes it possible to assess the state of anatomical formations of the hip joint.

Thus, MRI makes it possible to establish the initial signs of aseptic necrosis of the femoral head and to identify small foci of necrosis, to determine the length of the process, to differentiate this disease with another pathology of the hip joint

MRI is the most useful, non-invasive method in the diagnosis of idiopathic coxarthrosis of the hip joint, the best method for determining the indications for surgical treatment.

#### IV. FINDINGS

1. On the basis of MRI studies, 4 stages of hip joint damage can be detected
2. MRI examination is the best and objective method for determining the indications for conservative and surgical treatment.

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