

have been subjected to the second administration of IVGG. However, 20% of affected children were still proved to have the coronary damage by echo-cardiography examination. The introduction of infliximab for KD children after the 1st IVGG improved the coronary involvement to 6%. We have recently developed the biomarker of KD, and according to the findings of the high titer we are trying the plasma exchange for these severe KD children to remove all kinds of inflammatory cytokines. Taken together, the excessive and variable inflammatory cytokines in disease-specific manner available in our trials indicated to be causative agents of each inflammatory disease progression.

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The ability of tocilizumab induces the remission in systemic juvenile idiopathic arthritis: the main predictors

M.M. KOSTIK, I.A. CHIKOVA, E.A. ISUPOVA, M.F. DUBKO, L.S. SNEGIREVA, V.V. MASALOVA, T.L. KORNISHINA, T.S. LKHACHIEVA, O.V. KALASHNIKOVA, V.G. CHASNYK

Saint-Petersburg State Pediatric Medical University, Saint-Petersburg, Russian Federation

Background: Systemic juvenile idiopathic arthritis (SJIA) is one of the most striking forms of juvenile arthritis, required biologic administration due to failure of corticosteroids (CS) and DMARDs. Currently there are two strategies in treatment SJIA with biologic: blockade of IL-1 and IL-6. Despite similar efficacy and safety profile in latest ACR recommendations blockade of IL-6 recognized as second-line biologic treatment after using the anakinra. The question about first line biologic treatment in SJIA is still open.

Objectives: The aim of our study was to evaluate outcomes and find predictors of remission in SJIA children, receiving TCZ therapy.

Methods: Our retrospective study was included 48 active SJIA children who fall CS, methotrexate (MTX), cyclosporine A (CsA) and their combination in whom TCZ was initiated in dosage 12 mg/kg if weight was <30 kg and 8 mg/kg if weight ≥30 kg. The duration of study was limited the 1st and last TCZ infusions. We evaluated clinical and laboratorial signs, attributed to SJIA, such as presence of fever, hepatosplenomegaly, serositis, rash, lymphadenopathy, active joints, the levels of Hb, WBC, PLT, granulocytes, LDH, and macrophage activation syndrome (MAS). We check the granulocytes levels throw 1, 2 and 4 weeks after 1st TCZ infusion. The efficacy of TCZ was measured throw changes of SJIA attributed signs and symptoms and achievement the remission according to C. Wallace (2004) criteria.

Results: The main demographic parameters (Me; IQR) included the age-9.9 (5-12.7) years and delay of TCZ-27.0 (5.9-89.7) months. The treatment before TCZ included CS-38 (79.2%), MTX-40 (83.3%), CsA-18 (37.5%) and their combination. The macrophage activation syndrome (MAS) in past medical history before TCZ was in 14 (29.2%).

During the trial CS successfully discontinued 25 (65.8), CsA 8/18 (44.4%), MTX 12/40 (30.0%) patients. In 7 children TCZ was discontinued due to stable remission with median duration 640 days. After TCZ initiation 6 children have experienced MAS, but all of them had MAS before TCZ, so no "new cases" were observed on TCZ. 5 children early withdrew during the trial due to adverse events (infusion reaction, MAS) and 2 child died (1 severe uncontrolled MAS, 1 amyloidosis).

During the TCZ treatment 40 (83.3%) achieved the remission in 138.5 (56.0; 255.0) days. Patients, who achieved remission had milder disease course, presented in less frequent hepatosplenomegaly, lung, heart and CNS involvement, hemorrhagic syndrome and MAS. They had higher Hb (P = 0.02) and lower WBC (P = 0.048), granulocytes (P = 0.015), ESR (P = 0.034), CRP (P = 0.05), LDH (P = 0.0003), ferritin (P = 0.0007). The main predictors of achievement inactive disease, calculated with Cox-regression models, were CRP≤82.0 mg/l (OR=7.9, P = 0.016, HR=1.17, P = 0.66), ESR≤32 mm/h (OR=17.0, P = 0.014, HR=0.85, P = 0.62), ferritin≤273 ng/ml (OR=56.5, P = 0.0001, HR=2.6, P = 0.02), Hb>113 g/l (OR=17.0, P = 0.014, HR=1.33, P = 0.38), LDH≤676 U/l (OR=113.6, P = 0.000014, HR=3.2, P = 0.03), PLT>335*10⁹/l (OR=5.0, P = 0.11, HR=2.5, P = 0.007), and intensive depression of WBC in 2 weeks after 1st TCZ infusion>11% (OR=13.0, P = 0.03, HR=6.0, P = 0.02) and granulocytes>12% (OR=14.0, P = 0.05, HR=4.7, P = 0.13).

Conclusions: We found clinical and laboratorial criteria for SoJIA remission during the tocilizumab treatment.

Parameters	OR (95% CI)	P	HR	P
CRP≤82.0 mg/l**	7,9 (1,4-45,3)	0,016*	1,17	0,66
ESR≤32 mm/h**	17,0 (0,9-314,3)	0,014*	0,85	0,62
Ferritin≤273 ng/ml**	56,5 (2,8-1124,9)	0,0001*	2,6	0,02
Hb>11.3 g/dl*	17,0 (0,9-314,3)	0,014*	1,33	0,38
LDH≤676 U/l**	113,6 (5,3-2451,8)	0,000014*	3,18	0,029
PLT>335*10 ⁹ /l**	5,0 (0,9-28,9)	0,11*	2,54	0,007
Age of 1st TCZ infusion≤11y.**	2,6 (0,6-12,4)	0,24*	1,44	0,3
Decreased WBC in 2 weeks>11%**	13,0 (1,4-124,3)	0,03*	6,03	0,019
Decreased Granulocytes in 2 weeks>12%**	14,0(1,1-185,5)	0,05*	4,7	0,13
MAS before TCZ	0,17 (0,04-0,87)	0,037*	0,7	0,34

Me (IQR), * Fisher's exact test, ** AUC – area under the curve.

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Opportunities of cone-beam computed tomography application in rheumatology

D.V. MAKAROVA¹, K.V. KUSHNIR^{1,2}

¹Moscow State University of Medicine and Dentistry named after A. I. Evdokimov, Ministry of Healthcare of Russia, Department of Radiology, Moscow, Russia, ²The Main Clinical Hospital, Ministry of Internal Affairs of Russia, Center of Radiology, Moscow, Russia

In compliance with EULAR recommendations standard radiography (SR) should be used at the first stage of diagnostics of distal upper and lower limbs changes in RD (A. N. Colebatch et al., 2013). Unfortunately it has not always allows assessment of bone structure changes (A. Savnik et al., 2012). When characteristic features are absent ultrasound and / or magnetic resonance imaging (MRI) should be implemented (C. Wiell et al., 2008). Its advantages in diagnosis of inflammatory and destructive joints changes in such patients are covered in detail in numerous publications (M. A. McQueen et al., 2014, L. M. Stone et al., 2015). Radiology diagnostics in particular severity assessment of upper and lower limb joints damage is still limited mostly by SR in everyday clinical practice. According to some authors opinion multislice computed tomography (MSCT) is the most informative for characteristic radiologic features identification, but its application is restricted by many factors including relatively high radiation exposure (L. Barozzi et al., 2014).

Nowadays, it became possible to use high-tech technique of cone-beam computed tomography (CBCT) for distal upper and lower limbs examinations, including rheumatologic practice. (D. Makarova, K. Kushnir et al., 2015, 2016).

Aims and objectives: The aim of the research was to assess application opportunities of upper and lower distal limbs CBCT in patients with RD.

Materials and methods: The results of 248 CBCT studies of the upper and lower limbs distal segments were analyzed to determine the severity of articular syndrome in patients (n = 124) at the age from 34 to 65 with rheumatic diseases in anamnesis. CBCT was carried out using a cone-beam computed unit (NewTom 5G, QR s. r. l., Italy). It has the following technical characteristics: 200 × 250 mm flat-panel detector size, 180 × 160 mm maximum field of view, and a 360 ° gantry rotation around the region of interest. The CBCT examinations were performed in special-purpose positioning setups allowing full coverage of the region of interest. The obtained data were compared with the SR and MSCT results. In addition calculations of direct costs of different ray methods of the hand, wrist, ankle and foot examinations have been analyzed.

Results: CBCT images post-processing allowed identifying the characteristic signs of rheumatic joints' lesions of distal segments of upper and lower limbs: osteoporosis, cystoid body transformation, irregular joints spaces narrowing, bony ankylosis, articular surfaces erosions and osteolysis areas, bone deformities, subluxations and dislocations. Wide range of CBCT images mathematical processing reveals an opportunity to assess pathological remodeling areas of bone structure and to determine its precise spatial location. In addition, CBCT images were distinguished by high spatial resolution, optimal signal-to-noise ratio, uniform accuracy and dynamic range grayscale, which allowed estimating not only of bone structure, but dense soft tissue formations as well: diffuse periarticular thickening and density increasing. During comparative analysis of the obtained information it was found that CBCT was highly competitive with MSCT and, at the same time, was superior to SR in the characteristic features visualization in 74% of cases in patients from the observation group. It also should be noted that due to multiplanar reconstructions it became possible to identify and evaluate cystic cavities, erosions, enthesophytes and osteolysis areas even when its size does not exceed 1 mm. Such small changes were not visualized reliably with SR.

Conclusion: Taking into account low radiation dose in comparison with MSCT, high spatial resolution with the ability to identify even less than 1 mm bone structural remodeling, and relatively low direct cost of the study, CBCT could be considered as a first stage method for the characteristic changes diagnosis of the upper and lower distal limbs bones and joints in patients with RD. Additionally, this technique could be used in dynamics, while monitoring the therapy effectiveness, replacing gradually SR.

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Opportunities of cone-beam computed tomography in hand and wrist joints changes assessment in patients with psoriatic arthritis

E.V. LOPUKHOVA^{1,*}, D.V. MAKAROVA², K.V. KUSHNIR^{1,2}

¹The Main Clinical Hospital, Ministry of Internal Affairs of Russia, Center of Radiology, Moscow, Russia, ²Moscow State University of Medicine and Dentistry named after A. I. Evdokimov, Ministry of Healthcare of Russia, Department of Radiology, Moscow, Russia

One of the most severe forms of psoriasis which significantly decreases the patients' life quality is the joints damage – psoriatic arthritis (PsA) and it varies from 5 to 47 % among all the cases of skin and joints simultaneous lesions [1]. PsA is an independent nosological form of chronic inflammatory lesions of joints that develops in patients with psoriasis [2].

Nowadays high-tech technique of cone-beam computed tomography (CBCT) is gradually adapting to diagnostic algorithm for musculoskeletal system structural changes assessment. The most important advantage of CBCT is a low exposure dose (~0.035 μSv per examination) [3, 4].

There are only few publications on applicability of CBCT in patients with rheumatic diseases in actual literature. Some of them are devoted to CBCT in PsA diagnostics [4, 5].

Aims and objectives: Aims and objectives were to assess the opportunities of CBCT in detection of specific PsA changes.

Methods and materials: The results of standard radiography (SR) and CBCT (n = 56) examinations of hands and wrists aged from 24 to 59 with PsA in anamnesis have been analyzed.

There were 11 woman and 17 men among them. According to anamnestic data the duration of articular pain syndrome was 16.56 ± 1.82 months, the amount BSA – 9.83 ± 2.63 %, PASI – 12.05 ± 3.23 , DQII – 8.57 ± 0.94 .

X-ray examinations – SR and CBCT of wrists and hands – were carried out for the severity of articular syndrome assessment. CBCT of hands and wrists was conducted on the cone-beam unit NewTom 5G (Italy).

The hands and wrists joints changes have been assessed by the presence of the joints spaces narrowing and dilation, bone proliferation, eccentric and concentric erosions, cystic restructuring, articular surfaces osteolysis, resorption of the terminal fingers phalanges, joints subluxations.

Results: Wide range of CBCT images post-processing and high spatial resolution allowed identifying and determining the precise localization of bone structure pathological remodeling areas and enthesophytes which size was even less than 1 mm. Such small changes were not visualized reliably on standard X-ray.

On the obtained CBCT images osteoporosis was determined in 21.4 % ($n = 12$) of cases, narrowing of joint spaces – in 50.0 % ($n = 28$), bone proliferation – in 41.0 % ($n = 23$), erosions – in 46.4 % ($n = 26$), osteolysis and resorption in 28.5 % ($n = 16$) among all the examinations. Subluxations were found only in one patient.

The number of additionally detected proliferative and osteolytic changes specific to PsA with CBCT was exceeded 1.4–3.2 times in comparison with SR. It has been possible to identify small cystic restructuring lesions, edge osteolysis and enthesophytes, which were not significantly determined on standard X-ray.

Conclusion: CBCT with its obvious advantages could be considered as a first stage method for the characteristic changes diagnosis of the hand and wrist bones and joints in patients with PsA. Additionally, this technique could be used in dynamics, while monitoring the therapy effectiveness, replacing gradually SR.

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The use of radioisotope diagnostic methods in rheumatology. Review

E.G. PROKHOROVA¹, G.E. ZHILYAEV², E.V. ZHILYAEV³

¹Head Clinical Hospital of the IAM Russia, Moscow, Russian Federation, ²European Medical Center, Moscow, Russian Federation, ³Moscow State University of Medicine and Dentistry of AI Yevdokimov, Moscow, Russian Federation

A significant advantage of scintigraphy is the ability with high specificity and sensitivity to identify a number of lesions of the spine, such as bone metastases (sensitivity 97%, specificity 93%, spondylitis (sensitivity 90%, specificity - 78%), ankylosing spondylitis (sensitivity 45% to 100% specificity), discitis, compression fractures of the spine. This allows differentiating causes of back pain.

Joint inflammation is accompanied by processes that can be detected by nuclear medicine techniques with high sensitivity. At various polyarthritides observed increased accumulation of pyrophosphate labeled with Tc-99 m also in joints, whereas no marked spontaneous pain, tenderness or swelling. Quantification of isotope accumulation in various joints allows with high accuracy distinguishing rheumatoid, psoriatic arthritis, peripheral spondyloarthritis, osteoarthritis and arthritis associated with an infection. For the diagnosis of arthritis scintigraphy with Tc-99 m anti-CD3, the human polyclonal immunoglobulin labeled with Tc-99 m and radiopharmaceuticals (RPh) based on antibodies to tumor necrosis factor α were used. Bone scintigraphy and SPECT are highly informative, even at a very early stage of rheumatoid arthritis.

It is shown that the osteoscintigraphy can be used to assess the arthritic activity, as well as for predicting disease progression.

Three-phase skeletal scintigraphy with diphosphonate labeled with Tc-99 m is a standard procedure in the diagnosis of osteomyelitis with a sensitivity 80%, specificity of approximately 50%. Application SPECT or PET-CT may increase the specificity up to 90%.

Dynamic bone scintigraphy with Tc-99 m pyrophosphate can be used to evaluate bone mineralization. The method describes the state of calcium metabolism and may be useful in the differential diagnosis in patients with decreased bone mineral density.

Dynamic salivary gland scintigraphy with Tc-99 m- ptehnnitatom has long been used in the diagnosis of Sjogren's syndrome, and was included in the classification criteria of the disease.

It demonstrates the value of SPECT with Ga-67 to confirm the lesion of the temporal arteries in giant cell arteritis.

PET with 18F-FDG, has sensitivity for the detection of large vessel vasculitis more than 80%. In patients with fever of unknown origin basing on the results of PET vasculitis diagnosed in 17% of cases.

The use of modern methods of radionuclide diagnostics allow to:

- improve the early diagnosis of arthritis and spinal lesions, confirming the inflammatory nature of the symptoms;
- differentiate focal diseases of the spine and back pain;
- evaluate the activity of arthritis and spondyloarthritis, including detecting of treatment effect;
- predict the course of rheumatoid arthritis and osteoarthritis of large joints;
- diagnose a wide range of relatively rare diseases of the musculoskeletal system (osteonecrosis, SAPHO syndrome, Paget's disease, Erdheim-Chester disease, osteogenic fibrodisplacements et al.)

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Radiation diagnostics in poliartropathies

I.E. OBRAMENKO

The Volgograd Regional Clinical Cardiological Center, Volgograd, Russia

A common problem diagnosis polyarthropathies- early diagnosis of changes in the joints and the differential diagnosis of various origins polyarthropathies. Research objective — perfection of radiology diagnostics of poliartropathies. 300 patients with inflammatory poliartropathies at the age from 18 till 55 years have been examined. All the patients underwent through standart radiography and MRI. 86 patients underwent through MSCT. When standart radiography and MSCT is usually detected changes affecting the bony structures of the joints. MRI reveals changes in both bone and soft tissue structures of the joints. Articular syndrome in MRI manifested in the form of thinning or destruction of articular cartilage - in 234 subjects (78%); thickening of the synovial membrane of joints - in 267 patients (89%); the presence of effusion in the joint cavity - in 248 patients (82.7%); bursitis - 53 persons (17.7%). Bone marrow edema syndrome was detected in 95 (31.7%) cases. The syndrome of extra-articular manifestations of the inflammatory process in 168 (56%) patients were determined tenosynovitis signs, in 213 patients (71%) was visualized asymmetrical swelling of the periarticular soft tissues, or disruption of their differentiation (for rheumatoid arthritis). Subchondral erosions of the articular surfaces of the bones was detected in 69 (23%) cases, in patients with rheumatoid arthritis and psoriatic polyarthropathies. In 86 (86.0%) patients with gout MRI determined education gouty node (tophi) syndrome. When rendering subchondral erosions specificity of X-rays by 10% higher than the specificity of MRI. While the sensitivity and accuracy of the MRI data indicators exceeded under radiography at 45.99% and 9.8% respectively. MSCT imaging in subchondral erosions was comparable to MRI. When imaging tophi MRI sensitivity was 86.04%, a specificity of 96.71%, while the figures on X-rays were 66.05%, 70.04% respectively. Features MSCT in detecting intraosseous tophi were comparable to MRI, MSCT but ceded it to identify tophi in the soft tissues of the joint and periarticular soft tissues. Thus, the use of MSCT and MRI will raise informative clinical-ray examination of patients with polyarthropathies. MRI was the method of choice in the early diagnosis and reveals polyarthropathies joint syndrome and bone marrow edema syndrome, extra-articular manifestations of the inflammatory process. Also, MRI was the method of choice in the visualization tophi in periarticular and intraarticular soft tissues.

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Osteochondrosis and osteoarthritis: linkages and parallels

N.A. KHITROV

Central Clinic Hospital and Policlinic, Administrative Department of the President of the Russian Federation, Moscow, Russia

The main parallel between osteochondrosis (OCH) and osteoarthritis (OA), first of all, is in the fact that the definitions of both entities are untenable today.

The term "OCH" does not decode now the exact spinal disease, such as spondylosis, degenerative disease of the intervertebral discs, intervertebral hernia, OA of the facet joints, myofascial syndrome, spinal stenosis, spondylolisthesis and so on. Therefore, the term "back pain" is now used more frequently.

OA is defined as a group of diseases that form at the basis of inflammatory degenerative joint disease, in which the balance of the degradation and the synthesis of cartilage and subchondral bone is broken. In medical literature OA is defined as osteoarthritis, because the current synovitis, chondrite, osteitis and accompanying periartthritis have dominant pathogenetic significance.

Degenerative-dystrophic changes in OA articular structures are reflected in radiographic OA criteria: joint space narrowing, subchondral osteosclerosis, sharpening of the articular surfaces edges, osteophytes.

Similar changes are observed in spondylosis, which appears in changing of the vertebral bone structures, such as the degenerative bone restructuring, marginal osteophytes, and others. At the same time, the changes of fibro-cartilaginous tissue of intervertebral discs characterized by a diminishing of their thickness, the inhomogeneity of its structure and changes in the ligamentous apparatus.

Spondyloarthritis is the part of OCH. Spondyloarthritis is combined entity, which is divided into: OA of facet joints, degenerative intervertebral disc disease, spondylosis.

OA of facet joints is the true osteoarthritis. In OA the facet joints changes radiographically present as uneven narrowing of the joint space, subchondral osteosclerosis, edge bone sclerosis of the joint plates, osteophytes, etc.

The vertebrae joints don't have articular cavities, capsule, synovial membrane. Intervertebral cartilage has fibrous structure. However, the both, spondylosis and degenerative disease of the intervertebral discs, have the same pathomorphological characteristics as OA changes.

The spondylosis degenerative changes of the vertebrae are similar to those, which commonly take place in OA: subchondral sclerosis, uneven thinning of the vertebral bodies, subchondral osteosclerosis, marginal osteophytes, etc.

Both, OCH and OA, have inflammatory elements. Degeneration of the intervertebral discs is characterized by increased levels of inflammatory cytokines, which are secreted by cells of the nucleus pulposus, annulus fibrosus and by macrophages, T cells and neutrophils. Cytokines trigger a cascade of pathophysiological reactions in the cells of the intervertebral discs and stimulate cells autophagy, accelerated aging and apoptosis. The level of the tumor necrosis factor- α , interleukins, chemokines, and prostaglandins usually increase.

The inflammatory progression of OA takes place due to overproduction of interleukins, metalloproteinases, tumor necrosis factor- α . Arthritic cartilage expresses a large amount of nitrogen oxide, that inhibits cartilage matrix synthesis, increases the synthesis of prostaglandin E2, promotes chondrocytes apoptosis, decreases the intensity of the anabolic process. Leukotriene level in the synovia in OA is also increased. Leukotrienes potentiate the chemotaxis of inflammatory factors and stimulate the release the proinflammatory cytokines. This inflammation contributes to the progression of morphological changes of hyaline cartilage with its degeneration and decrease in volume.

OCH and OA have much in common. These primary chronic disease that affects both men and women, correlate with age. They are the most frequent diseases of the musculoskeletal system, are the most common pain disorders. OCH and OA often occur after injury,