

Spinal Injury for Rheumatoid Arthritis

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Resume. Rheumatoid arthritis (RA) is one of the most frequent inflammatory diseases of the joints, leading to permanent disability and early death of patients, and one of the frequent manifestations of RA is spinal damage, which significantly worsens the quality of life of such patients. The aim of the study was to evaluate spinal lesion in patients with different variants of RA and the factors determining it. Material and methods. 131 RA patients aged 18 and over were under observation up to 79 years old (45 years on average), among which there were 18% of men and 82% of women. The duration of the disease was 10 years, the first radiological stage of arthritis was established in 8% of cases of the disease, II — in 38%, III — in 35%, IV — in 19%, seropositivity for rheumatoid factor was noted in 77% of the examined patients, and for the presence of antibodies to citrulline cyclic peptide — in 3/4. Extra-articular (system) the form of the disease occurred in 43% of cases, systemic osteoporosis — in 67%. Results. Spinal damage in the form of osteochondrosis and spondyloarthrosis is observed in 1/2 of the number of RA patients, and it is clinically manifest in 35% of cases, which is directly related to the age of patients, involvement of wrist, elbow, hip and sacroiliac joints in the process, the presence of systemic osteoporosis and tendovaginitis, sensory and motor disorders caused by peripheral neuropathy. The ratio of the frequency of mechanical, disfixation, the dysgemic and inflammatory nature of spinal pain in RA is 1 : 2 : 6 : 14. The radiographs show ossification of the outer layers of the intervertebral discs and the formation of syndesmophytes, as well as spondylodiscitis. The involvement of the arch-process joints is characterized by the indistinctness of the articular surfaces and narrowing of the cracks. Vertebral pathology affects the signs of cardiac pathology (changes in electrical conductivity, chamber size, diastolic function of the left ventricle), autonomic changes and severity of neuropathy, and prognostic The indicators are the levels of rheumatoid factor and C-reactive protein in the blood. Conclusions. Spondylopathy is a frequent manifestation of RA, it is interconnected with many clinical and laboratory signs of the disease. In the future, such patients will benefit from active early detection of spinal pathology for timely rehabilitation measures.

Keywords: rheumatoid arthritis, spine.

Introduction

Rheumatoid arthritis (RA) is one of the most frequent inflammatory diseases of the joints, leading to permanent disability and early death of patients. One of the frequent manifestations of RA is spinal lesion, which significantly worsens the quality of life of such patients. The lesion of the intervertebral joints and arch-process joints of the spine in RA can be diagnosed by X-ray sonography and sonography, computer and magnetic resonance tomography. Atlantoaxial vertebral instability is very

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characteristic for such patients, the method of choosing the diagnosis of which is magnetic resonance imaging.

Due to the frequent development of osteoporosis of the vertebrae RA is considered a risk factor for vertebral fractures. The development of quadriparesis is described as a complication of rheumatoid spondylopathy, as well as stenosis of the cervical vertebral artery, which is often it is asymptomatic, but can cause disorders of cerebral circulation. It should be noted that compression of the spinal cord due to rheumatoid spondylopathy is often combined with the development of peripheral neuropathy (PNP).

The aim and objective of this work was to assess spinal lesions in patients with different variants of the course of RA and the factors that determine it.

Material and methods

There were 131 RA patients aged 18 to 79 years (on average 45 ± 1 year) under observation, among whom there were 18.3% of men and 81.7% of women. The duration of the disease was 10.0 ± 0.7 years. The I radiological stage of arthritis (RSA) was established in 7.6% of cases, II — in 38.2%, III — in 35.1%, IV — in 19.1%. Seropositivity for rheumatoid factor (RF) was noted in 77.1% of the examined patients, and for the presence of antibodies to citrulline cyclic peptide (ASSR) — 3/4. The extra-articular (systemic) form of the disease occurred in 42.8% of cases, systemic osteoporosis — in 67.2%, and the parameters of the Barnett-Nordin metacarpal index (IBN) and bone mineral density (BMD) were respectively equal 0.420 ± 0.005 OE and -1.530 ± 0.081 SD. Digital arteritis was diagnosed in 6.1% of the patients, ophthalmopathy (uveitis, scleritis, keratitis) — in 5.3%, myositis or myalgia — in 13.7%, lymphadenopathy — in 3.1%, heart damage (myocardium, endocardium, valves) — in 37.4%, serositis (pleurisy, pericarditis) — in 4.6%, pneumonitis (interstitial, fibrosing alveolitis, rheumatoid nodes) — in 7.6%, kidney damage (glomerulonephritis, interstitial nephritis, amyloidosis) — in 15.3%, liver (cryptogenic hepatitis) — in 9.2%, Sjogren's syndrome — in 3.8%, hypothyroidism — in 8.4%, encephalopathy (dyscirculatory, asthenovegetative and corticonuclear syndromes) — in 6.9%, polyneuropathy (PNP) — in 13.0% (in a ratio of "poly-/mono-" as 5: 1). Patients underwent X-ray (apparatus Multix-Compact-Siemens, Germany) and ultrasound (Envisor sonographs-Philips, Netherlands and ATL3500- Suemens, Germany) examination of peripheral, sacroiliac and vertebral joints with IBN, BMD counting using dual-energy X-ray osteodensitometry of the proximal femur (densitometer QDR-4500-Delphi-Hologic, USA), performed constant-wave dopplerography of extracranial vessels (Aplia-XG-Toshiba, Japan), computer (Somazom-Emotion-6 Siemens, Germany) or magnetic resonance imaging (Gygoscan-Intera-Philips, Netherlands) spine tomography. The Ritchie and Lansbury indices (IL) were calculated. To assess the overall activity of the disease, we determined The DAD indicator is in points, and the DAS28 criterion was used to determine the degree of activity of the articular syndrome. The integral arthritis severity Index (IWA) was evaluated using the formula $IWA = \square IL \cdot AS$, where AS — analog scale of arthralgia intensity. The arthritis progression index (IPA) was calculated using the formula $IPA = [(RSA)^2 + \square] : DD$, where \square is the sum of the radiographic signs, DD is the duration of the clinical manifestation of arthritis. The DAD parameters were equal to 2.0 ± 0.1 points (grade I was found in 25.2% of observations, grade II — in 35.9%, grade III - 38.9%), and DAS28 — 5.0 ± 0.1 oe. The severity index of PNP was determined by the formula $IWN = \ln[(3a) + (3b) + (2c) + d + e + f + g + h]$, where \ln is the decimal logarithm, a is polyneuropathy, b — Guillain—Barre syndrome, c — tunnel syndrome, d — distal-proximal prevalence of neuropathy, e — mononeuropathy, f — sensory disorders, g — motor disorders, h — autonomic disorders. Using enzyme immunoassay (Sanofi diagnostic pasteur reader PR2100, France), the level in the blood serum of the ASSR was studied, and using the Olympus-AU-640 biochemical analyzer (Japan), concentrations of RF, C-reactive protein (CRP), fibrinogen (FG) were determined.

Statistical processing of the obtained research results was carried out using computer variational, correlation, regression, single- (ANOVA) and multifactorial (ANOVA/MANOVA) analysis of variance (programs Microsoft Excel and Statistica-Stat-Soft, USA). Medians (M), their standard deviations (SD) and errors (m), correlation coefficients (r), regression criteria (R), variance (D), Student (t), Wilcoxon—Rao (WR) and reliability of statistical indicators (p) were evaluated.



Results

Clinically manifest spinal lesion was detected in 35.1% of the RA patients who were included in the 1st (main) group of the examined, and the remaining 64.9% of patients were in the 2nd (control) group. In total, with special research methods, spondylopathy was found in 51.9% of diseases. The development of vertebral pathology was closely and directly related to the age of patients, as demonstrated by correlation analysis ($r = +0.173$, $p = 0.047$). When the cervical spine was affected, there was limited mobility and pain with head movements, often combined with vertebrobasilar insufficiency syndrome. According to J.L. Gillick et al, more often in RA, the cervical spine is involved in the pathological process, but spondylopathy can occur in the form of pain in the lower back. According to our data, when the lumbar region was involved in the process, manifestations of lumbago and lumbosacralgia were observed in combination with myalgia and stiffness of the spinal column, segmental rigidity of the spine developed, sometimes there was atrophy of the muscles of the buttocks. In 3 out of 9 patients with lumbar spine lesion, a bowstring symptom was noted (lack of relaxation of the rectus dorsi muscles on the flexion side when the trunk tilts in the frontal plane), and in one case, hypotrophy of the sciatic muscles was detected. Changes in the thoracic spine were accompanied by dorsalgia with irradiation of pain along the intercostal spaces and restriction of chest excursion.

The ratio of the frequency of mechanical, dysfixation, dysgemic and inflammatory pain in the spine in RA was 1 : 2 : 6 : 14. The mechanical variant (4.4%) was characterized by the appearance of pain syndrome at the first attempt of movements, rapidly decreasing or disappearing at rest. In the dysfixation variant (8.7%), the pain syndrome appeared as a result of motor activity or the adoption of a biomechanically unfavorable posture, had a dull character, replaced by a feeling of discomfort and disappearing after taking a comfortable body position. With a dysgemic variant (28.3%) of pain in the spine they were of the nature of weather dependence, appeared and increased during the period of absolute rest, but decreased or disappeared after movement. The inflammatory variant of pain (58.7%) was accompanied by an increase as they stayed in a resting position and intensified in the cold. Spondialgia always appeared gradually for the first time and had a dull transient character. Soreness during palpation of the spinous processes of the vertebrae was detected in 10.9% of the number of patients, respectively, positive symptoms of Laseg, Schober and Tomayer — in 13.0, 15.2 and 17.4%, restriction of lateral slopes — in 19.6%. Radiographs revealed ossification of the outer layers of the intervertebral discs and the formation of syndesmophytes (bone bridges that encircle the intervertebral discs and connect the edges of the surfaces of the upper and lower vertebral bodies), as well as spondylodiscitis (inflammation of the intervertebral discs). The involvement of arch-process joints was characterized by indistinctness of articular surfaces and narrowing of cracks. The protrusion of the intervertebral discs forward and the formation of anterior beak-shaped osteophytes did not cause pain, whereas when the discs were shifted backwards, irritation with pain-rich receptors of the posterior longitudinal ligament. Especially pronounced signs of rheumatoid spondyloarthritis were detected at the level of the cervical spine (C4-C6).

Discussion

According to the analysis of variance, the involvement of the spine in the process is affected by the defeat of the wrist ($D = 4.51$, $p = 0.036$), elbow ($D = 4.60$, $p = 0.034$), hip ($D = 9.81$, $p = 0.001$) and sacroiliac ($D = 9.77$, $p = 0.002$) joints. In turn, changes from the heart depend on spondylopathy ($D = 8.06$, $p = 0.005$), in particular electrical conduction disorders ($D = 8.32$, $p = 0.004$), the size of the chambers ($D = 9.53$, $p = 0.003$) and the appearance of diastolic dysfunction of the left ventricle ($D = 7.93$, $p = 0.006$). In general, the state of the spine is dispersive and regression - dependent integral system (extraarticular) signs of RA, as demonstrated by the multifactorial analysis of Wilcoxon — Rao ($WR = 6.12$, $p < 0.001$) and multiple regression analysis ($R = +3.29$, $p = 0.001$). As shown in Fig. 1, the development of vertebral pathology is affected by the presence of systemic osteoporosis ($D = 4.26$, $p = 0.042$) and tendovaginitis in patients ($D = 3.96$, $p = 0.049$), which can be attributed to risk factors for rheumatoid spondylitis (spondyloarthritis). Such a clinical manifestation of RA, according to the results of ANOVA, has an impact on the parameters RSA ($D = 2.78$, $p = 0.048$), RF ($D = 4.01$, $p =$



0.039) and CRP ($D = 2.95$, $p = 0.024$). If in patients of the 2nd group (without spondylopathy) the blood values of RF and CRP were 12.2 ± 1.42 mg/l and 6.8 ± 0.38 mg/l, then in cases of spinal injury — respectively 72% more ($t = 2.11$, $p = 0.037$) and 21% more ($t = 2.09$, $p = 0.038$). Taking into account the data obtained, we believe that the parameters in the RF blood > 55 mg/l and CRP > 12 mg/l ($> M + SD$ of RA patients with spondylopathy) are prognosticative in relation to vertebral pathology. It should be noted that the mineral density of the vertebrae is inversely correlated with the indicators in the blood of patients with CRP and ACCP. The latter is variably related to sensory ($D = 6.35$, $p = 0.024$) and motor ($D = 4.61$, $p = 0.049$) disorders caused by PNP, and autonomic disorders depend on spinal lesions (respectively $D = 3.98$, $p = 0.049$ and $D = 5.02$, $p = 0.041$). There are direct correlations between the severity of neuropathy and spondylopathy ($r = +0.486$, $p = 0.048$).

Conclusion

Spinal damage in the form of osteochondrosis and spondyloarthrosis is observed in 1/2 of the number of RA patients, and it is clinically manifest in 35% of cases, which is directly related to the age of patients, involvement of wrist, elbow, hip and sacroiliac joints in the process, the presence of systemic osteoporosis and tendovaginitis, sensory and motor disorders caused by PNP, affects for signs of heart pathology (changes in electrical conductivity, chamber sizes, diastolic function of the left ventricle), vegetative changes and severity of neuropathy, and prognostic indicators are blood levels of RF and CRP. In the future, active early detection of spondylopathy will be useful for RA patients for subsequent timely rehabilitation measures.

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