THERAPY

Bilovol A.N., Knyazkova I.I.

ON THE PROBLEM OF THE DIAGNOSIS OF NONSPECIFIC AORTOARTERITIS

Kharkiv National Medical University, Ukraine

Abstract. *Nonspecific aortoarteritis (NAA) is a systemic vasculitis of unknown etiology mainly affecting the aorta and its branches. The article adduces the epidemiology, aetiology, pathogenesis, and diagnostics of NAA. Taking into account the scant and nonspecific clinical picture in NAA, a number of authors recommend that all persons under the age of 50 with elevated indices of erythrocyte sedimentation rate and/or C-reactive protein in the absence of obvious reasons for their increase have screening duplex scan of the arteries in the aortic arch and abdominal aorta. It is important to emphasize that proper organization of diagnostic search and subsequent implementation of therapeutic interventions help to improve the prognosis of life of patients with this disease.*

Keywords: *nonspecific aortoarteritis, aetiology, pathogenesis, diagnostics*

Nonspecific aortoarteritis (NAA) is a systemic vasculitis of unknown etiology mainly affecting the aorta and its branches [1, 2]. In accordance with the classification of vasculitis of Chapel Hill Consensus Conference (1994) this disease is defined as "granulomatous inflammation of the aorta and its major branches" [3]. Nonspecific aortoarteritis is also known as Takayasu arteritis, Takayasu disease, middle aorta syndrome, pulse lack disease, syndrome of the aortic arch, Martorell syndrome, the occlusal thromboaortopathy, young women arteritis.

The first reports of this disease appeared in the middle of the XIX century. In 1905 a Japanese ophthalmologist Mikito Takayasu first described the case of a young woman who complained of decreased vision and had specific ringlike arteriovenous anastomosis around the optic nerve head [4, 5]. Oonishi and Kagoshima were the first who connected the changes of retinal vessels with the lack of pulse in the radial artery [5]. Later several cases were registered in Japan, including Yasuzo Shinmi who first used the term "Takayasu arteritis" in 1939 [6]. To call the disease by name of

Takayasu was accepted in Japan, where the number of his descriptions was predominant up to the middle of the XX century.

Morphologically, this disease is characterized by lesion of all layers of the walls of the blood vessels originating from the aorta and mainly localized in their mouths. Therefore, the disease got the most widespread name “nonspecific aortoarteritis” that reflects the clinical-morphological nature of the process. In the English-language literature the term "Takayasu arteritis" is often used.

Epidemiology.

The disease occurs worldwide but it is most common in Japan, Southeast Asia, India, China, and Latin America [7]. Some geographical features of the distribution of NAA of different locations are distinguished: lesions of the ascending aorta and branches of its arc are more frequently observed in Japan; aortitis of brachiocephalic arteries and concomitant lesion of the branches of the aortic arch and thoracoabdominal aorta is dominated in Russia; lesions of the renal artery and the descending aorta are more often registered in South-East Asia [8, 9]. It is noted that NAA predominantly occurs in young women (the ratio of the incidence of women and men is 8:1) usually between the age of 20 to 30 [10]. At the same time, the ratio between men and women in Russia ranges from 1: 2,4 to 1,71 [11-13]. The incidence of NAA is 2,6 cases per one million of population [14] with possible increase, because the data on incidence and prevalence are limited. At the same time in East Asia its frequency is 100 times higher. It is noted that NAA is a common cause of renovascular hypertension in India [15]. In the Italian study [16] it is noted that aortic aneurysm is often found in Takayasu arteritis.

Etiology and pathogenesis.

The main stages of pathogenesis of NAA have been well studied. But the etiology of this disease still remains unknown [17, 18]. Initially the primary etiological factor was supposed to be an infectious agent (mycobacteria, intracellular bacteria and viruses) [19, 20] and even the relationship with tuberculosis was studied [21]. In 1960s it was found that autoimmune mechanisms were involved in the pathogenesis of NAA [22]. However, antigens responsible for the initiation of the

autoimmune response were not identified. It was reported that NAA was comorbid with a number of autoimmune diseases, particularly systemic lupus erythematosus, rheumatoid arthritis, juvenile rheumatoid arthritis, syndrome of Steele, ankylosing spondylitis, inflammatory bowel disease, anterior uveitis, Wegener's granulomatosis, sarcoidosis, amyloidosis, and certain conditions of immunodeficiency [23].

It has been found that NAA is a multifactorial disease. Panarteritis characterized by the infiltration of dendritic cells, T-cells, gamma/delta and others), natural killer cells and macrophages occurs in NNA. It is assumed that an unknown stimulus triggers the expression of heat shock protein 65 in the tissues of the aorta, which is also synthesized in other tissues under stress [24]. This protein, which is a homologue of mycobacteria and other bacteria, stimulates the expression of genes of the major histocompatibility complex class I (MICA). The subtypes of T-lymphocytes, which along with macrophages produce proinflammatory cytokines have been identified. So, gamma/delta T-cells and natural killer cells (NK-cells) expressing NKG2D receptors (activating cytotoxic functions of NK-cells), then infiltrate the arterial wall, recognize MICA on the smooth muscle cells of blood vessels and cause cytotoxic response initiating acute inflammation. These cells secrete perforin – one of the major cytotoxic proteins in the cytolytic granules and one of the effectors of cell lysis. Because of this, the inflammatory response is enhanced through greater infiltration of cells and stimulation of matrix metalloproteinases that contribute to the degradation of elastin and collagen in the arterial wall. Then, infiltration of alpha-beta T-cells and recognition of autoantigens, presented by common epitope (antigenic peptide) in complex with molecules of class I of major histocompatibility complex on dendritic cells, occurs. In addition, the humoral immune system plays a certain role in the pathogenesis of NAA. Thus, antibodies to the structures of endothelial cells that can lead to vascular damage through the formation of inflammatory cytokines, adhesion molecules and apoptosis are detected in patients with NAA [24].

In active phase there is an inflammation with granulomas and giant cells, which are mainly detected in the middle layer of arteries of elastic type [25]. Necrosis

can be seen in the middle layer, often surrounded by giant cells. At the early stages of lesion inflammatory infiltrates are detected in adventitia of vessel, and then they move to parabasal tissue [25]. Infiltration usually consists of lymphocytes, plasma cells and dendritic cells with different numbers of giant cells. Over time chronic changes occur. So, the replacement of the damaged parts of the middle layer of arteries with fibrous tissue, accompanied by loss of elasticity of large vessels, occurs due to chronic inflammation [26]. The lesion of intima is of secondary reactive hyperplastic nature. Myointimal hyperplasia leads to narrowing or complete occlusion of the vessel lumen. In some patients, the inflammation in the arteries is progressing so quickly that connective tissue has no time to be synthesized in sufficient quantities and aneurysms are formed. Neovascularization occurs in proportion to the thickening of the middle layer of the arteries and is a compensatory adaptation of the vessel, providing gas exchange and flow of nutrients into the deeper layers of the vessel [25].

The data of clinical studies indicate the important role of genetic factors in the pathogenesis of NAA [27]. It was demonstrated that human leukocyte antigen (HLA)-B52 and B39 was associated with Takayasu arteritis in Japan, and HLA-DR B1-1301/1302 – in Mexico [24]. Besides, it was found that the high frequency of haplotype HLA A24-B52-DR2 was observed in NAA with aneurysms of the abdominal aorta of inflammatory genesis [28]. Moreover, patients with this haplotype were observed to have more rapid progression of inflammation and more often the tendency to refractoriness to anti-inflammatory therapy [29, 30].

Diagnostics of nonspecific aortoarteritis is based on a thorough medical history collection, detailed clinical examination and necessary laboratory and instrumental studies using standardized diagnostic criteria.

In accordance with the accepted clinical classification 4 types of lesions of the aorta in NAA are distinguished [31, 32].

Type I is an isolated lesion of the branches of the aortic arch;

Type II is a lesion of only a thoracoabdominal segment of aorta with visceral branches and renal arteries, not involving the branches of the aortic arch;

Type III (or mixed) is a combination of the first two types;

Type IV – any part of the aorta can be affected, but with obligatory involvement of the branches of the pulmonary artery.

There are 4 types of vascular lesions in NAA: stenosis, occlusion, dilatation, and aneurysm. A multiple segmental lesion of the aorta and its branches with the presence of stenosis, occlusion, aneurysm formation in the same patient is characteristic for this disease [33, 34]. Initially the inflammatory process is localized in the media and adventitia of vessel, and then moves on parabasal cells. The intimal lesion is secondary reactive hyperplastic in nature.

There is no generally accepted classification. In accordance with the classification proposed by A. V. Pokrovsky (1979) basic clinical symptoms of the disease can be presented in the form of 10 syndromes [33]:

– syndrome of general inflammatory reactions;
– syndrome of lesion of the branches of the aortic arch;
– syndrome of stenosis of the thoracoabdominal aorta, or coarctation syndrome;
– syndrome of renovascular hypertension;
– syndrome of abdominal ischemia;
– syndrome of lesion of bifurcation of the aorta;
– coronary syndrome;
– syndrome of aortic insufficiency;
– syndrome of lesion of the pulmonary artery;
– aneurysmal syndrome.

As to the nature of the inflammatory process there are acute, subacute and chronic stages of NAA.

In acute period the disease begins with fever, pronounced articular syndrome accompanied with early appearance of ischemic disorders, pronounced increase of indicators of acute phase of inflammation in the blood.

In subacute stage – fever (up to subfebrile values) and slow (several months) development of symptoms of vascular lesion are observed.

The chronic course of the disease develops gradually in the form of ischemic syndrome in the pool of the vertebral artery, disorders of vision, and arthralgia.

According to the Institute of Cardiology named after A. L. Myasnikov the following variants of clinical course of NAA are described: latent, subacute and continuously recurrent [35]. Localization of ischemic syndrome is described with the degree of ischemia.

The clinical picture of NAA depends on the pool of arteries involved in the inflammatory process, and stage of disease. Usually at the onset of the disease patients have such nonspecific symptoms as: general weakness (40-70%), low grade fever (10-69%), migratory pain in joints and muscles (25%), weight loss (10-19%). At this stage the lumen of the artery is completely intact. This stage of the disease is also called "the stage of the unchanged pulse" or the phase of active inflammation. The noteworthy fact is that in 50% of cases asymptomatic course of the disease is observed [34]. Most often the symptoms appear at the stage of stenosis and occlusion of blood vessels, or in fibrous-ischemic chronic phase. The clinical manifestations in the lesion of the branches of the aortic arch are due to ischemia of the upper extremities and the brain. Patients with affected subclavian artery complain of weakness and paresthesia in the hands, Raynaud's disease being also revealed. The involvement of the carotid-vertebral artery is manifested as dizziness, orthostatic reactions, headaches, visual disturbances, fainting. Cerebral ischemia may manifest as transient ischemic attacks and strokes. However, it is this type of lesion when a significant discrepancy between the severe lesions of the branches of the aortic arch and the paucity of clinical symptoms is observed [36]. Stenosis of the carotid arteries causes dizziness, headaches, impaired vision. The most frequent complaint is carotidynia (up to 10-20% of cases) – pain in the projection of the common carotid arteries [37]. According to the description of the patients it is aching or shooting pain localized in the anterior surface of the neck, with possible extention to the region of the lower jaw and ears. When the process is localized in the abdominal aorta, celiac

trunk, mesenteric arteries patients usually have nausea, vomiting, abdominal pain, bleeding. In case the renal arteries are affected, arterial hypertension and renal failure are common; in ischemia of the iliac arteries the signs of ischemia of the lower extremities are found; in ischemia of the pulmonary arteries the symptoms are chest pain, shortness of breath, hemoptysis; when coronary arteries are involved – coronary heart disease and heart failure. The frequency of clinical manifestation of Takayasu arteritis is presented in Table 1.

Table 1

Clinical features of Takayasu arteritis [38]

Feature	Frequency, %	Feature	Frequency, %
Syndrome of general inflammatory reactions	66	Arterial hypertension	43
Lack of pulse	88	Aortic regurgitation	33
Noise determined by auscultation	77	Stenosis of the renal artery	26
Pain in the extremities	69	Cerebrovascular events	18
Paresthesia	48	Pulmonary hypertension	12

Objective examination reveals a weakening of the pulse at the radial artery, the difference between systolic blood pressure (BP) on the left and right hand is more than 10 mm Hg, auscultation determines the noise in the projection of the affected vessel; retinopathy and other signs indicating ischemia of organs and tissues are detected. Half of patients have hypertension. Involvement of the renal arteries may lead to the development of malignant hypertension. In the long course of NAA this complication develops in 30-50% of patients, renal artery stenosis being the cause of hypertension in the half of them. It is assumed that in intact renal blood vessels the cause of increased blood pressure is reduction of baroreceptor answer of carotid sinus, formation of coarctation of aorta, cerebral ischemia.

The study of Pokrovsky A. V. et al. [34] found that lesions of the brachiocephalic arteries occurred in 85% of cases of NAA. It should be noted that the subclavian arteries were involved more often (the left artery – almost twice more often than the right one), the process was localized in the second and third segments,

which explains the relatively rare syndrome of vertebral-subclavian victimization. The carotid arteries are rarely involved in pathological process. In recent decades, numerous reports of the failure of the heart, kidney, gastrointestinal tract in NAA, which previously was regarded as extremely rare complications of the disease, have been collected [39]. It was demonstrated that organ lesions occur in more than 2/3 of patients with Takayasu arteritis and predominantly involve the central nervous system (70%) and heart (55,5%), significantly (p=0,01) worsening the prognosis [40].

During the **physical examination** the following procedures are necessary to carry out [40]:

- comparison of the symmetry of the pulse in the region of the radial arteries;
- measurement of blood pressure in both upper and lower extremities;
- auscultation of the common carotid arteries, subclavian arteries, the abdominal aorta.

Laboratory diagnostics.

The results of laboratory studies in NAA are usually not specific and are manifested in the form of accelerated erythrocyte sedimentation rate (50-83% of cases), moderate anemia, thrombocytosis [16]. The increase in C-reactive protein, reflecting the activity of the inflammatory process is observed. There are some reports about the possibility of using highly sensitive markers of vascular inflammation, in particular the content of metalloproteinase-9 and interleukin-6 in serum, in diagnostic purposes to confirm NAA [40]. The study of Dagna et al. noted that levels of pentacene 3 in the serum can be applied for diagnostic purposes (see Table 2). An additional advantage of pentacene 3 as compared with other markers is that unlike other laboratory data there was no nonspecific increase for this indicator in the group of healthy people or in response to an infectious agent.

Instrumental diagnostics.

Angiography is the "gold standard" of diagnostics of NAA. Angiography of the thoracic and abdominal aorta is performed to visualize the aorta and its branches [41, 42]. There are 3 main angiographic models: (1) narrowing of the aorta and/or arteries of various degrees; (2) saccular and/or fusiform aneurysms; (3) a combination

of both. Angiography may determine the involvement of the pulmonary artery and phenomenon of victimization of subclavian artery, allowing to make a sensible choice of endovascular procedures (angioplasty, stenting). The disadvantages of this method are as follows: significant radiation dose and necessity of using large quantities of iodized contrast agent. In addition, angiography can assess only intravascular pathology and does not allow to distinguish acute intramural lesion from stenotic one [43]. In order to reduce the amount of contrast substance and improve the quality of images of vessels of a smaller caliber digital subtraction angiography is used.

Echosonography. **Duplex scanning** is the most convenient method of detection of vascular lesions in NAA. The advantage of ultrasound is the ability to measure the thickness of walls of surface vessels (in particular, the thickness of the intima-media of the carotid artery as a marker of activity of the process) [44]. The most characteristic change in NAA is uniform concentric narrowing of the vessel with no signs of calcification [34]. This study is indispensable at the early stages of the disease. If NAA is suspected, all patients should have the duplex scan of the neck vessels [40].

Computed tomographic angiography (CT angiography). It allows to estimate the thickness of the walls of blood vessels, to visualize the aneurysm, including intramural areas of calcification, the formed thrombus [45]. Transverse image provides greater accuracy. Spiral CT with contrast allows to build two - and three-dimensional images of blood vessels. CT is required for dynamic monitoring of intramural changes in the aorta and pulmonary arteries [46]. The disadvantages of this method include its high cost, the use of iodine-containing contrast agents and radiation exposure.

Magnetic resonance angiography (MRI-angiography) due to the high sensitivity proved itself to be a method of screening vasculitis of the central nervous system, albeit with limited specificity (see Table 2). MRI with contrast enhancement and non-contrast three-dimensional MR- angiography allows to easily identify areas of stenosis of vessels and to detect subtle morphological and pathological changes in

the arterial wall. Significant thickening of the wall in and around the aorta is observed in the acute phase of Takayasu arteritis. In addition, thickening of the vessel wall is detected in the chronic phase, which indicates the possibility of determining the activity of the disease at the tissue level [47, 48]. The main disadvantage of this method is the increase in time of visualisation, as well as contraindications: patient having electronic devices, clips on blood vessels, stents, pacemakers and other surgical hooks, brackets, metal sutures [48]. Wide dissemination of this method is hindered by the high cost and poor visualization of calcified vessels.

Positron-emission tomography (PET) with oxide-18-fluorodeoxyglucose (18F-FDG). When detecting metabolic activity, the presence of inflammation is thus determined [49]. The advantage of this method over echosonography or angiography is the ability to visualize foci of inflammation regardless of the degree of stenosis of the artery. Hemodynamic insufficiency of cerebral blood flow is also determined with the help of PET, according to the evaluation of the perfusion of brain tissue and measuring the fraction of the extraction of oxygen [50].

Table 2.

The value of serological markers and indicators of imaging in NAA diagnosis

Performance	Sensitivity (%)	Specificity (%)
ESR	72*	56*
C-RP	71,4*	100*
FDG-PET	92*	100*
MRI-angiography	100*	100*
CT-angiography	95*	100*
Pentaxin 3	82.1-89**	87-94.1**

Notes: * – for the diagnosis of nonspecific aortoarteritis; ** – in the determination of disease activity. Abbreviations: PET – positron-emission tomography (PET) with oxide-18-fluorodeoxyglucose (FDG); ESR – erythrocyte sedimentation rate; C-RP – C-reactive protein.

Classification criteria

Today in the world practice the criteria proposed by the American College of Rheumatology (1990) are used in diagnosis of nonspecific aortoarteritis (Table 3).

The presence of any three or more of the criteria for Takayasu arteritis is characterized by sensitivity of 91% and specificity of 98% [8].

Table 3.

Classification criteria of the American College of Rheumatology for Takayasu arteritis [51]

1. Development of clinical manifestations characteristic of Takayasu arteritis at the age of 40
2. Intermittent claudication Development or progression of muscle weakness or discomfort in one or more limbs (especially the upper ones)
3. Reduction of the height of the pulse on brachial artery (s)
4. Difference in levels of systolic blood pressure in hands > 10 mm Hg
5. Presence of systolic murmur over one or both subclavian arteries or abdominal aorta
6. Angiographic changes: narrowing and/or occlusion of the aorta, its proximal branches, or large arteries in the proximal upper or lower extremities, not caused by atherosclerosis, massive fibromuscular dysplasia or other reasons. These changes are usually focal or segmental.

The basis of instrumental diagnostics of aortoarteritis is a combination of radiation methods – color duplex scanning and CT/MR angiography or radiopaque angiography, allowing to specify the localization and extent of the disease artery (level of evidence C) [1]. Patients with confirmed diagnosis of NAA need clinical and laboratory monitoring of the activity of the inflammatory process (level of evidence C) [1].

Thus, NAA is a dangerous disease that is difficult to diagnose and that deserves special attention of clinicians. Taking into account the scant and nonspecific clinical picture in NAA, a number of authors recommend that all persons under the age of 50 with elevated indices of erythrocyte sedimentation rate and/or C-reactive protein in the absence of obvious reasons for their increase have screening duplex scan of the arteries in the aortic arch and abdominal aorta [13]. It is important to emphasize that proper organization of diagnostic search and subsequent implementation of therapeutic interventions help to improve the prognosis of life of patients with this disease.

References.

1. Дядык А.И., Зборовский С.Р. Артериит Такаясу // Здоров'я України. – 2012.- Тематичес-кий выпуск Кардиология.- С.60-61

2. Arnaud L., Kahn J.-E. J.-E., Girszyn N. et al. Takayasu's arteritis: an update on physiopathology // Eur. J. Intern. Medicine.- 2006..- Vol.17.- P.241–246,

3. Jennette JC, Falk RJ, Andrassy K, et al. . Nomenclature of systemic vasculitides. Proposal of an international consensus conference. Arthritis Rheum 1994.- Vol.-37.- P.187–92.

4. Kobayashi Y. and Numano F. Takayasu arteritis // Internal Medicine.- 2002..- Vol.41.- P.44–46,

5. Numano F. The story of Takayasu arteritis // Rheumatology.- 2002.- Vol.41.- P.103–106,.

6. Numano F. and Kakuta T. Takayasu arteritis—five doctors in the history of Takayasu arteritis // International Journal of Cardiology.- 1996.- Vol. 54, suppl. 1.- P. S1–S10,

7. Vidhate M, Garg RK, Yadav R, Kohli N, Naphade P, Anuradha HK. An unusual case of Taka-yasu's arteritis: Evaluation by CT angiography // Ann Indian Acad Neurol.- 2011.- Vol.-14(4).-P.304-6.

8. Kothari SS. Takayasu's arteritis in children – a review // Images Pediatr Cardiol.- 2001.- Vol.-3(4).-P.4-23.

9. Чихладзе Н.М., Сивакова О.А., Чазова И.Е. Клинические проявления поражения сердеч-но-сосудистой системы при неспецифическом аортоартерииите // Системные гипертензии.- 2008 -№4

10. Hedna VS, Patel A, Bidari S, Elder M, Hoh BL, Yachnis A, Waters MF: Takayasu's Arteritis: is it a reversible disease? Case report and literature review // Surg Neurol Int 2012. - Vol.- 3.-P. 132

11. Зотиков А.Е., Суслов А.П., Минкина А.Е. с соавт. Имунологические механизмы разви-тия неспецифического аортоартериита, Тер. Архив.- 1990.- № 4.-С. 114–118.

12. Насонов Е.Л., Баранов А.А., Шилкина Н.П. Васкулиты и васкулопатии. Ярославль; Верхняя Волга. 1999; 616 с.

13. Семенкова Е.Н., Генералова С.Ю. Некоторые клинические проблемы неспецифического аортоартериита // Тер. арх.- 1998.-№ 11.- С. 50.

14. Watts R, Al-Taiar A, Mooney J, Scott D, Macgregor A. The epidemiology of Takayasu arteritis in the UK // Rheumatol. - 2009.- Vol.-48(8).-P.1008-11.

15. Yadav MK, Leeneshwar H, Rishi JP. Pulseless cardiomyopathy // J Assoc Physicians India.- 2006.- Vol.-54(1).-P.814-6.

16. Guido R., Domenico A., Alessandro B. et al. Aortic aneurysms in takayasu arteritis [Online] 2001 // По материалам сайта www.intechopen.com

17. Boon NA, Colledge NR, Walker BR, Hunter JAA. Davidson's principles & practice of medi-cine. 20th ed. India: Elsevier; 2009.

18. Gosi G, Pencz Z, Laczko A. Takayasu's arteritis; rare disease with special considerations. Magy Seb. 2005. Vol.- 58(1) .-P. 9-15.

19. Numano F, Okawara M, Inomata H, Kobayashi Y. Takayasu's arteritis // Lancet. - 2000;.- Vol.- 356.-P. 1023–1025

20. Weck KE, Dal Canto AJ, Gould JD et al.. Murine gamma-herpes virus 68 causes severe large-vessel arteritis in mice lacking interferon-gamma responsiveness: a new model for virus-induced vascular disease // Nat Med. – 1997.- Vol. 3.-P. 1346–1353

21. Kothari SS Aetiopathogenesis of Takayasu's arteritis and BCG vaccination: the missing link? // Med Hypotheses. – 1995.- Vol. 45(3).-P.227-30.

22. Ueda H, Saito Y, Ito I, Yamaguchi H, Sugiura M, Morooka S. Immunological studies of aorti-tis syndrome // Jpn Hear J.- 1967.-Vol. 8.-P. 4–18.

23. Al Abrawi S, Fouillet-Desjonqueres M, David L. et al. Takayasu arteritis in children // Pediatr Rheumatol Online J. – 2008.- Vol. 28.-P. 6-17.

24. Arnaud L, Haroche J, Mathian A. et al. Pathogenesis of Takayasu's arteritis: a 2011 update // Autoimmun Rev. – 2011.- Vol.11(1).- P.61-7.

25. Tavora F, Burke A Review of isolated ascending aortitis: differential diagnosis, including syphilitic, Takayasu's and giant cell aortitis // Pathology.- 2006.- Vol.38.-P. 302-308.

26. Springer J.M., Hoffman G.S. Insights into Pathogenesis of Takayasu's Arteritis // Translational Medic.- 2012.- Vol. 3.- P.1-5

27. Kobayashi Y, Numano F. Takayasu arteritis // Intern Med. – 2002.-Vol. 41.-P. 44–46

28. Numano F. Takayasu arteritis, Buerger disease and inflammatory abdominal aortic aneurysms: is there a common pathway in their pathogenesis? // Int J Cardiol. – 1998.-Vol. 66, suppl 1.-P. S5–S10.

29. Kasuya K, Hashimoto Y, Numano F. Left ventricular dysfunction and HLA Bw52 antigen in Takayasu arteritis // Heart Vessels Suppl.- 1992.- Vol. 7.-P. 116–119.

30. Kimura A, Kitamura H, Date Y, Numano F. Comprehensive analysis of HLA genes in Takaya-su arteritis in Japan // Int J Cardiol. - 1996.- Vol. 54, suppl.-P. S61–S69

31. Ueno A, Awane Y, Wakabayachi K et al. Successfully operated obleterative brachiocefalic ar-teritis (Takayasu) associated with elongated coarctation. Jap Heart J 1967; 8: 538–44.

32. Lupi-Herera E, Sanches-Torres G, Varchushamer J et al. Takayasu's arteritis. Clinical study of 107 cases. Am Heart J 1977; 93: 94–103.

33. Покровский А.В. Заболевания аорты и ее ветвей. М.: Медицина. 1979.

34. Покровский А.В., Зотиков А.Е., Юдин В.И. Неспецифический аортоартериит (болезнь Такаясу). М.: ИРСИС. 2002.

35. Arabidze G.G., Abugova S.P., Domba G.U. Non-specific aortoarteritis. Clinical course and long-term medical treatment // Inter Angio.- 1985.- 4: 165–9.

36. Ringleb PA, Strittmatter EI, Loewer M et al. Cerebrovascular manifestations of Takayasu Arte-ritis in Europe. Rheumatology 2005; 44 (8): 1012–5.

37. Vanoli, M. et al. Takayasu's arteritis: A study of 104 Italian patients // Arthritis Rheum.- 2005.- Vol. 53.-P.100–107.

38. Al-Bishri J. Takayasu's Arteritis: A Review Article // British Journal of Medicine & Medical Research.- 2013.- Vol.3(4).-P. 811-820,

39. Zelichowski G. Problems with therapy for renovascular hypertension in Takayasu's arteritis~on the basis of two cases. // Pol Merkuriusz Lek. 2000. -Vol.9. - P. 849-854.

40. Смитиенко И.О. Клинические варианты органных поражений, оценка активности и прогноза артериита Такаясу // Автореф… канд.мед.н., 2010, 22 с.

41. Kissin E.Y., Merkel P.A. Diagnostic imaging in Takayasu arteritis // Curr Opin Rheumatol. - 2004.- Vol.16.-P.31–37

42. Nastri M.V., Baptista L.P., Baroni R.H. et al. Gadolinium-enhanced three-dimensional MR an-giography of Takayasu arteritis // Radiographics.- 2004.- Vol. 24.-P.773–786

43. Mason J. C. Takayasu arteritis-advances in diagnosis and management // Nature reviews Rheumatology.- 2010.- vOl. 6.- P.407-416

44. Perera A.H., Mason J.C., Wolfe J.H. Takayasu Arteritis: Criteria for Surgical Intervention Should Not Be Ignored // International Journal of Vascular Medicine.- 2013.- Vol.2013, 8 p.

45. Schurgers M, Dujardin K, Crevits I, Mortelmans L, Blockmans D. Takayasu's arteritis in a young Caucasian female: case report and review // Acta Clin Belg.- 2007.- Vol.-62(3).-P.177-83.

46. Soto ME, Melendez-Ramirez G, Kimura-Hayama E. et al. Coronary CT angiography in Taka-yasu arteritis // JACC Cardiovasc Imaging.- 2011.- Vol.4(9).- P.958-66

47. Matsunaga N, Hayashi K, Okada M, Sakamoto I. Magnetic resonance imaging features of aor-tic diseases // Top Magn Reson Imaging.- 2003.- 14:253–266

48. Halefoglu A.M., Yakut S. Role of magnetic resonance imaging in the early diagnosis of Taka-yasu arteritis // Australas Radiol.- 2005. - 49:377–381

49. Henes JC, Mueller M, Pfannenberg C, Kanz L, Koetter I. Cyclophosphamide for large vessel vasculitis: Assessment of response by PET/CT // Clin Exp Rheumatol.- 2011.- Vol.29, Suppl. 64.- P.S43-8.

50. Бокерия Л.А., Покровский А.В., Сокуренко Г.Ю. и др. Национальные рекомендации по ведению пациентов с заболеваниями брахиоцефальных артерий // Российский согласительный документ.- Москва, 2013.- 72 с.

51. Mukhtyar, C. et al. EULAR recommendations for the management of large vessel vasculitis // Ann. Rheum. Dis.- 2009.- Vol. 68.-P. 318–323.

Беловол А.Н., Князькова И.И.

К вопросу о диагностике неспецифического аортоартериита

Харьковский национальный медицинский университет

Резюме. Неспецифический аортоартериит (НАА) – системный васкулит с преимущественным поражением аорты и ее ветвей неизвестной этиологии. НАА является сложным для диагностики и опасным заболеванием, заслуживающим пристального внимания клиницистов. В обзоре рассмотрены вопросы эпидемиологии, этиопатогенеза, классификация и пошаговый диагностический алгоритм. Принимая во внимание скудную и малоспецифическую клиническую картину при НАА, ряд авторов рекомендуют всем лицам моложе 50 лет с повышенными показателями скорости оседания эритроцитов и/или С-реактивного белка в отсутствие очевидных причин для их повышения скрининговое дуплексное сканирование артерий дуги аорты и брюшной аорты. Важно подчеркнуть, что правильная организация диагностического поиска с последующей реализацией терапевтических мероприятий позволяют улучшить прогноз жизни пациентов с этим заболеванием.

Ключевые слова: неспецифический аортоартериит, этиология, патогенез, диагностика

Біловол О.М., Князькова І.І.

До питання про діагностику неспецифічного аортоартериита

Харківський національний медичний університет

Резюме. Неспецифічний аортоартеріїт (НАА) - системний васкуліт з переважним ураженням аорти та її гілок невідомої етіології. НАА є складним для діагностики та небезпечним захворюванням, що заслуговує на пильну увагу клініцистів. В огляді розглянуті питання епідеміології, етіопатогенезу, класифікація і покроковий діагностичний алгоритм. Беручи до уваги мізерну і малоспеціфічну клінічну картину НАА, ряд авторів рекомендують всім особам молодше 50 років з підвищеними показниками швидкості осідання еритроцитів і/або С-реактивного білку при відсутності очевидних причин для їх підвищення скринінгове дуплексне сканування артерій дуги аорти і черевної аорти. Важливо підкреслити, що правильна організація діагностичного пошуку з подальшою реалізацією терапевтичних заходів дозволяють поліпшити прогноз життя пацієнтів з цим захворюванням.

Ключові слова: неспецифічний аортоартеріїт, етіологія, патогенез, діагностика

Received: 27.12.2014 *Accepted: 25.02.2015*