

**DIAGNOSIS OF PURULENT ARTHRITIS OF THE
STERNOCLAVICULAR JOINT**

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Abstract: the work is devoted to the study of the role of sonography in the diagnosis of purulent arthritis of the sternoclavicular joint (SCJ) and the choice of treatment tactics. A prospective single-center study was performed, which included 28 patients with acute nonspecific arthritis of the SCJ and its complications.

In the study of the results of ultrasound scan of the SCJ, 3 sonographic variants of the lesion were identified: exudative, destructive with synovial hyperperfusion, destructive with synovial hypoperfusion. The sonographic criteria for the diagnosis of SCJ arthritis, which have been developed, allow to verify the diagnosis and choose the optimal treatment tactics.

Key words: sternoclavicular joint, purulent arthritis, diagnosis, sonography.

Inflammatory lesion of the SCJ is a rare disease that requires surgical treatment [1, p. 370; 2, p. 1]. The SCJ infection, in most cases, is associated with diabetes, injecting drug use, treatment with immunosuppressants, rheumatic diseases [2, p. 2; 3, p. 1; 4, p. 2; 5, p. 1]. In the initial stages of the disease, local changes are insignificant, and the differential range of pain in the joint includes non-surgical diseases [6, p. 866; 7, p. 2]. Various research methods are used for diagnosis, mainly

medical imaging procedures, however, the elucidation of disease-specific changes causes some difficulties [8, p. 230, 9, p. 1505]. Traditional radiography reveals osteolysis and osteosclerosis, however, usually at the beginning of the disease there are no changes.

These shortcomings bring to the fore such imaging techniques as computed tomography, magnetic resonance imaging and sonography. The first two methods are close to the "gold standard", but the high cost of the method, the limited number of diagnostic devices, and for computed tomography also a significant radiation load, significantly limit the diagnostic capabilities.

Sonography, on the contrary, is devoid of these disadvantages: a sufficient number of devices in each hospital, low cost, the presence of portable devices ensure the availability of the method. In addition, the absence of harmful radiation determines the feasibility of repeated examinations to assess the dynamics of the pathological process.

These advantages of the ultrasound method make it important to study the possibilities of sonography in patients with purulent arthritis of the SCJ.

Aim.: The aim of the article is to study the role of sonography in the diagnosis of purulent arthritis of the SCJ and the choice of treatment tactics.

Materials and methods. A prospective single-center study was performed, which included 28 patients with acute nonspecific arthritis of the SCJ and its complications: phlegmon of the neck and chest wall, upper mediastinitis, chronic osteomyelitis of the clavicle and / or ribs.

Depending on the stage of the disease and treatment tactics, patients are divided into two groups. The first group includes patients with a serous stage of the inflammatory process in the absence of purulent complications. In these cases, antibacterial and anti-inflammatory therapy was performed. Combination therapy with lincomycin and levofloxacin was used, followed by correction of prescriptions according to the results of bacteriological studies. Diclofenac 75 mg twice daily intramuscularly was administered as anti-inflammatory therapy.

In the case of purulent destruction of the capsule, cartilaginous surface of the

joint and / or bone tissue, chronic inflammatory process, the source of which is the elements of the joint, and the development of the purulent complications, patients were included in the second group. They underwent surgical treatment - the resection of the clavicle, sternum and / or ribs. The main characteristics of the studied groups are given in the table (Table 1).

Table 1

Characteristics of patient groups

Indicator	First group abs. (%)	Second group abs. (%)	p
Number	10	18	
Age, years, median	41,0 (32,0; 66,0)	35,5 (27,0; 55,0)	0,49
Male	7 (70,0)	15 (83,3)	0,63
Concomitant pathology (coronary heart disease, hypertension, COPD)	8 (80,0)	16 (88,9)	0,6
Diabetes	4 (40,0)	4 (38,9)	0,40
Drug addiction	3 (30,0)	9 (50,0)	0,43

The use of X-ray (radiography, computed tomography), ultrasound methods before surgery established the limits of the spread of the inflammatory process, the nature and extent of damage to surrounding tissues and organs. In cases of exacerbation of chronic osteomyelitis with existing fistula, radiological diagnosis was supplemented by the introduction of water-soluble contrast agent and fistulography to identify the source of inflammation and inoculation of fistula secretions on the microflora and sensitivity to antibacterial drugs. In the preoperative examination, all patients underwent clinical and biochemical examination, ECG, spirometry, anesthesia risk assessment by ASA; in the presence of signs of generalized infection - bacteriological examination of blood.

Particular attention was paid to the performance of sonography techniques and signs of arthritis. The ultrasound examination was performed with the patient sitting in a natural position. A linear sensor (5 MHz) was used. Both joints were scanned in two planes: parallel and perpendicular to the long axis of the sternal end of the clavicle.

The B-mode study was performed to determine structural changes in the SCJ.

Attention was paid to the presence of synovitis, which was determined in the form of an- and hypoechoic line cluster of fluid in the periarticular tissues and accumulations inside the joint that did not form a signal in the color Doppler mode.

The sonographic pattern of joint destruction had the form of interruption of the intra-articular cartilage line (presence of hypoechoic areas) in two mutually perpendicular planes.

Synovial perfusion (using the number of Doppler signal sources in the joint area) was assessed using energy Doppler and comparing healthy and affected joints. The following qualitative characteristics were used: normoperfusion - when the number of signals in both joints is equal, or when the difference in their number did not exceed 2 sources; hyperperfusion - when the number of such signals on the affected side was greater than 2 compared to the contralateral joint; hypoperfusion - when the number of signals on the affected side was less than 2 compared to the contralateral joint.

Statistical analysis was performed using the software package "Statistica 10.0". Quantitative data are presented as the median (upper quartile; lower quartile). Qualitative values are given in the form of absolute and relative quantity. Quantitative traits were compared using the Mann-Whitney U-test. The evaluation of the reliability of the distribution of qualitative binary parameters was performed using the χ^2 -test. The level of statistical significance is $p < 0.05$.

Results and discussion. In the study of the results of ultrasound scan of the SCJ, 3 sonographic variants of the lesion were identified. The first variant- exudative - is characterized by the presence of exudative changes: periarticular edema, intra-articular accumulation of exudate with synovial hyperperfusion. This pattern was associated with the exudative phase of arthritis and serous inflammation. Computed tomography showed no signs of destruction of joint elements in any of the patients (n = 10).

The second variant - destructive with synovial hyperperfusion - is characterized by the appearance of zones of violation of the continuity of the articular cartilage line and the preservation of synovial hyperperfusion. Computed tomography confirmed

the presence of destruction in the form of rounded and linear areas of osteolysis (n = 15).

The third variant - destructive with synovial hypoperfusion - against the background of existing areas of destruction of articular cartilage was determined synovial hypoperfusion. This sonographic picture is due to thrombosis of the corticosteroids. Computed tomography revealed the presence of bone sequestrs in the joint (n = 3).

Patients with the first variant of the sonographic picture, as mentioned earlier, were included in the first group and were subject to drug therapy. The second group of surgical treatment includes patients with the second and third sonographic patterns.

The length of hospital stay of both groups was not statistically different: 12 (12; 13.5) vs 14 (12; 14) days for the first and second groups, respectively, $p = 0.194$.

Preliminary analysis of long-term (from 3 months to 3 years) results of drug therapy (patients of the first group) for arthritis of the sternoclavicular joint found unsatisfactory results due to the development of osteomyelitis or recurrence of arthritis in 3 cases (30%). In all these cases, patients had comorbidity in the form of intravenous drug addiction. This fact may be, in our opinion, the key reason for the failure of drug treatment, because among these patients in the first group positive results of bacteriological examination of blood samples (*St. aureus*) were in all 3 patients compared with 1 patient without this comorbidity from other patients (n = 7) of the first group, $p = 0.03$. Recovery of all patients with recurrence was achieved by surgery.

No complications or recurrence was observed in the second group of patients during this period.

Thus, the proposed sonographic criteria for the diagnosis of ACS arthritis allow not only to verify the diagnosis, but also to choose the optimal treatment tactics. In patients with an exudative variant of the sonographic pattern, drug therapy was effective in 70% of cases. Intravenous drug addiction, which is associated with bacteremia, is a predictor of adverse drug treatment outcomes. Such patients should be considered as candidates for surgical correction regardless of the sonographic

picture. Destructive sonographic variants of the arthritis of the SCJ are associated with irreversible changes in the joint, leading to the appointment of conservative treatment as a stage of the preoperative program.

Conclusions. Sonography is appropriate for arthritis of the sternoclavicular joint. It allows to predict the effectiveness of conservative treatment and to outline the group of patients who are subject to mandatory surgical correction. Intravenous drug addiction associated with bacteremia is a predictor of adverse drug treatment outcomes and is an indication for the choice of active surgical tactics.

LIST OF REFERENCES

1. Sternoclavicular Joint Infections: Improved Outcomes With Myocutaneous Flaps / [B. Ali, A. Shetty, F. Qeadan та ін.]. // *Semin Thorac Cardiovasc Surg.* – 2019. – №32(2). – P. 369–376. doi: 10.1053/j.semtevs.2019.12.007.
2. Tapscott D. C. Sternoclavicular Joint Infection [Електронний ресурс] / D. C. Tapscott, M. D. Benham // StatPearls Publishing. – 2020. – Режим доступу до ресурсу: <https://www.ncbi.nlm.nih.gov/books/NBK551721/>.
3. Ороку-Агьеман J. Surgical configurations of the pectoralis major flap for reconstruction of sternoclavicular defects: a systematic review and new classification of described techniques [Електронний ресурс] / J. Ороку-Агьеман, D. Matera, J. Simone // *BMC Surgery*. – 2019. – Режим доступу до ресурсу: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6743145/pdf/12893_2019_Article_604.pdf. doi: 10.1186/s12893-019-0604-7
4. Reconstruction of Sternoclavicular Defect With Completely Detached Pectoralis Major Flap [Електронний ресурс] / J.Ороку-Агьеман, S. Perez, A. Behnam, D. Matera // *J Surg Case Rep*. – 2019. – Режим доступу до ресурсу: <https://pubmed.ncbi.nlm.nih.gov/31044064/>. doi: 10.1093/jscr/rjz122.
5. Surgical management of sternoclavicular joint septic arthritis / [A. von Glinski, E. Yilmaz, V. Rausch та ін.]. // *J Clin Orthop Trauma*. – 2019. – №10(2). – P. 406–413. doi: 10.1016/j.jcot.2018.05.001.

6. Kawashiri S. Y. Early Detection of Inflammation and Joint Destruction Revealed by Ultrasound in a Patient with Sternoclavicular Septic Arthritis / S. Y. Kawashiri, Y. Edo, A. Kawakami. // Intern Med. – 2019. – №58(6). – P. 865–869. doi: 10.2169/internalmedicine.1782-18.
7. MRI findings for unilateral sternoclavicular arthritis: differentiation between infectious arthritis and spondyloarthritis / [B. S. Kang, H. S. Shim, W. J. Kwon та ін.]. // Skeletal Radiol. – 2019. – №48. – P. 259–266. doi: 10.1007/s00256-018-3023-4.
8. Sternoclavicular Joint Infection Presenting as Nonspecific Chest Pain / [S. A. McAninch, C. Smithson, A. L. Juergens та ін.]. // J Emerg Med. – 2018. – №54 (2). – P. 229–231. doi: 10.1016/j.jemermed.2017.11.026.
9. Treatment for sternoclavicular joint infections: a multi-institutional study / [A. Murga, H. Copeland, R. Hargrove та ін.]. // J Thorac Dis. – 2017. – №9(6). – P. 1503–1508. doi: 10.21037/jtd.2017.05.76.