ACTUAL TACTICAL CLASSIFICATIONS OF THE INFECTIOUS INFLAMMATORY LESIONS OF THE CERVICAL SPINE AND THEIR USE ON THE EXAMPLE OF A SERIES OF 24 CASES

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Objective. To analyze the known classifications of infectious and inflammatory lesions of the cervical spine using the example of the author's clinical material.
Material and Methods. Data on the results of treatment of 24 patients with lesions of the cervical spine were analyzed. Classifications proposed by groups of authors led by Homagk (2016), Pola (2017), Akbar (2012) and Almansour (2020) were used for comparison.
Results. Out of 24 patients with osteomyelitis of the cervical spine, monosegmental lesions were observed in 15, polysegmental — in 5, multilevel — in 2, and multilevel polysegmental lesions — in 2 cases. The C5—C6 segment was affected in 70.8 % of cases. Sepsis was diagnosed in 2 (8.3 %) patients. One case was not classified, as there was a lesion of the C1—C2 segment. The total number of neurological deficit was 16 (66.7 %). Twenty (83.3 %) patients were admitted with the acute form of the disease, and 4 (16.7 %) patients with the chronic form. Surgery was performed in 20 (83.3 %) patients. Hospital mortality was 8.3 % (n = 2), 91.7 % (n = 22) of patients recovered. The analysis of the classifications presented above was carried out, and proposals for their use were outlined.
Conclusion. «New Classification of Pyogenic Spondylodiscitis» by Pola et al., a modified classification with specification of instability criteria and adaptation of surgical methods of treatment for the cervical spine allows applying it as the main treatment and diagnostic algorithm.
Key Words: spondylodiscitis, vertebral osteomyelitis, cervical spine, classification, algorithm, treatment tactics.
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Since the beginning of the second decade of the twenty first century a series of scientific works [1–6] have been published on the classification and tactics of treating of inflammatory spine lesions (hematogenous osteomyelitis, spondylitis, spondylodiscitis).

Most of the works are based not on a descriptive approach but on a tactical one. The foundation of the spine osteomyelitis classification is based on answers to the main questions: is there an inflammatory lesion of the spine, destruction, involvement of paravertebral tissues, instability, spinal epidural abscess (SEA) or neurological deficit. Additional criteria include the degree of instability, the severity of kyphosis and pain syndrome, CRP level, and sepsis [2, 3, 5, 7, 8]. Taking into account inflammatory process localization in the axial skeleton, a multidisciplinary approach to treatment is necessary [9]. An attending physician must resolve issues that fall within the competence of general and thoracic surgeons, neurosurgeon, and orthopedic traumatologist. At the same time, it is necessary to actively identify conditions that can potentially lead to severe complications, such as development of a neurological deficit.

Although patients may have the same disease, localizations in different parts of the spine have their own important particularities. We have been able to find only one publication on classifications of infectious and inflammatory lesions of the subaxial spine [10].

Other publications consider osteomyelitis in the cervical spine along with other lesion focuses, while all tactical decisions are similar to localization in the thoracic or lumbar spine [1–3, 5].

A pertinent question arises: does the localization of the process in the cervical spine require an individual approach, starting with lesion classification and ending with indications for surgery and the intervention itself?

The anatomical peculiarities of the cervical spine, significantly different biomechanics and load, the volume of bone structures, interfascial compartment and spatium cellulosum, certainly require modification and detailing of the existing classifications.

The objective is to analyze the known classifications of infectious and inflammatory lesions of the cervical spine using our own clinical material as an example.

Material and Methods

We carried out a comparative analysis of the following current tactical classifications of infectious and inflammatory lesions of the spine:

1) Spondylodiscitis severity code (SSC): scoring system for the classification and treatment of non-specific spondylodiscitis [1];

2) Spondylodiscitis scoring system: SponDT – spondylodiscitis diagnosis and treatment [2];

3) New classification for the treatment of pyogenic spondylodiscitis (NCPS) [3];

4) Pyogenic spondylodiscitis. The quest towards a clinical-radiological classification (CRC) [5];

5) Pyogenic spondylodiscitis: therapy algorithm and a new classification for therapeutic decision-making (PSTA) [10].

We assessed the convenience of using a classification, compliance with the anatomical localization of the pathological process, the presence of criteria for the severity of an inflammatory lesion and vertebral instability, the applicability of the proposed surgical options for the cervical spine.

We also analyzed the clinical material for 2006–2019. A total of 266 patients with hematogenous spine osteomyelitis were treated at No. 2 Regional Clinical Hospital (Tyumen), 24 (9.0 %) of them had localization in the cervical spine. Men prevailed – 79.2 % (n = 19), the ratio of men and women was 3.8 : 1.0. The average age of patients was 47.0 ± 13.4 years. The general characteristics of the clinical material are presented in Table 1.

Results

Out of 24 patients treated for hematogenous osteomyelitis of the cervical spine 15 had monosegmental lesions, 5 – polysegmental lesions, 2 – multilevel lesions, and 2 – multilevel polysegmental lesions. The C5–C6 segment was affected in 70.8 % of cases. Sepsis was diagnosed in 2 (8.3 %) patients. One case was not classified according to NCPS [3], as there was a lesion of the C1–C2 segment. The total number of neurological deficits was 16 (66.7 %). Twenty (83.3 %) patients were admitted with the acute form of the disease, and 4 (16.7 %) patients – with the chronic form. Patients with less destructive, uncomplicated forms of acute lesions were treated conservatively, and recovery was achieved in all cases. The surgery was performed in 20 (83.3 %) patients. A recurrence was noted in one case with a multilevel lesion of the lumbar localization; it was cured by a repeated course of antibiotic therapy and extrafocal minimally invasive transpedicular fixation. No relapses were observed in patients with cervical localization. There were 2 (8.3 %) cases of mortality. The cause of death was ascending edema of the spinal cord. Recovery – 91.7 % (n = 22) of the cases.

The main criteria considered in all presented classifications are given in Table 2.

The distribution of patients by the type of lesion and the used treatment tactics is shown in Table 3.

Based on the analysis of the abovementioned classifications, proposals for their use are formulated.

A patient with a lesion of the atlantoaxial joint who underwent a course of conservative treatment is not included in the Table 3. Seven (29.2 %) patients had polysegmental lesions, 2 of them had multilevel lesions.

Discussion

Only two criteria are unambiguously interpreted in the considered classifications of infectious spine lesions: bone destruction and neurological deficit, and bone destruction is taken into account only in the spinal motion segment without involving the posterior support complex and intervertebral joints. Surgical options appropriate for cervical spine lesions are indicated only in the PSTA.

There can be several approaches to instability of cervical spine in infectious and inflammatory lesions: analysis of the available criteria for instability in injuries and neoplastic processes [11–13], as well as data on infectious and inflammatory instability of thoracic and lumbar spine [1–3, 14].

One of the optimal and clinically acceptable classifications of cervical spine injuries is SLIC that considers the injury morphology, including damage to bone and ligamentous structures, and assesses the neurological status. Each injury is ranked according to the scores: injuries over 4 points are subject to surgical treatment, less than 4 points – conservative treatment [11, 12]. It is important to note that injuries can cause damage to the anterior and posterior structures of the spinal column, including transverse injury, while inflammatory processes are localized mainly in the anterior sections of the spinal motion segment; spreading of purulent edema into the paravertebral tissues and/or into the spinal canal with formation of secondary spondylogenic SEA is typical. The posterior structures and intervertebral joints are usually not affected by osteomyelitis. As a result, direct comparison of the signs of instability in injuries with osteomyelitis is impossible.

An experience of using the spinal instability classification in neoplastic processes (SINS) for spine osteomyelitis is interesting: the authors note a correlation between the signs of instability and the invasiveness of surgical treatment and the need to restore anatomical alignment can determine the extent of a surgery. The classification by Fisher et al. [13] is summed up in Table 4.

It is necessary to modify or specify the instability criteria for cervical spine with inflammatory lesions: lesions of the occiput-C2, C7–T2 junctions or the mobile spine (C3–C6) are possible. Morphological type of lesion, excluding neoplastic processes specified as destructive, mixed, proliferative. Other criteria do not require specification. It is advisable to consider them as complementary concepts of instability in cervical spine osteomyelitis [13, 15].

Homagk et al. [1, 2] only mention instability without specification of the criteria. Thus, we consider it appropriate to return to the classification of Pola et al. (NCPS) [3] and the possibility of using it in cervical spine lesions.

The classification scheme, where the lesion types become more complex from simple discitis without destruction to destructive and neurologically complicated forms, is optimal in clinical practice. At the same time, unilateral or bilateral paravertebral or intramuscular abscesses, destruction accompanied by instability, detail the main types of pathosis. An important factor is that this principle is used in the AO Spine classifications and is known to a wide range of traumatologists and neurosurgeons.

Table 1
General characteristics of author's clinical material

Patients	Age, years	Localization	Pola Classification [3]	ICC	Concomitant disease	Neurological deficit	Diagnosis is made, months	Type of surgical intervention	Outcome
1st	34	C5–C6	A.3	0	–	No	0.75	0	Recovery
2nd	28	C3–C4	B.1	1	HCV	No	3	0	Recovery
3rd	72	C3–C4	B.1	5	meningitis	No	1	ACIF	Recovery
4th	34	C5–C6	B.1	0	–	No	1	0	Recovery
5th	40	C6–C7, L2–L3	C.1	1	HIV, HCV	No	0.5	Decompression, ACIF, locking plate	Recovery
6th	34	C6–C7	C.2	0	–	No	2.5	Decompression, ACIF, locking plate	Recovery
7th	41	C5–C6	C.2	0	HCV	No	0.25	Decompression, ACIF	Recovery
8th	54	C5–C6	C.2	1	AH	Yes	3.00	Decompression, ACIF, locking plate	Recovery
9th	38	C3–C5	C.3	1	HIV, HCV, HBV	Yes	0.25	Decompression, ACIF	Recovery
10th	70	C5–C7	C.3	4	CHD, PMI, AH	Yes	0.5	Decompression, ACIF	Recovery
11th	44	C5–C7	C.3	0	–	Yes	0.25	Decompression, ACIF	Recovery
12th	41	C5–C7, L5–S1	C.3	0	HIV, HCV	Yes	0.25	Decompression, ACIF, locking plate	Recovery
13th	61	C5–C7, L3–L4	C.3	4	GU	Yes	0.5	Decompression, ACIF	Recovery
14th	39	C4–C5	C.3	1	HIV, HCV	Yes	0.26	Decompression, ACIF	Recovery
15th	53	C3–C4	C.3	1	–	Yes	0.75	Decompression, ACIF	Recovery
16th	75	C5–C6	C.3	6	CHD, PMI	Yes	0.5	Decompression, ACIF	Case of mortality
17th	50	C5–C7	C.4	1	HBV	Yes	0.5	Decompression, ACIF	Recovery
18th	42	C5–C6, L5–S1	C.4	6	HIV, HCV	Yes	1	Decompression, ACIF	Recurrence
19th	37	C5–C6	C.4	3	HCV, HBV	Yes	0.75	Decompression, ACIF	Recovery
20th	57	C6–C7	C.4	1	–	Yes	0.5	Decompression, ACIF	Recovery
21st	36	C5–C6	C.4	1	HCV, HBV	Yes	0.5	Decompression, ACIF, locking plate	Recovery
22nd	63	C6–C7	C.4	6	DM, CHD	Yes	1.1	Decompression, ACIF, locking plate	Case of mortality
23rd	35	C5–C6	C.4	1	HIV, HBV	Yes	1.0	Decompression, ACIF	Recovery
24th	43	C1–C2	–	1	HCV, DM, cirrhosis	No	0.75	0	Recovery

ICC – Charlson comorbidity index; HCV – hepatitis C virus; ACIF – anterior cervical interbody fusion; HBV – hepatitis B virus; CHD – coronary heart disease; PMI – past myocardial infarction; AH – arterial hypertension; GU – gastric ulcer; DM – diabetes mellitus.

Table 2
Criteria for inflammatory lesions of the spine and their use in the considered classifications

Criterion	Classification			
	SSC	NCPS	PSTA	CRC
Destruction	+	+	+	+
Deformity	–	+	+	+
Abscess regadless localization	+	–	+	–
Paravertebral abscess	–	+	–	+
Intramuscular abscess	–	+	–	+
Spinal epidural abscess	–	+	+	+
Neurological deficit	+	+	+	+
Instability	+	+	–	+
Instability criteria	–	+	–	+
Criteria for systemic inflammatory response syndrome	+	–	–	–
Compliance with anatomical localization	±	±	±	±
Compliance of surgical localization options	–	–	+	–

Table 3
Distribution of patients with hematogenous osteomyelitis of the cervical spine by type of NCPS lesion [3] and treatment methods

Type	Treatment	Patients, n (%)
A.3	External immobilization, ABT	1 (4.2)
B.1	Anterior decompression, anterior spinal fusion, external immobilization, ABT	1 (4.2)
	External immobilization, ABT	2 (8.3)
C.1	Anterior decompression, anterior spinal fusion, fixation with locking plate, external immobilization, ABT	1 (4.2)
C.2	Anterior decompression, anterior spinal fusion, external immobilization, ABT	1 (4.2)
	Anterior decompression, anterior spinal fusion, fixation with locking plate, external immobilization, ABT	2 (8.3)
C.3	Anterior decompression, anterior spinal fusion, external immobilization, ABT	7 (29.2)
	Anterior decompression, anterior spinal fusion, fixation with locking plate, external immobilization, ABT	1 (4.2)
C.4	Anterior decompression, anterior spinal fusion, external immobilization, ABT	5 (20.8)
	Anterior decompression, anterior spinal fusion, fixation with locking plate, external immobilization, ABT	2 (8.3)

ABT – antibacterial therapy.

According to the classification under discussion, only MRI is needed to fully determine the type of lesion and the only clinical sign is neurological deficit. We consider this approach to be insufficient since acute discitis is not typical for adult patients. At the early stages of the inflammation, destruction may not be recognized on MRI. Bone-destructive process is one of the key features of this classification and its determination requires a comprehensive examination, including CT and MRI. To assert the above approach, we can cite the indisputable fact of the increase in bone-destructive manifestations in the affected spinal motion segment with full observance of the fundamental principles for treating spine osteomyelitis: targeted antibiotic therapy and immobilization of the affected spine against the background of a positive clinical response to treatment. Despite the importance of the issue, instability is represented by two variants with B.3.1 and B.3.2 lesion types with kyphosis less than 25° and more than 25°, respectively [3].

We consider it appropriate to present the main points of the classification of cervical spine osteomyelitis according to Akbar et al. [10], developed on the basis of a retrospective analysis of the available clinical material (Table 5).

There are several contradictory statements in that work: 1) instability against the background of infectious-inflammatory lesion is not considered; 2) presence of paravertebral abscesses; 3) recommendation to drain a spondylogenic epidural abscess (usually located in the anterior epidural space) through the posterior approach; 4) complication of the underlying disease (SEA) in type I is a defining classification feature.

In addition to the mentioned surgical options, it should be noted that extensive decompression, debridement, and anterior fusion can also be

performed from the anterior approach, in particular when using locking plates [16, 17].

Herren et al. [14] and Rajasekaran et al. [18] give the most complete instability criteria in inflammatory spine lesions in their papers. Herren et al. [14] reported segmental kyphosis over 15°, vertebral body collapse less than 50 %, translation over 5 mm. Rajasekaran et al. [18] reported divergence of articular facets, displacement of posterior parts of the affected vertebrae into the spinal canal, lateral translation, overturning of the superjacent vertebra. It should be noted, that the parameters of the sagittal balance in infectious lesions of cervical spine have been actively studied in recent years [19].

Based on an equal number of considered disease criteria in NCPS and CRC (Table 1), the latter has a number of significant shortcomings and contradictions: psoas abscess and SEA without involvement of vertebral structures are classified as spondylodiscitis. Neurological deficit is considered without taking into account deformities, and deformities are considered without dividing abscesses according to localization This prevent planning the optimal surgical approach and the extent of a surgery. Severe deformities (destruction of more than 50 % of the vertebral body height, kyphosis of more than 25°) are considered regardless of the severity of neurological deficits and inflammation.

NCPS is built similarly to the widely used AO Spine Injury Classification System. In this case, a higher reproducibility can be expected. The main criteria are absence or presence of destruction, SEA and/or neurological deficit. The only criterion for instability is kyphosis greater or less than 25°. Tactical solutions have been developed for localization in thoracic and lumbar spine only, and they are not applicable for cervical localization.

So, we consider using the classification of Pola et al. for cervical spine to be optimal with additional consideration of three questions:

1) cervical spine instability;

Table 4

X-ray signs of spinal instability according to SINS

X-ray sign	Points
Localization	
Junction (occipital – C2, C7–T2, T11–L1, L5–S1)	3
Mobile spine (C3–C6, L2–L4)	2
Semi-rigid (T3–T10)	1
Rigid (S2–S5)	0
Bone tissue lesion	
Lytic	2
Mixed lytic/blastic	1
Blastic	0
Radiographic spinal alignment	
Subluxation or translation	4
Kyphosis or scoliosis	2
Normal arrangement	0
Collapse of the vertebral body	
More than 50 %	3
Less than 50 %	2
No collapse, but there is a vertebral body lesion more than 50 %	1
No collapse	0
Involvement of posterolateral structures	
Bilateral	3
Unilateral	1
None	0
Total:	0–15

2) severity of the general condition due to the systemic inflammatory response syndrome and sepsis;

3) surgical tactics (treatment options corresponding to the localization in cervical spine).

The presence of a type A lesion in an adult patient is determined by the time of diagnosis and treatment onset, but not by a specific feature of the disease course. Primary discitis due to the anatomical features of a growing body is typical for children; infectious process spreading from a vascularized disc to vertebral bodies is secondary. Meanwhile, in an adult patient, a lesion of an avascular formation, such as an intervertebral disc, is possible only per contiguitatem from vertebral bodies. This thesis is supported by the fact that the anterosuperior part of a vertebral body is the main primary lesion focus in the vertebrae in nonspecific processes. Destruction of bone structures manifests itself in the form of nascent erosion of the subchondral endplate [20, 21]. Widely accepted recommendations to use MRI without CT for diagnosis do not allow in most cases to detect a bone-destructive focus at the early stages.

The systemic inflammatory response syndrome and sepsis significantly affect the general condition of patients and determine the treatment tactics: from emergency surgery to treatment in the intensive care unit and empirical antibiotic therapy against the background of unstable hemodynamics.

The definition of the type of lesion according to the modified NCPS is presented in Fig.

We suggest the necessary, in our opinion, additions on NCPS types of lesions and treatment tactics for cervical spine (Table 6).

One case has not been classified due to atlantoaxial localization and in this case it is advisable to use the Lifeso classification [22, 23].

An important addition to the classification is sepsis in patients with cervi-

Table 5
Classification of infectious and inflammatory lesions of the cervical spine [10]

Type	Classification signs	Treatment Options
Type 0	Spondylodiscitis without abscess formation, no data on bone destruction	External immobilization, antibiotic therapy
Type I	Epidural abscess against the background of lesion of the intervertebral disc and vertebral bodies (destruction and deformity are not determined, the sagittal profile is preserved), neurological disorders of varying degrees	Posterior decompression, discectomy, posterior stabilization. Alternative: anterior decompression, anterior spinal fusion with plate fixation
Type IIA	Spondylodiscitis with bone destruction with pathological fracture, kyphotic deformity	Debridement through the anterior approach, resection of the affected vertebrae, spinal fusion using a cage, stabilization with an anterior plate, as an option – posterior stabilization with screw constructions
Type IIB	Spondylodiscitis with destruction, deformity and neurological deficit	Monosegmental lesion: anterior decompression, vertebral resection, anterior spinal fusion with a plate. Polysegmental lesion: 360° spinal fusion with posterior instrumentation

cal spine osteomyelitis that under the condition of stable hemodynamics is an indication for urgent surgical treatment, and with unstable hemodynamics – for intensive therapy and empirical antibiotic therapy until stabilization.

Summing up this section, we consider it important to note the following:

1) type A lesions are determined by the time of diagnosis onset (less than 2–4 weeks) by MRI without CT, but not a specific feature of a disease course;

2) MRI and CT of the affected spine region are obligatory in diagnostics of infectious-inflammatory lesions;

3) with the concern of the maximum high risk of neurological deficits in case of hematogenous pyogenic cervical spine osteomyelitis and predominance of type C lesions, anterior decompression, debridement and stabilization are indicated for the vast majority of patients;

4) anterior surgical approach enables to perform the planned scope of the intervention, except for the localization of SEA in the posterior epidural space and extensive anterior reconstruction (more than two vertebrae and three intervertebral discs) that requires posterior debridement and/or stabilization (360° fusion);

5) joint lesion most often leads to significant instability and requires certain measures to prevent this complication;

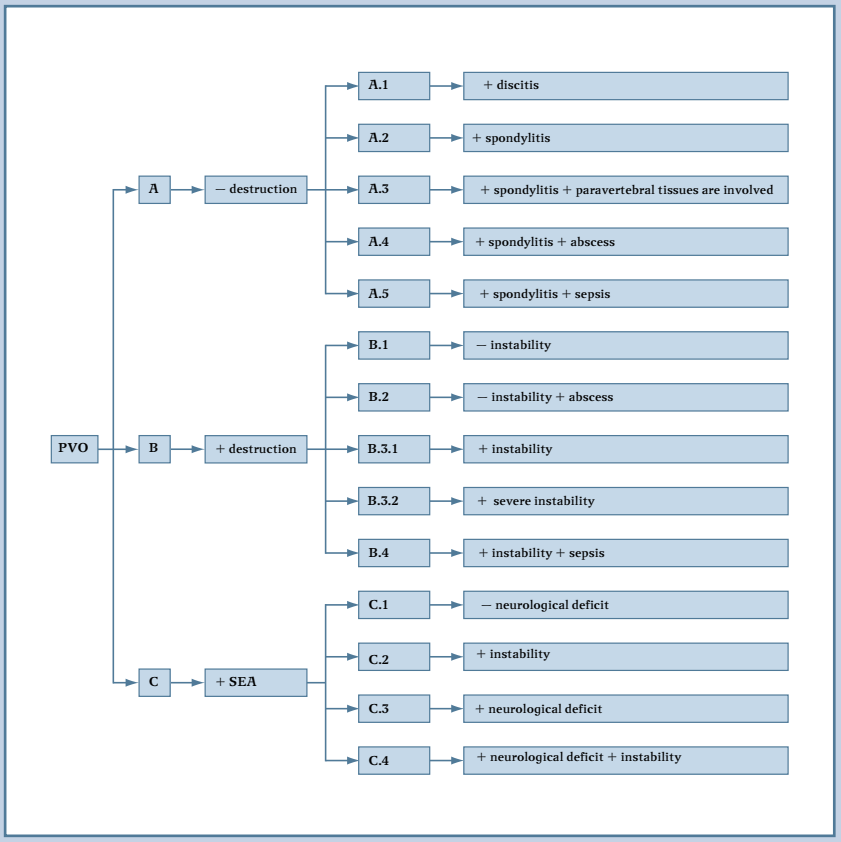

Fig.
The scheme for determining the type of lesion according to the modified NCPS classification [3]: the signs «-» and «+» indicate the presence or absence of a classification attribute; PVO (pyogenic vertebral osteomyelitis); SEA – spinal epidural abscess

Table 6

Spinal Osteomyelitis Classification (NCPS) adapted for the cervical spine

Type	Patients, n (%)	Criteria	Treatment tactics
A.1	–	Simple discitis (not typical for adults)	External immobilization, ABT
A.2	–	Spondylodiscitis not involving vertebral bodies (vertebral body edema without destruction)	
A.3	1 (4.2)	Spondylodiscitis with limited involvement of paravertebral tissues	
A.4	–	Spondylodiscitis with paravertebral or intramuscular abscesses	Anterior debridement, anterior spinal fusion, external immobilization, ABT. Fixation with a locking plate is possible.
A.5	–	Spondylodiscitis, sepsis	Stable hemodynamics – anterior sanation, anterior spinal fusion, external immobilization, ABT. Fixation with a locking plate is possible. Unstable hemodynamics – intensive therapy, empiric ABT after obtaining blood samples for hemoculture
B.1	3 (12.5)	Bone destruction in a segment without signs of instability	External immobilization, ABT
B.2	–	Bone destruction without instability, with paravertebral or intramuscular abscesses	Anterior debridement, anterior spinal fusion, external immobilization, ABT, fixation with a locking plate is possible.
B.3.1	–	Kyphosis 15° or more, vertebral body destruction less than 50 %	Anterior debridement, anterior spinal fusion, fixation with a locking plate, external immobilization, ABT
B.3.2	–	Kyphosis over 25°, vertebral body destruction over 50%, divergence of articular facets, translation	Anterior debridement, anterior spinal fusion, fixation with a locking plate, external immobilization, ABT. With polysegmental lesions (resection of two vertebral bodies and three intervertebral discs) additional posterior stabilization is possible
B.4	–	Bone destruction with instability and sepsis	Stable hemodynamics: anterior debridement, anterior spinal fusion, fixation with a locking plate, external immobilization, ABT. Unstable hemodynamics: intensive therapy, empiric antibiotic therapy after obtaining blood samples for hemoculture
C.1	1 (4.2)	SEA without neurological deficit and instability (contact destruction of vertebral bodies), discitis	Anterior decompression, anterior spinal fusion, external immobilization, ABT. Conservative therapy with targeted monitoring of neurological status is possible. Posterior decompression only if SEA is localized in the posterior epidural space
C.2	3 (12.5)	SEA without neurological deficit and with segmental instability	Anterior decompression, anterior spinal fusion, fixation with a locking plate, external immobilization, ABT. With polysegmental lesions, 360° spinal fusion in one or two steps
C.3	8 (33.3)	Spondylodiscitis, SEA with neurological deficit, no instability	Anterior decompression, anterior spinal fusion, fixation with a locking plate, external immobilization, ABT
C.4	7 (29.2)	Spondylodiscitis, SEA with neurological deficit and instability	Anterior decompression, anterior spinal fusion, fixation with a locking plate, external immobilization, ABT. With polysegmental lesions (resection of two vertebral bodies and three intervertebral discs), 360° spinal fusion in one or two stages

ABT – antibacterial therapy; SEA – spinal epidural abscess.

6) unstable patient's condition in addition to sepsis can significantly affect the treatment tactics.

The use of NCPS as the main diagnostic and treatment algorithm required anterior debridement and fusion in 82.2 % of patients (all type C lesions). The use of anterior approach for surgical treatment of cervical spine osteomyelitis has been noted in a number of modern studies, posterior stabilization is shown as an additional option for extensive lesion resections [19, 24].

Conclusion

The use of NCPS is reasonable for cervical spine lesions, however, the lack of applicable instability criteria and surgical options for this localization creates significant limitations. Modification of the classification with specification of the instability criteria and surgical methods of treatment enables using it as the main treatment and diagnostic algorithm for cervical spine osteomyelitis. The largest proportion of type C lesions – 83.3 % (n = 20), complicated by spondylogenic SEA and/or neurological deficit in cervical spine osteomyelitis required anterior debridement and fusion in the vast majority of patients. Recovery was observed in 91.7 % (n = 22) of cases, mortality in 8.3 % (n = 2).

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