

## EMERGENCY OSTEOPERFORATION IN POST-OPERATIVE SPONDYLOGIS

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### Summary

Infectious spondylitis accounts for 4 - 8% among suppurative diseases of the musculoskeletal system, and its frequency is estimated at 1.0 - 2.5 cases per 100,000 population. A special form of spondylodiscitis - acute post-manipulation spondylodiscitis - is observed in one of 40-50 patients who underwent discectomy from the posterior approach for a herniated disc, which, given that this operation is the most frequent in neurosurgery, allows one to assess the total volume of the problem.

Purpose of the study. To study the results of the use of emergency osteoperforation in acute postoperative spondylodiscitis. We studied the data of 40 patients, 15 women and 13 men, aged from 30 to 63 years, who underwent discectomy from the posterior approach, who developed postoperative spondylodiscitis within 3 months after the operation. The main group consisted of 28 patients with acute spondylodiscitis, who underwent our developed method of treating spondylodiscitis. The comparison group included 12 patients who underwent conservative therapy. The subject of the study was the features of the clinical and radiation picture of the disease, laboratory parameters, as well as the assessment of the effectiveness of the proposed treatment method. The early signs of the effectiveness of treatment were considered the dynamics (relief) of pain syndrome, decreased sweating, improved general condition, increased appetite, as well as the dynamics of manifestations of inflammatory changes ("edema") assessed by MRI.

Thus, emergency osteoperforation of the vertebra and disc in combination with antibiotic therapy can reduce the edema of the bone vertebra, reduce intraosseous pressure, which in most cases provides good (67.8%) and satisfactory (14.2%) clinical results in acute spondylodiscitis. developed after removal of a herniated disc.

**Key words:** spondylitis, spondylodiscitis, biopsy, osteoperforation.

Infectious spondylitis accounts for 4–8% among suppurative diseases of the musculoskeletal system, and its frequency is estimated at 1.0–2.5 cases per 100,000 population [1–4]. A special form of spondylodiscitis, acute post-manipulative spondylodiscitis, is observed in one of 40-50 patients who underwent discectomy from the posterior approach for a herniated disc, which, given that this operation is the most frequent in neurosurgery, makes it possible to assess the total volume of the problem.

Errors in diagnosis and treatment of post-manipulation spondylodiscitis reach 84%, and one of the main reasons for their late recognition is the similarity of the nature and severity of subjective pain

before and after surgery, especially with initially severe pain reaching 7-8 points on the VAS scale [5].

There is no unambiguous tactics for the treatment of spondylodiscitis, which is explained by the peculiarities of the clinical course and duration of the disease. So, if for patients with neurological disorders and epidural abscess urgent decompression of nerve structures is unambiguously recommended [6, 7, 15], then for nonspecific spondylitis corresponding to 1 - 2 degrees of severity according to Homagk [2, 3] or type A, the most cited at present time of tactical classification of acute spondylodiscitis E. Pola et al. [4]. Many authors recommend only conservative treatment, first of all, antibiotic therapy, while the peculiarities of local blood flow in the intervertebral discs (its reduction or complete absence) does not initially imply the creation of high ("therapeutic") concentrations in the pathological zone, which can lead to chronic the course of the disease [8, 9].

It should be noted that recommendations for urgent surgical treatment of spondylodiscitis usually relate to drainage of the inflammation focus, one of the pathogenetic components of which is a decrease in high intraosseous pressure, characteristic of any acute osteomyelitis process, it is not accidental; decompressive osteoperforation is one of the basic methods of its surgical treatment. We were unable to find publications concerning the targeted effect on this component in postoperative spondylodiscitis.

**Purpose of the study.** To study the results of the use of emergency osteoperforation in acute postoperative spondylodiscitis.

**Materials and methods.** As a material for the study, patients were taken in hospital at the Samarkand branch of the Republican Scientific and Practical Center of Traumatology and Orthopedics in the Department of Spine Surgery for 2009-2019. The data of 40 patients were studied, who were divided into 2 groups. Of these, there were 23 (57.5%) women and 17 (42.5%) men, aged 30 to 63, who underwent discectomy from the posterior approach, underwent disc curettage, and all patients were prescribed antibiotic therapy the day before surgery. the duration of the course of antibiotics lasted for 8 days. The study patients developed postoperative spondylodiscitis within 3 months after the operation. Previously, patients were operated on for disc herniation at the following levels: L3-L4 - 7 (17.5%), L4-L5 - 20 (50%) and L5-S1 - 13 (32.5%).

All patients belonged to type A according to the NCPS classification by E. Pola et al. The main group consisted of 28 patients with acute spondylodiscitis, who underwent the developed method for the treatment of spondylodiscitis. The comparison group included 12 patients who underwent conservative therapy.

For the diagnosis of the disease, a leading role is played by a change in the nature of subjective complaints - pain, which is usually assessed as constant before the operation, becomes cramping after some time after the operation. Only 8 patients developed similar complaints on the 2nd day after the operation: in the remaining 20 cases it happened after 2 weeks. The slightest movements lead to increased pain, due to which the patient often takes a forced position and does not bend the lower limbs (such pain and position differ from those existing before the operation and associated with a herniated disc, when, with positive symptoms of root tension, relief is usually noted with bent knees and hip joints).

As a rule, an increase in temperature, ESR indices and the number of leukocytes during postoperative spondylodiscitis was detected 4-6 days after surgery.

The only MRI sign of spondylodiscitis in the early days of the disease is bone marrow edema. Increasing back pain is caused by increased intraosseous and disc pressure, irritation of the nerve

endings and dural sac, both due to edema and possible accumulation of exudate. The progressive deterioration of blood circulation impairs the nutrition of the disc and contact bone structures, which can lead to the formation of foci of necrosis.

Upon identifying these complaints and establishing the diagnosis of post-manipulation spondylodiscitis, all patients underwent emergency osteoperforation (tunneling) of the vertebral body through the root of the arch in accordance with the following methodology "Method for the treatment of spondylodiscitis" patent No. IAP 05393 2017.

Osteoperforation (tunnelization) of the spine was performed in the operating room using a trocar with a diameter of 4 mm, under image intensifier control. With the patient in the prone position, under local anesthesia with a solution of novocaine, a trocar was inserted through a micro-incision through the root of the arch with angles in the frontal and sagittal planes predetermined from radiographs (angulation from 20 to 40 °) so that it would enter the center of the affected area. After perforation of the endplate and entering the destruction zone, material was taken (aspiration) for bacteriological and histological examination. Before removing the trocar, a drain was installed through it for the administration of antibiotics. After surgery, two broad-spectrum antibiotics were administered daily through both catheters for several days (usually 7-8) until a bacterial response was obtained. On the 8th day, we remove the catheter. After receiving its results, the subsequent parenteral administration of antibiotics was carried out taking into account the sensitivity. The indication for the prolongation of antibiotic therapy at a later date (up to 3 months with a change every 12-14 days) was the preservation of the pain syndrome against the background of the expansion of the motor regimen, and the preservation of laboratory parameters of the inflammatory reaction

Thus, simultaneous tunneling of the body and disc with transpedicular administration of the irrigator provided drainage of the destruction focus, taking material for biopsy, and created conditions for local administration of antibiotics.

The subject of the study was the features of the clinical and radiation picture of the disease, laboratory parameters, as well as the assessment of the effectiveness of the proposed treatment method. The early signs of the effectiveness of treatment were considered the dynamics (relief) of pain syndrome, decreased sweating, improved general condition, increased appetite, as well as the dynamics of manifestations of inflammatory changes ("edema") assessed by MRI.

**Results.** The histological examination of the biopsy specimen showed signs of inflammation in 24 patients (88%). Positive growth of bacterial cultures was obtained in 15 (62.87%) cases, of which 9 (37.5%) - Staphylococcus aureus. In 13 cases, the comparison of bacteriological and histological data made it possible to regard the process as aseptic.

In the main group, on the first day after osteoperforation, the severity of pain syndrome decreased from 6-8 to 2-3 points according to VAS. In the comparison group, the pain syndrome in 5 (41.7%) patients within 1.5-2 months showed a slow decrease in pain to 3 points by

VAS, and 7 (58.3%) showed no reduction in pain. We would like to note that in 22 (78.6%) patients of the main group, 2 weeks after osteoperforation, they were discharged home with bed rest for 1 month and continued antibiotic therapy.

The results of the treatment were assessed clinically, taking into account the improvement in the quality of life, the use of pain intensity assessment on the VAS scale, as well as the use of the Oswestria questionnaire, which were assessed as follows:

in 19 patients (67.8%) of the main group, and in 2 (16.7%) patients, the result corresponded to good: complete regression of pain syndrome was achieved at rest and when turning the bed, a decrease in

the feeling of fatigue in an upright position, improvement of clinical and laboratory parameters ... According to MRI data, this was accompanied by a decrease in edema according to MRI data already by the 3rd month of treatment and disappearance by 6 months. (Fig 1.c); indicators on the Oswestria scale averaged 22 points in both groups;

The data of 4 (14.2%) patients of the main and 3 (25%) of the comparison group corresponded to satisfactory results: back pain persisted and worsened after 2 - 3 weeks with the addition of a clinic of instability in the form of complaints when trying to rise. The complaints slowly disappeared over 12 weeks, however, with exercise and walking, they persisted for up to 7 months. The instability clinic was eliminated with the use of a rigid corset, the indicators on the Oswestria scale averaged 42 points in both groups;

in 23 (82.1%) patients of the main and in 5 (41.6%) of the comparison group, the results of which were regarded as good and satisfactory, a clinical and X-ray examination was performed within 12 months. On functional radiographs in flexion / extension positions, no pathological mobility was found in any of them; according to MRI data, degeneration of the inflammation zone was noted - in the absence of edema of the vertebral bodies, the disc height decreased and the hydrophilicity of the nucleus pulposus ("black disc") was lost;

An unsatisfactory result was noted in 5 (17.8%) patients of the main group, of which 2 had concomitant diabetes mellitus. In the comparison group, in 7 cases (58.3%), an unsatisfactory result was noted. The patients did not show signs of the effectiveness of treatment, clinical and laboratory data, as well as according to MRI data, remained with the continuation of an active inflammatory process in the affected vertebral body. Indicators on the Oswestria scale averaged 88 points.

Preservation of bone marrow edema of the appearance of signs of vertebral body distortions on control MRI at late follow-up with an increase in clinical complaints required surgical treatment in 4 (14.3%) patients of the main group and in 7 (58.3%) patients of the comparison group, surgical treatment - necrectomy with ventral spondylodesis with autografts.

Clinical example: Patient S.Z., 40 years old, was admitted to the clinic with complaints of severe pain in the lumbar spine, inability to turn in bed, weakness, loss of appetite. 3 months ago, he underwent removal of the herniated disc at the L5-S1 level from the posterior approach. After discharge from the hospital, back pain began to intensify, the condition progressively worsened, and cramping back pains were added at the slightest movement and coughing. I went to the clinic with a diagnosis of "postoperative spondylodicitis L5-S1". (Fig 1.a.).

Upon admission to the clinic: the general condition of moderate severity, the skin and visible mucous membranes are pale, the position in bed is passive. Low-grade fever, sweating in the afternoon and especially at night. No pathological changes were found on the part of the internal organs.

Status localis: when viewed in the area of the operating scar, there are no visible changes, with palpation and the slightest movements of the trunk - severe pain. The pain is worse in the supine position, symptoms of tension on the roots ("stuck heel") on both sides. In blood tests, there was no increase in the number of leukocytes (WBC =  $7.6 \times 10^9$ ), ESR = 5 mm / h.

On MRI in T1 and T2 modes, bone marrow and disc edema is noted (Fig. 1.b.).

Osteoperforation of the S1 vertebra was performed under local anesthesia, drainage was installed on both sides of the spine for debridement and administration of antibiotics (Fig. 1.c, d.). After osteoperforation, the patient's condition improved dramatically: back pain disappeared, appetite appeared, sweating decreased. Antibacterial and decongestant treatment was carried out (culture result - sterile).

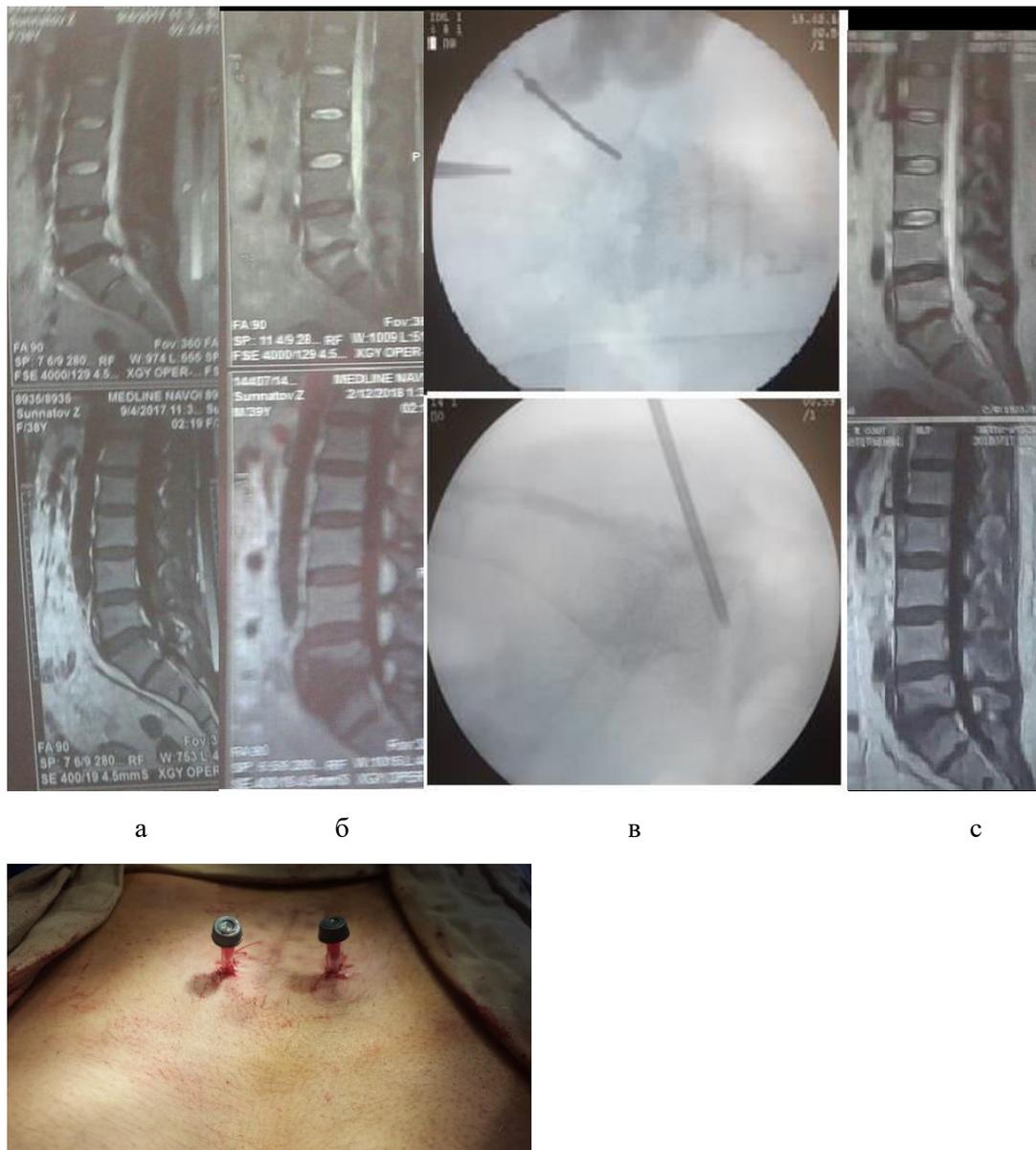


Figure 1. Clinical example. Patient S.Z., 40 years old.

Diagnosis: Postoperative spondylodiscitis L5-S1.

A - MRI at admission: signs of osteochondrosis of the lumbosacral spine - a decrease in the height and intensity of signals from the L4-5, L5-S1 disks; herniated disc L5-S1. Sequestered central with lateralization to the left VL5-VS1 disc herniation

B - MRI 3 months after surgery: spondylodiscitis L5-S1: epidural component;

B - intraoperative radiographs during osteoperforation under image intensifier control; D - operational photographs with installed .....

c) MRI after 3 months, after osteoperforation: positive dynamics in the form of a decrease in bone marrow edema of the vertebral bodies, disappearance of the epidural component

**Discussion.** A steady increase in the number of surgical interventions performed annually on the spine in the world inevitably leads to an increase in the absolute number of postoperative complications accompanied by chronic pain syndrome [10, 11], while clinical deterioration in comparison with the preoperative state is observed in 1-3% of patients [12].

One of these complications is postoperative spondylodiscitis, the frequency of which after removal of disc herniation (the most frequent operation in spinal neurosurgery), depending on whether it is performed using minimally invasive or traditional methods, varies considerably, reaching 3.5% [13].

Mechanical impact on the contact surfaces of the vertebrae during removal of a herniated disc is accompanied by microdamage and compression of their endplates - and in the early postoperative period, edema of the subchondral plates of the vertebral bodies detected by MRI may not be a pathotonic sign of acute spondylodiscitis after discectomy [9,11]. In the early postoperative period, changes in the nature and severity of pain syndrome are of greater diagnostic value.

At the same time, bone marrow edema impairs local blood circulation, which causes the development of osteonecrosis of the subchondral parts of the vertebrae, from which the intervertebral disc receives nourishment in a diffuse way [16].

Trepanobiopsy performed for the purpose of histological and bacteriological examination of the material is the leading method for diagnosing spondylodiscitis, and its diagnostic value for etiological verification reaches 80% [8, 10]. In turn, as a therapeutic procedure, biopsy of the vertebral body with a conventional trepanning needle (diameter 18 G) leads to the progression of destruction due to narrow biopsy channels and the impossibility of full drainage [14]. The use of a tractor with a diameter of 3-4 mm allows you to quickly reduce intraosseous tension, improves blood circulation in the affected vertebra, which is accompanied by a rapid decrease in pain syndrome from 6-8 to 2-3 points according to VAS with simultaneous drainage of the disc.

**Conclusion.** Emergency osteoperforation of the vertebra and disc in combination with antibiotic therapy can reduce the edema of the bone vertebra, reduce intraosseous pressure, stop the transition of osteodynamic destruction, which in the overwhelming majority of cases provides good (67.8%) and satisfactory (14.2%) clinical results in acute spondylodiscitis that developed after removal of a herniated disc.

MRI changes in the form of edema of the vertebrae contacting the discectomy zone in the early postoperative period are not an absolute sign of spondylodiscitis, however, the spread of edema to the entire vertebral body or to the adjacent segment, accompanied by chronic, incl. progressive pain syndrome is a sign of disease progression.

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