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Management of Patients with Purulent Mediastinitis in the Postoperative Period

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ABSTRACT

In this review article, we presented modern data on the treatment of patients with purulent mediastinitis in the postoperative period. Purulent mediastinitis remains an extremely severe and life-threatening form of acute surgical pathology, the prevalence of which has remained stable for many years with a moderately pronounced tendency to increase. The main cause of adverse outcomes in patients with purulent mediastinitis is the untimely performance of surgical interventions, due in turn to diagnostic errors at all stages of medical care. Use of proposed standards Examination of patients with suspected purulent inflammation of the mediastinal tissue in typical clinical situations can reduce the time for diagnosing purulent mediastinitis. The use of a system for monitoring the course of the postoperative period in patients with purulent mediastinitis makes it possible to ensure early detection of postoperative complications in case of occurrence. The implementation of the principles of organizing the provision of medical care to patients with purulent mediastinitis makes it possible to increase the frequency of referral to a specialized hospital for patients with suspected purulent mediastinitis and, as a result, increase the frequency of early diagnosis of this disease.

Keywords: Purulent mediastinitis, administration of patients in the postoperative period, postoperative complications of purulent mediastinitis.

As with other forms of severe surgical infection, in the treatment of patients with purulent mediastinitis, drug treatment is no less important than a properly performed operation [1,29].

The basic therapeutic effect is aimed at eliminating microbial endogenous intoxication in the postoperative period. Achieving this goal requires solving three equally significant tasks [38,39,46,59,60]:

- ✱ neutralization of bacterial pathogens,
- ✱ elimination of bacterial toxins,
- ✱ optimization of the inflammatory and immune response.

Complementary therapy should be aimed at syndromic correction of disorders of organs and systems, usually initiated by developed intoxication, but often acquiring independent significance [32].

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Patients with purulent mediastinitis need, especially careful care, the quality of which is not least determined by the success of treatment [25, 33].

Antibiotic therapy. The principles of antibiotic therapy for purulent mediastinitis are like those for other severe forms of purulent surgical infection [12, 14-19, 36, 55, 64, 65].

Given the extreme severity and danger of the disease, the initiation of antibiotic therapy cannot be postponed until data on the type of pathogen and its sensitivity to antibiotics are obtained [30]. Therefore, antimicrobial treatment begins with one of the empirical schemes. The latter can be based on two principles - escalation (when the most «popular» and relatively inexpensive drugs are used first, while it is assumed that if they are ineffective, they are replaced by more modern and expensive) and de-escalation (when the most modern, effective, and expensive antibiotics are initially prescribed). Further correction of antibiotic therapy is carried out considering the information received about the type and antibiotic sensitivity of pathogens.



Figure-1. Anterior superior purulent mediastinitis

Considering the above information about the microbiology of purulent mediastinitis, from the very beginning of treatment, the combination of antibacterial drugs should cover almost the entire spectrum of known pathogens of purulent surgical infection [41]. It is also necessary to consider the possibility of participation in the infectious process of multidrug-resistant hospital strains of microorganisms [67].

Another circumstance influencing the choice of drugs is the high cost of the most effective antibiotics - IV-generation cephalosporins, thienamycins, and glycopeptides.

The most typical recommendations contained in publications on empirical antibiotic therapy of severe forms of surgical infection include the following provisions [11, 27, 56].

- ✳ When used in empirical antibiotic therapy of cephalosporins, preference should be given to drugs of the third generation (Tsefotsime, Tsefoperazon, Tsefazidime, Tseftriaxone) or IV generations (Tsefepim).
- ✳ When used in empirical antibiotic therapy of aminoglycosides, one of the following drugs should be used: Gentamicin, Tobramycin, Netilmicin, Amikacin.
- ✳ If carbapenem can be chosen, it is preferable to use Mironem.
- ✳ With the ineffectiveness of carbapenem therapy, the use of vancomycin is indicated.
- ✳ With the development of acute renal failure in a patient with purulent mediastinitis, vancomycin is the drug of empirical choice.
- ✳ In cases of detection of flora that is insensitive to vancomycin, the latter should not be cancelled, but treatment should be supplemented with a second antibiotic or nitrofurantoin drug.
- ✳ In case of ineffectiveness of glycopeptide therapy, an antifungal drug (Amphotericin B or Fluconazole) should be added to the treatment.

However, the results of the treatment of patients with purulent mediastinitis and the data of microbiological studies of the last 4-5 years have become for us the basis for a certain correction of standard provisions (the results of earlier studies seem to us not relevant for the development of practical recommendations). Thus, 29.2% of the isolated strains were initially insensitive to drugs such as Mechanemand Levofloxacin (Tavanik).

The basis for the development of empirical therapy regimens is a regular analysis of the antibiotic sensitivity of all strains isolated in the hospital (with a division into departments, nosologies, and the severity of the disease). Antibiotics to which more than <80% of the isolated strains are sensitive are selected as the main drugs recommended for escalation schemes. As drugs recommended for de-escalation schemes - drugs to which all or most of the isolated strains are sensitive.

Considering all the significant circumstances, we have determined that in primary, postoperative and delimited secondary mediastinitis, empirical therapy is carried out according to the principle of escalation. Initial antibiotic therapy after surgery is carried out by a combination of preferred cephalosporin and aminoglycoside in combination with metronidazole. If this scheme is ineffective, after 48-72 hours (in the absence of antibioticogram data), T yen or Meronem is connected. In the most severe cases, with odontogenic and tonsilogenic

purulent mediastinitis without tendencies to delimit the purulent process and total purulent mediastinitis of other origins, therapy is carried out according to the principle of de-escalation. As the first drug of empirical choice, T is used gentamicin - Tyenam or Meronem in combination with metronidazole.

The first experience of using this approach in patients with purulent mediastinitis (and other severe forms of purulent surgical infection) has shown its sufficient effectiveness both from a clinical and pharmaco-economic point of view.

Immunotropic therapy. Based on the data on the polymorphism of the causative agents of purulent mediastinitis, the use of active immunization methods is not logically expedient. In the literature of 15-20 years ago, there are reports of the use of staphylococcal toxoid, *Pseudomonas aeruginosa* and *Proteus* vaccines with a positive effect in the treatment of patients with mediastinitis [44, 66]. However, the system of evidence presented by the authors from the standpoint of evidence-based medicine contains systemic errors.

A sufficiently developed area of immunotherapy is the method of passive immunization. Transfusion of hyperimmune donor plasma (antiproteus, antipseudomonal) for purulent mediastinitis was used by M.M. Abakumov et al. [66]. This technique currently has no prospects since it is effective only with strict compliance of the transfusion medium with the pathogen leader. If the latter condition is not met, the result of transfusions of hyperimmune plasma from transfusions of fresh frozen plasma differs only in a significantly higher cost. Due to its complexity and high cost, the method of homologous leukotransfusions has not yet become widespread [32].

Of the immunoglobulin preparations in clinical practice, Pentaglobin («Biotest»), Octagam («Octapharma»), Biaven («Farma Biagini»), and immunoglobulin («Biochemie»), Candoglobulin («Novartis»), normal human immunoglobulin for intravenous administration is currently used. The last two of these drugs we used with a clear clinical effect in our own practice. The most effective of these drugs, which has a large positive literature, is Pentaglobin. Only the reasonably high cost of the drug limits its widespread use [32].

Immunotropic drugs of various origins are significantly more widely used in clinical practice. According to B.V. Pinegin et al. [42], Immunocorrectors are divided into three groups.

- Medicines of exogenous origin (based on bacterial and fungal preparations) - P prodigiosin, Pirogenal, Likopid.

- Drugs - mediators of immunogenetics and their synthetic analogues. The first generation of drugs in this group includes T activin, T imalin, T imoptin and other drugs derived from thymus tissue. Currently, synthetic analogues of natural hormones of the thymus are widely used - T imopentin, Timogen, and Immunofane. In addition, drugs - analogues of interleukins (P oncoleukin) and granulocyte-colony-stimulating factor (Granocyte, Neipogen).
- Synthetic drugs with specific or concomitant bioregulatory activity (Levamisole, Diuciphon, Polioxonium, etc.).

In patients with purulent mediastinitis, sodium Nucleinate, Levamisole, Timoptin, Timalin, etc. were used with a positive effect [3]. Normalization of cellular immunity reactions has been shown - an increase in the content of T-lymphocytes and T-helpers, and a decrease in the content of T-suppressors when Taktivin is used in patients with purulent mediastinitis [9, 13].

It should be noted that generally accepted schemes for choosing drugs for immunotropic therapy - both empirical and based on data from relevant laboratory studies - simply do not exist.

Detoxification therapy is an essential component of the treatment of purulent mediastinitis, however, in practice, the choice of a method for eliminating bacterial toxins is very difficult. The use of the publicly available method of forced diuresis against the background of severe water and electrolyte disorders is inappropriate. Opportunities for the use of extracorporeal methods of detoxification are absent or limited in many institutions. There are reports in the literature about the use of hemosorption [23, 24], plasmapheresis, and blood perfusion through the xenospleen in the treatment of mediastinitis [3, 23]. Our own experience of using plasmapheresis in patients with purulent mediastinitis does not allow us to recommend it for widespread use, since we observed a case of acute disseminated intravascular coagulation immediately after a session of discrete plasmapheresis in plasma exchange mode.

Of the other methods of efferent effects in the treatment of patients with purulent mediastinitis, indirect electrochemical blood oxidation (transfusions of 0.03% sodium hypochlorite solution) [52] and blood irradiation with a low-intensity laser [7, 52] were used. It should be noted that the attitude towards the latter method has recently been rather restrained [32]. Perhaps, only the use of enterosorbents (naturally, if there is the possibility of enteral administration of drugs) can be recommended for

inclusion in the protocol for managing patients with purulent mediastinitis without reservations.

Nutritional status adjustment. Correction of nutritional status in patients with purulent mediastinitis is of particular importance. Huge energy and protein losses make the problem of nutritional support one of the main ones in the whole complex of therapeutic measures. If enteral nutrition is not possible, most foreign specialists carry out parenteral nutrition in the mode of intravenous hyperalimentation [37, 53], and then, as soon as possible, they switch to enteral nutrition with mixtures enriched with glutamine and vegetable fiber to improve the trophism of the intestinal mucosa, reduce protein catabolism and increase immunoresistance [28].

It should be noted that the provision of enteral nutrition in patients with purulent mediastinitis is often associated with significant difficulties. The latter are due to persistent gastrostasis observed in almost all patients with lower and common forms of purulent mediastinitis. The cause of this condition is an inflammatory lesion of the vagus nerves. The situation becomes even more serious if one or both trunks of the vagus nerves are accidentally or deliberately crossed during surgery.

Vagotomy leads to several adverse effects:

- * a significant increase in the likelihood of gastroesophageal reflux (if the esophagus is not crossed in the lower section),
- * leakage of gastric contents through the gastrostomy (if, of course, there is one),
- * decrease in the efficiency of the conducted probe feeding.

Repeatedly encountering a similar situation in clinical practice, we concluded that the most rational way out of this situation is to install a probe into the duodenum or, better, the jejunum for parenteral nutrition and a second probe «for unloading» into the stomach. It is fundamentally important to implement this component of the treatment program during the primary surgical intervention, since, firstly, it is much simpler technically, and secondly, it allows to minimize the adverse effects of «inflammatory» or mechanical vagotomy.

The nutrient mixture should provide at least 3-3.5 thousand kcal per day.

Posyndromic therapy. The infusion program in patients with purulent mediastinitis, in addition to colloidal and polyionic solutions, during the first 7-10 days after surgery, must necessarily include an albumin solution to maintain the proper level of plasma osmolarity.

Cardiotropic and vasotropic therapy for purulent mediastinitis is carried out by conventional means. Most

patients with severe purulent mediastinitis require inotropic support after surgery. In the case of pronounced signs of hypocirculation, some authors managed to save patients using the technique of introducing solutions of colloids and proteins with glucocorticoids into the brachial artery using a roller pump («intra-arterial support») [3].

Treatment of respiratory failure in some patients, especially in the early postoperative period, may require prolonged mechanical ventilation. There are observations of successful use of hyperbaric oxygenation in the treatment of patients with purulent mediastinitis [26, 63].

Correction of hemorheological disorders. The main content of the therapy of hemorheological disorders is the prevention of the development of the syndrome of disseminated intravascular coagulation. As a basic treatment, transfusions of fresh frozen, therapeutic, and supernatant plasma containing proenzymes and their natural inhibitors in a complete set against the background of heparinization are used to activate antithrombin III administered with plasma. The volume of transfusions is 150 - 800 ml/day. Heparin is administered at the rate of 2500 IU per 100 ml of plasma and an additional 2500-5000 IU every 6 hours into the subcutaneous tissue of the paraumbilical region. In the last 10 years, in patients with purulent mediastinitis, we have been using drugs of low molecular weight heparins - Fraxiparin and Clexane.

Broad-spectrum protease inhibitors are used in large dosages. Contracal is administered on the first day at a dose of 100.000 - 200.000 AE, then 100.000 AE for another 3-5 days. Gordox and Antagozan were used in dosages of 1.000.000 and 500.000 IUD, respectively. When choosing the components of the cryoplasmanithyferment complex, the initial indicators of hemostasis, the stage and features of the development of disseminated blood clotting syndrome are taken into account. In the phase of hypercoagulation, hyperfibrinogenemia, large doses of heparin and cryosupernatant (deprived of coagulation factors) plasma and/or moderate doses of freshly frozen plasma are used. With a sharp decrease in antithrombin III in the patient's plasma, doses of freshly frozen plasma are increased and the amount of heparin injected is reduced. In severe hypocoagulation of hyperfibrinolysis, large doses of protease inhibitors are used.

Prevention of complications of purulent mediastinitis. A complicated course of purulent mediastinitis is observed so often that it is sometimes quite difficult to decide whether this or that condition is a manifestation of purulent mediastinitis or its complications. Among the

numerous and varied complications of purulent mediastinitis, we distinguish three main groups:

- ✱ inflammatory, caused by the spread of the pathological process beyond the mediastinal fiber;
- ✱ destructive-inflammatory, the hallmark of which is the development of inflammatory destruction of hollow tubular formations located in the mediastinum and associated with it cellular spaces;
- ✱ systemic.

Pleural empyema. This complication is very common, especially in secondary purulent mediastinitis [27]. The mechanism of development of pleurisy can be different. Perhaps primary infection of the pleura with simultaneous perforation of the esophagus and mediastinal pleura. Another option is to spread the process from the mediastinal fiber along the length. Finally, infection by the hematogenous and lymphogenous routes is possible. In practice, a combination of the last two mechanisms is probably possible. An essential point in the development of pleurisy is also a violation of the outflow of blood and lymph from the pleural sheets, due to compression of the infiltrated tissue of the mediastinum of the lymphatic ducts and unpaired and semi-unpaired veins (Figure-2).

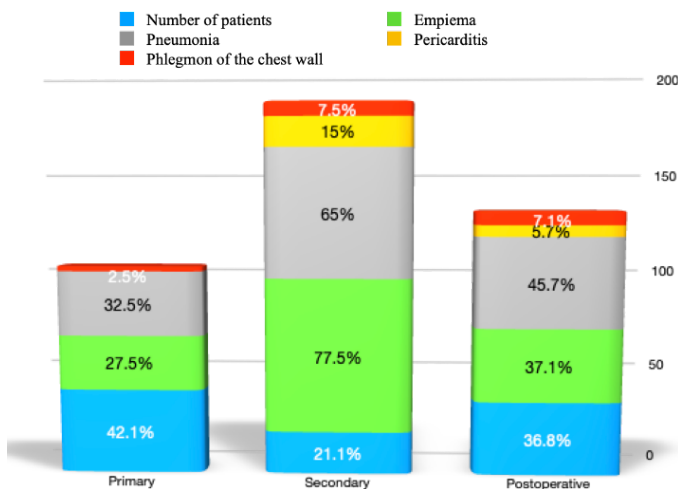


Figure-2. The frequency of inflammatory complications in patients with various forms of purulent mediastinitis

In almost 100% of cases, empyema developed with total and posterior lower mediastinitis. The course of this complication depended, first, on the adequacy of sanitation and drainage of the primary purulent focus and was, as a rule, long and torpid.

Pneumonia with mediastinitis usually develops due to aspiration against the background of hypostasis. In addition, the development of this complication as a septic metastasis by the lymphogenous and hematogenous

route is possible. The incidence of pneumonia in purulent mediastinitis is 34-45% (38.3% in our observations). The development of a lung abscess in a hospitalized patient with purulent mediastinitis (4-7% according to the literature data), in our opinion, should be regarded as a clear defect in patient management. The basis for the prevention of pneumonia and lung abscesses is a thorough sanitation of the tracheobronchial tree, achieved by the appointment of appropriate drugs, physiotherapy and therapeutic exercises, and, if necessary, repeated therapeutic bronchoscopy.

Pericarditis. In primary (perforative) purulent mediastinitis, pericarditis is observed infrequently, usually in the terminal stages of the process as the last manifestation of severe sepsis [2,6]. E.N. Popov [45] noted pericarditis in 11.8% of patients with traumatic mediastinitis; we did not observe them in our practice. With secondary (contact) purulent mediastinitis, pericarditis is quite common; the frequency of their development, according to some data, reaches 44% [13], and in our observations - 15%. The pericardial effusion is usually infected. The rapid accumulation of effusion can lead to the development of cardiac tamponade and death [5].

Clinical manifestations of pericarditis are often lost against the background of the general serious condition of patients; weakening of cardiac tones in purulent mediastinitis is often observed in the absence of pericarditis [8]. Therefore, the only way to timely diagnose this complication is through mandatory repeated X-ray and echocardiographic studies. The development of pericarditis was usually observed in the second week of the postoperative period, against the background of a relative stabilization of the patient's condition.

Retroperitoneal phlegmon. Rarely observed in the terminal stages of the disease. Vaideeswar R. and Tandon S.P. reported the development of retroperitoneal phlegmon with purulent mediastinitis in a patient with HIV infection [61]. In our observations, we noted 2 cases of the spread of pus into the retroperitoneal space, one of which was detected during surgical interventions, and one - only during post-mortem examination. In both cases, the cause of purulent mediastinitis was Boerhaave's syndrome.

Based on these observations, we consider it necessary to conduct ultrasound examination of the retroperitoneal space in patients with spontaneous rupture of the esophagus before surgery, and during surgery, a thorough revision of the diaphragm to identify possible leakage of the mediastinal abscess through its natural openings.

Vertebral osteomyelitis. Reports of the development of this complication relate mainly to the pre-antibiotic era. B.S. Rozanov [48] reported 12 observations of vertebral osteomyelitis over 30 years of work in this field, noting lesions only in the cervical spine. Of these 12 patients, 8 died, and the direct cause of death was the breakthrough of the abscess into the spinal canal with the development of cerebrospinal meningitis. M.A. Podgorbunsky and T.I. Schraer [43] described a case of the development of osteomyelitis of the bodies of 7-8 thoracic vertebrae, which ended in recovery with the formation of a slight kyphosis. In modern publications, damage to the vertebrae and intervertebral discs in purulent mediastinitis is described extremely rarely [21], we have not observed such cases (Figure-3).



Figure-3. Purulent mediastinitis is complicated by phlegmon of the neck and osteomyelitis of the vertebrae

Phlegmon of the chest wall in patients with purulent mediastinitis usually develops in connection with the provision of surgical assistance by thoracotomy access [11]. A prerequisite for the development of this complication is inadequate sanitation and drainage of the mediastinum and pleural cavity; improper wound care and drainage; untimely diagnosis and surgical intervention for suppuration of the postoperative wound. The frequency of this complication in our observations was 5.3% (Figure-4).

Arrosive bleeding. The development of a severe purulent-destructive process in the cellular spaces of the neck and mediastinum in a number of patients leads to erosion of the walls of large vessels. The resulting bleeding is often the end of the disease. There are two direct reasons for the development of arrosive bleeding in the postoperative period - this is inadequate sanitation and drainage of the purulent focus and defects in the installation of drainage (adverse trophic effects due to direct contact of the drainage with the vessel wall).



Figure-4. Anterior upper mediastinitis, complicated by phlegmon of the chest wall

With anterior purulent mediastinitis that develops after interventions on the heart and blood vessels, bleeding is observed from the vessels and parts of the heart that were directly subjected to surgery - the aorta, the right ventricle, autovenous graft [10, 20, 49]. With descending mediastinitis, bleeding from vessels located in the neurovascular bundle of the neck, internal jugular vein, and common carotid artery is observed [31]. Cases of arrosive bleeding from the brachiocephalic trunk, thyroid and intercostal arteries are described [11, 48, 58], etc. Despite the supercritical situation, cases of successful treatment of purulent mediastinitis after surgical arrest of bleeding are described, although in most patients' fatal relapses are observed after the primary arrest of bleeding [4, 48].

Of the 8 arrosive bleeding observed by us, in 3 cases the source of bleeding was the internal jugular vein, in 2 - the common carotid artery, in 2 - the aorta. In another 1 patient, the source of bleeding remained unclear (the bleeding was stopped by tamponade of the wound, the patient subsequently recovered). 6 (75%) patients died.

Prevention of the development of arrosive bleeding consists in observing the rules for installing drainage (without contact with blood vessels) and in the implementation (if necessary) of staged sanitation of the purulent cavity after the initial surgical intervention.

Arrosive lymphorrhoea. Lymphorrhoea due to arrosion of the thoracic lymphatic duct is occasionally observed in both primary and secondary purulent mediastinitis [40].

Arterial-venous fistulas. In the literature there are isolated reports of the development of this complication. M. King [31] described the development of an aortocaval fistula in subdiaphragmatic progression of purulent mediastinitis.

Esophageal-aortic fistulas. In the world literature there are descriptions of several dozen cases of development of aorto-esophageal fistulas with purulent mediastinitis with single reports of successful surgical treatment.

Esophageal, tracheal and bronchial fistulas. As described above, traumatic defects of the esophagus, trachea, bronchi are one of the reasons for the development of purulent mediastinitis. With purulent mediastinitis that has developed due to other causes, it is possible to spread the necrotic process to the walls of hollow organs, leading to the formation of various fistulas (esophageal-tracheal, esophageal-pleural, esophageal-bronchial, esophageal-mediastinal, etc.) [51, 54], secondary to purulent inflammation of mediastinal tissue. The development of this complication, of course, worsens the prognosis of the disease, but still is not fatal (Figure-5).

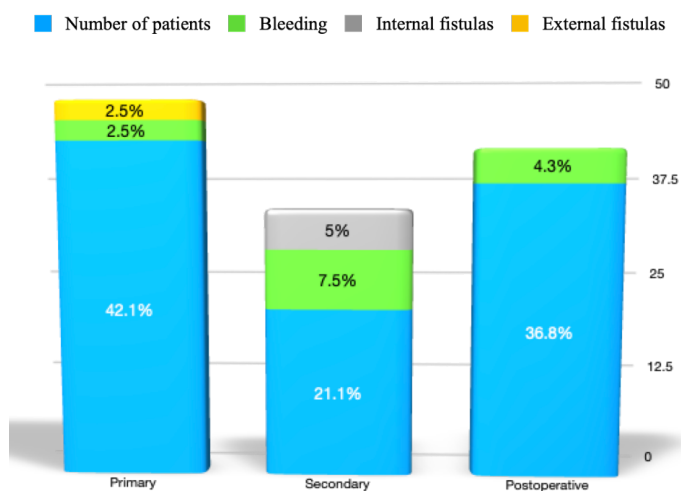


Figure-5. Frequency of destructive-inflammatory complications in patients with various forms of purulent mediastinitis

Van Straalen N. C. et. al. [62] The development of a fistula of the left main bronchus in a patient with odontogenic purulent mediastinitis was observed. J. Fukada and M. Inaoka [22] described the successful treatment of a patient with descending necrotizing mediastinitis complicated by the development of a fistula of the right main bronchus. During the operation, the bronchial defect was eliminated by a patch of m. latissimus dorsi on the leg.

In our own practice, we observed a case of a patient with odontogenic mediastinitis developing a fistula between the esophagus and the right main bronchus, which closed on its own during treatment.

External fistulas of the esophagus. In the literature, there are isolated descriptions of such complications in purulent mediastinitis that developed after perforations

of the esophagus [43]. Such fistulas are of no significant importance; with a favorable course of the disease, they close on their own with the development of a traction diverticulum (Figure-2) at the site of perforation.

Systemic complications. The criterion for the presence of sepsis according to the decisions of the Conciliation Conference of the American Society of Pulmonology and the Society for Critical Care Medicine (Chicago, 1991) is the presence of a combination of a clinically identified or confirmed microbiologically focused infection (the presence of bacteremia is not necessary!) and a systemic inflammatory response.

The criterion for the presence of a systemic inflammatory reaction, in turn, is the presence of at least three of the following symptoms:

- body temperature above 38° or below 36° C;
- heart rate more than 90 per minute;
- respiratory rate more than 20 per minute;
- the number of leukocytes in peripheral blood is more than 12.000 in 1 mm or less than 4.000 in 1 mm (or at least 10% of immature cells).

The concept of severe sepsis implies a combination of the above symptoms with manifestations of organ dysfunctions, perfusion disorders and arterial hypotension (i.e., multiple organ failure syndrome). The persistence of arterial hypotension, despite adequate infusion therapy and the need for inotropic support, is a criterion for diagnosing septic (infectious-toxic) shock [47].

The incidence of laboratory-confirmed bacteremia was low - 3.7% (according to the literature data - 6 - 7% [68]). We did not observe the development of distant purulent foci (outside the chest and out of connection with the main purulent foci). In the literature, we know the only description of the development of a brain abscess in purulent mediastinitis [50].

Severe forms of sepsis, characterized by the development of multiple organ failure syndrome, with common forms of purulent mediastinitis are according to Temes R.T. et. al. over 50% [57], among our patients (at the time of admission) they amounted to 42.1%.

Data on the frequency of detection of organ dysfunctions in severe forms of sepsis in the patients observed by us are presented in figure-6.

The development of the classical picture of infectious-toxic shock is observed in the fulminant form of the course of purulent mediastinitis and in cases of prolonged inadequate treatment of purulent mediastinitis. The prognosis in such cases is doubtful.

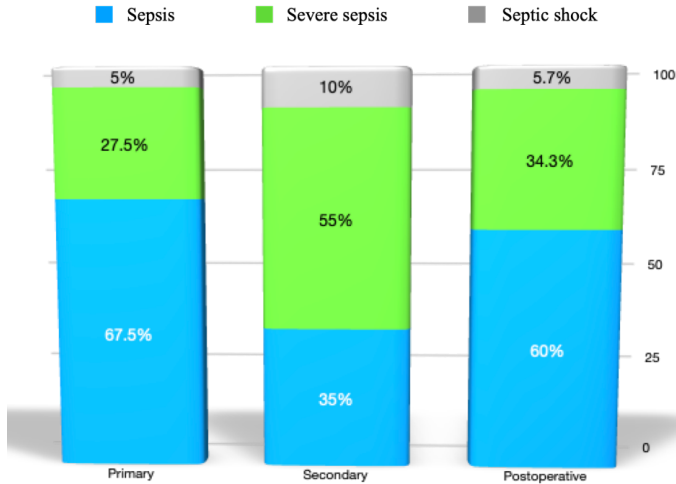


Figure-6. Variants of the course of the systemic inflammatory reaction in patients with various forms of purulent mediastinitis (at the time of diagnosis)

With purulent mediastinitis, all possible systemic thrombohemorrhagic complications are often observed (figure-7).

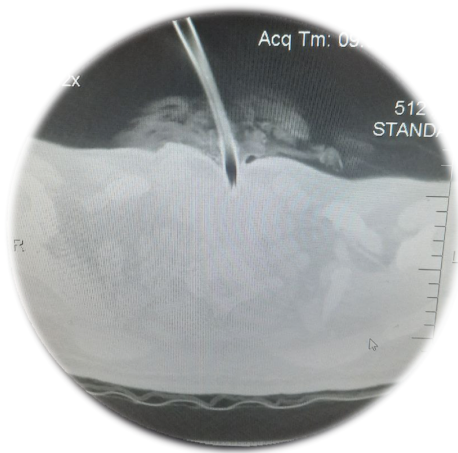


Figure-7. Thrombosis and infiltration of mediastinal tissues

There are cases of the development of local venous thrombosis of the jugular veins, iliofemoral segment, etc. [35].

In patients with descending necrotizing mediastinitis, there are cases of clinically advanced disseminated intravascular coagulation syndrome. In our own practice, we had to observe such patients three times, in two cases the patients were saved.

Gastrointestinal bleeding stands somewhat apart, the cause of which, along with violations of the system of regulation of the state of aggregation of the blood, is also

negative vagal tropic effects on the gastric wall. Even M.A. Podgorbunsky and T.I. Schraer [43] pointed to the relationship between the lesion of the vagal trunks and the development of complications from the stomach in purulent mediastinitis - erosions and acute ulcers.

The incidence of gastric erosion and acute ulcers in patients with purulent mediastinitis is very high - up to 50% and above. Profuse gastric bleeding is rare but poses a very serious danger. J. Moser et al. lost 1 out of 2 patients with purulent mediastinitis who had gastric bleeding in the postoperative period [34].

Of the 34 patients with purulent mediastinitis observed by us, who underwent endoscopic examination of the upper gastrointestinal tract in the postoperative period, acute ulcerations were detected in 7 (20.6%) patients, erosion - in 17 (50%) patients. We encountered profuse gastric bleeding from acute ulcerations twice. In both cases, this complication was managed to cope with conservative measures.

The high probability of gastric bleeding makes it mandatory to include gastroprotective drugs in the complex therapy of patients with severe forms of purulent mediastinitis.

Monitoring of patients with purulent mediastinitis in the postoperative period. The high incidence of serious complications causes the rigidity of the requirements for the management of the postoperative period and postoperative monitoring in patients with purulent mediastinitis. The program of dynamic observation is based on the characteristics of the course of the postoperative period in this patient and the probabilistic timing of the development of complications.

Our experience in the treatment of patients with various forms of purulent mediastinitis allowed us to formulate general principles of monitoring in the postoperative period.

Organizational issues. The need for the patient to stay in the intensive care unit ranges from 2-3 days to 2-3 weeks. For the same period, it is necessary to organize an individual nursing post. The criteria for the effectiveness of the organization of care is the absence of maceration of the skin in the places of drainage, bedsores and complications caused by hypostasis.

Control of vital functions. Continuous monitoring of the electrocardiogram, blood pressure, heart rate, blood oxygen saturation, central venous pressure, as a rule, is necessary only in the immediate postoperative period. In the future, it is enough to fix the indicators of central hemodynamics 4-6 times a day.

Control of water and electrolyte balance. The functioning of at least one flow-aspiration system in patients requires a particularly strict account of the amount of fluid injected and lost. Determination of the level of blood electrolytes and indicators of acid-base balance in the first 7-10 days should be carried out daily for the timely correction of the infusion therapy.

Nutritional status control. Objective criteria for the effectiveness of correction of nutritional status are the rate of weight reduction of the patient and the level of total protein and plasma albumin. These indicators should be determined in the first 10 days of treatment daily, then 1 time in 2-3 days.

Monitoring the state of the system of regulation of the aggregate state of blood. Among other problems of postoperative monitoring of patients with purulent mediastinitis, monitoring the state of the system of regulation of the aggregate state of blood deserves special attention due to the high incidence of life-threatening thrombohemorrhagic complications.

Coagulography and determination of paracoagulation products are performed daily during the first 3-5 days of the postoperative day, in the future - depending on the course of the disease. It should be borne in mind that the value of laboratory parameters against the background of massive infusion-transfusion therapy may be distorted. Therefore, the results of these studies should always be correlated with the data of the clinic.

Microbiological control. The high probability of changes in the microbial landscape during the disease makes it necessary to conduct multiple studies of wound discharge (in the presence of several wounds - from each separately) with the mandatory use of media that allow the culture of anaerobic pathogens and representatives of fungal microflora.

Control of the course of the purulent process. The main parameters that make it possible to assess the course of the purulent process in the mediastinal tissue, and to make an appropriate correction to the treatment program, is the amount and nature of the discharge through the drains. So, if the discharge is too thick, we increase the amount of injected washing solution. The absence of a decrease in the amount of wound discharge and the preservation of a high content of detritus for 2-4 days after surgery is a sign of inadequate sanitation or (with necrotizing fasciitis) a progradient course of the process. As a rule, in such cases, there is an increase in the severity of the patient's condition, both in clinical and laboratory parameters.

A very alarming indicator is the appearance of hemorrhagic impurities in the wound discharge. When the drains are in the immediate vicinity of large vessels, this can serve as a harbinger of arrosive bleeding due to the adverse trophic effect of the drainage tube and / or the progression of the purulent-necrotic process.

In the event of such situations, we use techniques that allow us to directly assess the course of the purulent process in the mediastinum - video mediastinoscopy or ulnerography. Based on the results of these studies, a decision is made on the advisability of additional measures - repeated intervention (open or video-assisted endoscopic), correction of the position of drains, etc.

Early detection of complications. The initial clinical manifestations of developing complications in patients with mediastinitis are often difficult to grasp due to the significant severity of the general condition. Therefore, diagnostic studies for the early detection of complications should be carried out in a planned manner. The choice of research methods is determined by the incidence of complications and their significance. Since the most common complications in patients with purulent mediastinitis are pulmonary and pleural X-ray examination of the chest organs in the first 7-10 days should be carried out daily, in the future - at least 1 time in 2-3 days. Echocardiographic examination for the purpose of early detection of myocarditis and pericarditis in the initial period of the disease should be carried out 1-2 times a week. On the 5th-6th day after the operation, we perform an endoscopic examination of the stomach, with the main goal of monitoring the condition of the mucous membrane due to the high risk of erosive gastric bleeding. Other diagnostic tests are carried out according to indications.

Thus, the treatment of patients with purulent mediastinitis in the postoperative period can reduce the incidence of postoperative complications and thereby improve the results of treatment. Reducing the incidence of purulent mediastinitis and a significant improvement in treatment results is possible only with the implementation of a set of organizational measures, including: with the creation of a system of operational monitoring of patients, on the organization of the system of training and advanced training of specialists, on the preparation and approval of regional standards of examination and protocols for the management of patients, with the creation of specialized care groups as part of regional medical-advisory and organizational-methodological centers, organization of the system of

interaction of regional centres with medical institutions of the 1st and 2nd levels, on the one hand, on the one hand, and with federal head institutions, on the other.

Ethics approval and consent to participate - All patients gave written informed consent to participate in the study.

Consent for publication - The study is valid, and recognition by the organization is not required. The author agrees to open the publication.

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**YIRINGLI MEDIASTINIT BILAN OG'RIGAN
BEMORLARNI AMALIYOTDAN SO'NGGI
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ABSTRAKT**

Ushbu maqolada biz yiringli mediastinit bilan og'rilgan bemorlarni postoperativ davrda davolash bo'yicha zamonaviy ma'lumotlarni taqdim etdik. Yiringli mediastinit o'tkir xirurgik patologiyaning nihoyatda og'ir va hayot uchun xavfli shakli bo'lib qolmoqda, uning tarqalishi ko'p yillar davomida o'rtacha aniq ko'rsatkichli moyillik bilan barqarorligicha qolmoqda. Yiringli mediastinit bilan og'rigan bemorlarda salbiy natijalarning asosiy sababi jarrohlik aralashuvlarining o'z navbatida diagnostika xatolari tufaylidir. Taklif etilayotgan standartlardan foydalanish oddiy klinik holatlarda mediastinal to'qimalarning yiringli yallig'lanishida gumon qilingan bemorlarni tekshirish yiringli mediastinitni tashxislash vaqtini kamaytirishi mumkin. Yiringli mediastinit bilan og'rigan bemorlarda operatsiyadan keyingi davrni kuzatish tizimidan foydalanish, yuzaga kelganda operatsiyadan keyingi asoratlarni erta aniqlashni ta'minlash imkonini beradi. Yiringli mediastinit bilan og'rilgan bemorlarga tibbiy yordam ko'rsatishni tashkil etish tamoyillarining amal qilishi yiringli mediastinitda gumon qilingan bemorlar uchun ixtisoslashtirilgan shifoxonaga murojaat qilish chastotasini oshirish va natijada ushbu kasallikning erta tashxis qo'yish chastotasini oshirish imkonini beradi.

Kalit so'zlar: Yiringli mediastinit, operatsiyadan so'nggi davrda bemorlarni davolash, yiringli mediastinitning operatsiyadan so'nggi asoratlari.

**ВЕДЕНИЕ БОЛЬНЫХ ГНОЙНЫМ
МЕДИАСТИНИТОМ В
ПОСЛЕОПЕРАЦИОННОМ ПЕРИОДЕ**

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В данной обзорной статье мы представили современные данные о лечении больных гнойными медиастинитами в послеоперационном периоде. Гнойный медиастинит остается крайне тяжелой и жизнеугрожающей формой острой хирургической патологии, распространенность которой на протяжении многих лет остается стабильной с умеренно выраженной тенденцией к нарастанию. Основной причиной неблагоприятных исходов у больных гнойными медиастинитами является несвоевременность выполнения оперативных вмешательств, обусловленная в свою очередь диагностическими ошибками на всех этапах оказания медицинской помощи. Использование предлагаемых стандартов обследования больных с подозрением на гнойное воспаление клетчатки средостения в типичных клинических ситуациях позволяет сократить сроки диагностики гнойных медиастинитов. Использование системы мониторинга течения послеоперационного периода у больных гнойными медиастинитами позволяет обеспечить раннее выявление послеоперационных осложнений в случае их возникновения. Реализация принципов организации оказания медицинской помощи больным гнойными медиастинитами позволяет увеличить частоту направления в специализированный стационар больных с подозрением на гнойный медиастинит и, как следствие, увеличить частоту ранней диагностики данного заболевания.

Ключевые слова: Гнойный медиастинит, введение больных в послеоперационном периоде, послеоперационные осложнения гнойного медиастинита.