

Difficult Aspects of Treatments Patients With Acute Lung Abscesses Who Survived COVID -19

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Abstract

Suppurative diseases of the lungs are topical issues of pulmonology that require detailed study due to the difficulties of diagnosis and high mortality of patients. This is due to several objective and subjective reasons such as the widespread use of antibiotic-resistant microflora, which is especially important when antibiotics are prescribed unreasonably, even with a mild form of COVID – 19. This, of course, affects COVID patients, who already have reduced immunity. The question of the exact mechanism of development of purulent complications of the lungs after or during infection with COVID – 19 remains open. Clinical and radiological signs of a lung abscess often resemble the symptoms of pneumonia; however, antibacterial, and symptomatic therapy have differences. With gangrene of the lung, the increase in intoxication syndrome can be gradual, which reduces the doctor's alertness regarding the most severe disease and causes inadequate therapy. Comprehensive diagnostic measures, knowledge of the main clinical, instrumental and laboratory parameters are necessary for all physicians.

Introduction

Among patients with acute purulent-destructive lung diseases (APDLLD), the most severe in terms of course and prognosis are patients with abscesses and gangrene of the lungs [5].

Despite advances in the technique of surgical operations and the use of powerful antibacterial and antiseptic agents of new generations, mortality in this category of patients remains high. So, according to various clinics, in patients with lung abscesses, it ranges from 10 to 35% [13], with gangrene of the lung, empyema and sepsis against the background of phlegmon of the soft tissues of the chest, it varies from 30–90% [5].

An important role in high mortality is played by progressive endotoxemia, which causes the development of multiple organ and multisystem failure [2,3,6–8]. At the same time, the traditional conservative treatment of APDLLD is ineffective and often ends in death.

According to the data of our clinic in 2005–2010, conservative treatment was successful only in 64.4% of patients, of which complete recovery occurred in 4.5%, clinical - in 27.4%, the process turned into a chronic form in 43.6%; mortality was 24.5%. Mortality after surgery reaches 34.5% [5].

Material And Research Methods

From 2011 to 2017 In the Republican Center for Purulent Surgery of the Ministry of Health of the Republic of Uzbekistan, 265 patients with acute abscesses and gangrene of the lungs were treated, in which we used various methods of treatment depending on the age, severity of the patient's condition, the course and localization of the suppurative process.

In 89 (33.6%), the disease was complicated by pleural empyema or pyopneumothorax. Gangrenous abscesses and gangrene of the lungs were present in 84 (31.7%) patients: widespread gangrene - in 9,

limited gangrene (gangrenous abscess) - in 75. The overall mortality in the group of patients with APDLLD was 8.3% (22 patients died): among the dead, 14 had pleural empyema and pyopneumothorax, and 8 had gangrene and gangrenous abscesses (1 of them after lung resection due to pulmonary hemorrhage). All deceased patients were admitted to the clinic with severe purulent intoxication and respiratory failure, the severity of the condition was so pronounced that most of them died 1–3 days after admission to the hospital. The deceased patients more often had such concomitant diseases and complications as an extensive bilateral process in the lungs (6), pulmonary hemorrhage (3), extensive phlegmon of the chest and severe sepsis (3), less often – cor-pulmonale, extensive bedsores, myocardial infarction, sugar diabetes.

It should be noted that all patients before admission to the center were treated in therapeutic clinics, where intensive antibiotic therapy was carried out for 1–3 weeks. Despite this, abscess formation occurred, and patients were often admitted in an extremely serious condition, with severe purulent intoxication.

All of them needed more effective methods of treatment.

Results And Discussion

Diagnosis of APDLLD was based on the data of clinical, laboratory and microbiological studies, on the results of polypositional X-ray examination, fiberoptic bronchoscopy. Computed tomography and abscessography (transthoracic injection of water-soluble X-ray contrast preparations into the destruction cavity) were used to clarify the phase of formation of foci of destruction and to identify pulmonary sequesters.

Staphylococcus was sown in the crops of 27% of the patient, streptococcus in 20%, Escherichia coli in 19%, Proteus in 18%, Pseudomonas aeruginosa in association or monoculture in 7.2%, non-pathogenic bacteria in 2.1% and 6, 7% - bacterioids.

Antibiograms revealed a low sensitivity of staphylococcus to penicillin and streptomycin, which are most often used to treat pulmonary destruction preceding complications. So, in 19 cases out of 60, the microflora was sensitive to streptomycin, in 18 - to penicillin. The highest sensitivity was observed to klaforan – 44, gentamicin and kanamycin – 42, chloramphenicol, ampicillin, and methicillin – 34, polymyxin – 7.

The general direction of treatment of patients with acute purulent-destructive lung diseases was complex intensive therapy. Operative interventions were performed according to strict indications.

When choosing a treatment method, we considered the severity of the disease (Marchuk indices, Kitamura SL index, SAPS, Glazko scale), the nature of the pathological process and its localization (peripheral and central location of the decay site, the presence or absence of a breakthrough into the pleural cavity), and the sensitivity of the flora to antibiotics.

The main task in the treatment of acute lung abscesses is the most rapid evacuation of purulent contents from the abscess cavity, which helps to reduce perifocal infiltration, restore full bronchial drainage and obliteration of the cavity [14].

One of the methods of treatment to solve this problem is transthoracic drainage of the abscess cavity. Such drainage allows you to quickly evacuate pus from the cavity, carry out its constant sanitation through drainage, which leads to the elimination of an acute inflammatory process in the abscess cavity and the surrounding lung tissue. The main indications for the use of this method were large single abscesses located subcortically. Complete recovery occurred in 35 (50.7%) of 69 patients. Clinical recovery with an outcome in a dry residual cavity was observed in 23 (33.3%) patients. 7 (10.1%) patients underwent radical surgery.

The lack of effect from conservative therapy most often depends on inadequate endobronchial sanitation of the abscess cavity. In such cases, we used microtracheostomy with a catheter inserted into the bronchus, a draining abscess, and washing the abscess cavity with chlorhexidine detergent solutions (1:10,000).

Microtracheostomy is indicated for welldrained pulmonary abscesses of any location.

This method was used in 23 (8.6%) patients. 13 patients (56.5%) recovered completely, 9 patients (39.1%) were discharged with dry residual cavities, 1 patient (4.3%) was operated on due to pulmonary bleeding.

Most bronchopulmonary diseases are of a primary segmental nature; therefore, the pathological process in the lung tissue is accompanied by varying degrees of damage to the draining bronchi [5]. In these cases, we consider segmental bronchial catheterization indicated. It was performed in 33 (12.4%) patients. In all cases, segmental bronchial catheterization was combined with endobronchial sanitation. In this group of 33 patients, 17 (51.5%) recovered, 11 (33.3%) had dry cavities, 2 (6.1%) died, 3 (9.1%) patients underwent radical surgery.

The intra-arterial method of drug administration has several advantages over others because it makes it possible to deliver the drug to the affected organ in a short time and in a higher concentration [1,9–12].

To achieve the maximum concentration of administered drugs in the focus of inflammation, 78 (29.4%) patients, upon admission to the hospital, underwent angiographic transfemoral access to install an intra-arterial catheter at the orifice of the bronchial artery (with a unilateral process) or the aortic arch (with a bilateral process) with a long-term intra-arterial catheter therapy for 4–6 days. Treatment included intra-arterial bolus administration of antibacterial drugs in 2–3 combinations; correction of disorders of the non-gas exchange function of the lungs [1,16]: intra-arterial administration of protein-synthetic amplification agents (albumin, alvesin + retabolil) with simultaneous intravenous administration of esterified fat preparations, oral administration of polyene or polyene-ext 150 mg per day, refractory fats, 40% ethyl alcohol; stimulation of the body's immune forces was also carried out – the introduction of freshly citrated blood, antistaphylococcal plasma, anti-staphylococcal gamma globulin, staphylococcal

toxoid, protease inhibitors (kontrykal, gordox); regional intra-arterial anti-inflammatory therapy (prednisolone); correction of electrolyte metabolism; detoxification (hemodez, gelatinol); anticoagulant (fraxiparine) and antiplatelet (rheopolyglucin, trental, etc.) therapy.

Cephalosporins (ceftriaxone, lendacin, fortum, rocephin) and aminoglycosides (amikacin, amikin, gentamicin, netromycin) were administered intra-arterially in maximum shock doses on the first day, respectively, because bactericidal action could be achieved at a concentration of the antibiotic in the blood, 2–4 times higher than the average therapeutic [4]. To date, the undoubted role of non-clostridial anaerobic microorganisms in the development of pulmonary destruction [5], therefore, we used metronidazole (metrogil, efloran, klion) intra-arterially up to 3000 mg per day.

We used this method in patients: 1) with a progressive course of lung gangrene and pronounced purulent intoxication; 2) with widespread gangrene of the lung; 3) with central localization of the abscess.

Out of 78 (29.4%) patients, 52 (67.6%) recovered, 7 (9%) had dry cavities, 2 (2.6%) patients died from progression of sepsis, 7 (9%) were operated on. remissions.

Pulmonary destruction complicated by pyopneumothorax or pleural empyema can proceed according to the pleural or pleuropulmonary type [5,16,18]. The pleural type is observed with subpleural abscesses that do not communicate with the bronchial tree. If such reports did occur, then after emptying into the pleural cavity, the abscess subsides and heals with the development of focal fibrosis during treatment, the further course of the disease is mainly determined by pleural empyema [5].

Therefore, treatment should be aimed at eliminating pleural empyema.

The pleuropulmonary type of complicated lung destructions has a more severe course, since pyopneumothorax or pleural empyema are supported by the main process, treatment in this case is aimed at active sanitation of the tracheobronchial tree, abscess cavity and purulent process of the pleura [15,17,18].

Treatment of pleural complications of OHDL was started with a diagnostic pleural puncture followed by one of two closed drainage methods. We agree with the authors who believe that indications for drainage should be expanded in comparison with punctures [18,19]. In this regard, we replaced the puncture treatment with microthoracocinthesis, which is performed according to the Seldinger method after the primary puncture of the pleural cavity. Microdrainage of the pleural cavity was performed by us with limited, unstressed pyopneumothorax and pleural empyema containing odorless liquid pus, with a tendency to cleanse and reduce the purulent cavity; bronchopleural fistulas of small size during treatment are closed with fibrinous pleural overlays.

Indications for closed macrodrainage were intense pyopneumothorax, the presence of more than 200–300 ml of thick pus, severe intoxication, and the ineffectiveness of microthoracocinthesis within 2–3 days.

For the sanitation of the pleural cavity, an ozonized 0.9% solution of sodium chloride was used (in the absence of a bronchopleural fistula), an electrolyzed solution of sodium hypochlorite at a concentration of 0.08–0.15 mg/l, 0.1% dioxidine with water-soluble ointments (levamikol, dioxicol).

Out of 70 (26.4%) patients, only 11 (15.7%) patients managed to cure pleural empyema with microthoracocinthesis. 59 (84.3%) patients underwent closed macrodrainage of the pleural cavity with a double-lumen silicone tube of the TMMK type with an outer diameter of 0.5-1.0 cm, of which 4 (6.8%) underwent double closed drainage with constant drip irrigation of the pleural cavity with solutions sodium hypochlorite at a concentration of 0.08 mg/l through the upper tube with active aspiration through the lower tube. A double lumen tube is useful for limited pleural empyema.

Continuous irrigation of the pleural cavity with ozonized 0.9% sodium chloride solution is possible only in the absence of a bronchopleural fistula. Out of 59 (84.3%) patients who underwent closed drainage with active aspiration, clinical recovery was achieved in 52 (88.1%).

We believe that closed drainage with active aspiration, if it does not give a complete cure, then helps to limit empyema in its total form with the formation of pleural adhesions around. This prevents lung collapse during open drainage of the empyema cavity. In 7 (11.9%) patients, sanation and reduction of the empyema cavity were achieved by closed drainage, which was a preoperative preparation for pleurectomy and decortication. One of the complications of closed drainage is phlegmon of the soft tissues of the chest wall, 1 (1.7%) patient with this complication underwent open drainage.

Given our experience, we have completely abandoned mutilation operations such as pneumotomy. Indications for lung resection in acute abscesses are massive bleeding that is not amenable to conservative measures (including acute embolization of the bronchial artery on the affected side and paralon obstruction of the regional bronchial segment), treatment failure for more than 2 months, i.e. almost in the chronic stage.

Conclusions

1. Treatment of APDLLD should be differentiated and complex.
2. An effective treatment for APDLLD is the local use of high doses of antibacterial drugs through long-term selective intra-arterial catheter therapy.
3. In case of pleural complications of APDLLD, the indications for drainage should be expanded:
 - microdrainage of the pleural cavity is effective for limited, non-tense pyopneumothoraxes and pleural empyemas containing odorless liquid pus, with a tendency to cleanse and reduce the purulent cavity;
 - indications for closed macrodrainage are intense pyopneumothorax, the presence of more than 200-300 ml of thick pus, intoxication;

4. Lung resection in acute abscesses cannot be considered justified and is permissible only for special indications (bleeding, ineffectiveness of all non-operative methods of treatment for more than 2 months).

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