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Surgical treatment of patients with purulent descending mediastinitis

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Abstract

Purpose: To improve the treatment outcome of patients with purulent descending mediastinitis.

Materials and methods: During 2000-2018, 170 patients with a low neck phlegmon were examined and treated in 170 patients with thoracic surgery in the Ivano-Frankivsk Regional Clinical Hospital, of which 97 (57.1%) without penetration of purulent infection in the mediastinum, in 73 (42.9%) neck phlegmon was complicated by the development of the purulent descending mediastinitis.

Research results: Intramediastinal administration of antibacterial agents was used in 33 (19.4%) patients. Purulent process was eliminated at the stage of neck phlegmon in 30 (90.9%) patients, development of purulent descending mediastinitis were observed in 3 (9.1%) patients. In conducting the through cervical drainage of abscesses of the mediastinum, repeated surgical intervention were used in 15 (50%) patients. When using the video-assisted thoracoscopy, simultaneously with the trans cervical drainage, we managed to reduce the number of repeated surgical intervention from 50% to 11.1%.

Conclusions

1. The primary task in surgical treatment of patients with purulent descending mediastinitis should provide adequate disclosure and drainage of the causes of purulent infection on the neck.
2. The use of intramediastinal administration of antibacterial agents can prevent the spread of purulent infection from interfascial nicks in the mediastinum. By using this technique, we managed to reduce the incidence of infection from 50.7% to 9.1% of cases.
3. The cervical drainage of mediastinal abscesses, was not always ensure the effective elimination of purulent process. The use of additional surgical intervention should be with the slightest signs of the spread of purulent process in lower mediastinum.
4. With the use of video-assisted thoracoscopy, simultaneously with trans cervical drainage, we managed to reduce the number of repeated surgical interventions from 50% to 11.1%.

Keywords: Mediastinitis, intramediastinal administration of drugs, surgical treatment of mediastinitis

Introduction

Acute purulent mediastinitis (APM) is one of the most severe forms of surgical infection [1]. Mortality in patients with APM is according to various authors from 17 to 80% [2, 3]. The severity of the flow of APM is due to the presence in the middle of the central sympathetic and parasympathetic nerves, important blood and lymph vessels. Mediastinum also intensively absorbs tissue breakdown products, which promotes the rapid development of severe intoxication [1, 4]. Given the negative pressure, the large number of lymph nodes and formations, the mediastinum has a high resorption activity, which leads to a rapid increase in the severity of purulent intoxication already in the first hours of the onset of the disease and, in most cases, determines its prognosis [5, 6]. Since the thoracic cavity contains vital organs, the spread of purulent process often occurs by contact, which leads to the development of severe complications, creating a direct threat to the life of patients [7]. One of the most severe forms of APM is purulent descending mediastinitis (PDM), which occurs when the purulent process spreads from the interfascial nicks to the mediastinum. The combination of neck phlegmon (NP) and PDM leads to the phenomena of severe endogenous intoxication. Sepsis is diagnosed in 45 - 100% of cases, syndrome of multiple organ failure - in 9 - 17% of cases [9]. Several authors believe that the key issues are bad blood supply to purulent mediastinum, which leads to not effective antibacterial therapy in the center of infection, namely in the mediastinum [10]. This prompts scientists to find new treatments that would provide the most effective antibacterial action in purulent mediastinum, provide for the permanent removal of purulent masses and adequate drainage and sanation of affected areas.

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Purpose: to improve the treatment of patients with purulent descending mediastinitis by intramedistinal administration of antibacterial agents.

Materials and methods: During 2000-2018, 170 patients with a low neck phlegmon were examined and treated in 170 patients with thoracic surgery in the Ivano-Frankivsk Regional Clinical Hospital, of which 97 (57.1%) without penetration of purulent infection in the mediastinum, in 73 (42.9%) neck phlegmon was complicated by the development of the purulent descending mediastinitis.

Of the 73 patients 47 (64.4%) were male patients and 26 (35.3%) women were 21-72 years old, with an average age of 41.3 ± 3.9 years.

The main causes of secondary APM were tonsilogenic NP, which we found in 30 (41.1%) of 73 patients, odontogenic NP - in 27 (36.9%), suppurated lymphadenitis - in 9 (12.3%), other causes - in 7 (9.6%) patients.

Among the 73 patients with PDM, the anterior-upper mediastinitis was diagnosed in 28 (38.3%) patients, the upper - was 20 (27.4%), the posterior - was 11 (15.1%), total - in 14 (19.2%).

X-rays used for diagnosis of the chest, ultrasonography, spiral computed tomography (SCT) tissues of the neck and mediastinum, and the fibrobronchoscopy, esophagogastroduodenoscopy.

Results of treatment and their discussion.

Surgical treatment of PDM directly depends on the type, the prevalence of purulent process in the mediastinum and the presence of complications.

Surgical treatment of the PDM includes:

1. Removal of the primary source of the disease.
2. Selection of surgical access to mediastinum.
3. Disclosure of all purulent areas of the mediastinum.
4. Remediation of affected areas.
5. Ensure the permanent removal of purulent masses from the mediastinum and thoracic cavity.

One of the first stages of surgical treatment of the PDM is to eliminate the source of the primary disease. This is achieved by the disclosure and drainage of the nasal cavities and faces, which were the direct cause of the PDM. The treatment of tonsilogenic NP and PDM should begin with the disclosure of paratonsillar abscesses. Treatment of odontogenic NP should begin with oral sanitation, tooth extraction, which is the cause of purulent process. A number of patients were transferred from other departments due to the fact that in the initial stages they were not provided with adequate surgical care. So, 24 (32.9%) patients were transferred from specialized departments, namely 14 (19.2%) from the department of maxillofacial surgery and 10 (13.7%) from the department of otolaryngology. In all patients had surgical tactics typical disadvantages, such as insufficient length of surgical approaches, inadequate sanitation and drainage of purulent lesions, not timely diagnosis of spread purulent process on the neck and mediastinum. The critical value for surgical treatment of the otolaryngology is the choice of surgical access to the mediastinum, which would involve the complete visualization of the affected areas of the mediastinum with the possibility of full disclosure and rehabilitation. Since the main cause of the development of the otolaryngology is the spread of NP in the mediastinum, one of the important factors is radical surgical treatment, which in the first place would

ensure the elimination of the cause of NP and PDM.

In diagnosed with deep NP, complicated by the PDM, all patients were operated. Surgical tactics in each individual case depended on the cause of abscess, localization, the ways of spreading on the interfascial gaps between the neck and mediastinum, the nature of suppurative defeat and the general condition of the patient. Surgical treatment began with the discovery of deep lesions and the drainage of its interfascial gaps. Taking into account the literature on the effectiveness of various surgical access in the treatment of NP, we applied forward-side cervicotomy according to I.I.Razumovsky, which was used in 152 (89.4%) patients. The cut of the skin was carried out along the anterior edge of m. sternocleidomastoideus from the level of the sublingual bone to the jugular cut. Polished m. platysma with a surface facial neck (fascia colli superficialis) and a surface leaf of its own fascia of the neck (fascia colli propriae and the second fascia of VN. Shevkunenko). Pushing the m. sternocleidomastoideus in the lateral direction were dissected by a parietal leaf fascia endocervicalis (a quaternary fascia of the neck according to VN. Shevkunenko) and penetrated into the center of the purulent-inflammatory center with the removal of purulent contents. The layering of the cellulose penetrates the gap between the trachea and the muscles of the anterior surface of the neck (m. Sternothyroideus, m. Thyrohyoideus). Pushing m sternocleidomastoideus in the lateral direction, we shift to the back the vascular-nerve bundle of the neck. Trachea, along with the thyroid gland, is displaced in the medial direction, stupidly straining around the esophageal retrosceral cellulose.

The skin, subcutaneous tissue and their own fascia were cut sharply, deepening in the neck of the penetrating penetrates the layers of blinding paths. The opening of deep interfascial nicks was carried out in layers according to the anatomical guidelines, which provides for adequate, widespread tissue exposure, careful revision of the lesion area (taking into account adjacent anatomical cases), control of the possible spread of infection, elimination of pus, maximum removal of obvious and non-obvious necrosis. To ensure full drainage "in a straight line" superstructures were applied, thick drainage polychlorinated tubes up to 1 cm in diameter, fine micririgators and rubber strips were applied.

Taking into account the high probability of the distribution of low NP in the mediastinum with the development of PDM, we have been offered an original method of intramediastinal administration of antibacterial agents (IMAA) (Patent of Ukraine №128808). The purpose of this method was: the creation of a zero or positive intramediastinal pressure to eliminate the suction action of the mediastinum, which prevents the spread of purulent infection from the neck in the mediastinum. Another important factor of the IMAA is the creation of an antibacterial barrier between the purulent area of the neck and mediastinum in order to prevent the spread of purulent infection in the mediastinum. Anti-bacterial agents and antiseptics were used for IMAA, which prevented the spread of infection, created local antibacterial action and separated the healthy mediastinum from the purulent cavity. The essence of the technique is as follows: after the completion of the disclosure of the phlegmon of the neck in the projection of the jugular cervical spine clearly in the middle line according to the method of V. Kazantsev, the introduction of a microcatheter by the Seldinger method into the mediastinum at the back surface of the sternum to a depth of 3-4 cm below the upper edge of the stern arm.

After introduction of a catheter by an intramedyastinal drip method we introduce a solution of antibiotics at a rate of 1.0 gram of antibiotic in 100-150 ml of isotonic saline solution for 2-3 hours. This volume of solution allows you to equalize the negative intra-thoracic pressure in the mediastinum and eliminate the suction action of the mediastinum. Given the lack of mediastinum in any of the fascial interference infusion during this time provides the spread of antibiotic throughout the mediastinal fiber, which creates a pronounced local antibacterial effect, which is confirmed by our research [8]. Such an injection of antibiotic solutions was performed 3-4 times a day alternating with the administration of antibiotics and antiseptics. From antibacterial preparations most often used solutions of cephalosporins 3-4 generations at a rate of 1.0 grams per single administration. From the antiseptics was used deka san.

IMAA was performed in patients with a low-level NP at the level of a jugular scissors. This method was used in 33 (19.4%) patients (the main group of patients). In this case, when applying the method of IMAA in 30 (90.9%) patients, purulent process was eliminated at the stage of NP without the spread of purulent process in the mediastinum. The development of PDM was observed only in 3 (9.1%) patients with low NP, in patients with overweight, with late hospitalization (more than 3 days from the onset of the disease) and with marked accompanying pathology (type II diabetes, ischemic heart disease). In the comparison group (137 patients), in whom this method was not used, NP spread to mediastinum in 70 (50.7%) patients.

Surgical tactics differed in patients with the spread of purulent infection in the mediastinum with the development of PDM. So, with the NP and development of the PDM, the main surgical access was cervicotomy on the side of the defeat with the disclosure of abscesses of the upper mediastinum. Through cervical drainage mediastinum is possible, if according to SCT data purulent process did not spread below the bifurcation of the trachea, which corresponds to Th4 - Th5 level. Disclosure and drainage of abscesses in the PDM only through the sewage access was carried out by us in 30 (41.1%) patients. The indications for the lateral cervicotomy and drainage of the PDM were the localization of the process above the bifurcation of the trachea. In this case, we did cervicotomy of the mediastinum along the purulent channels with the removal of pus and necrotic tissues under the control of vision. The operation was completed by drainage of mediastinum thick (up to 1.1 cm) drainage with perforated apertures and connected to an active aspiration system. The choice of quantity, location and length of drainage is determined directly during the operation. Drainages with this should be removed outside the main wound and do not adhere to the vascular-nerve beams. The distal end of the drainage is brought to the bottom of the wound, but it should be free to be at the lower pole of the purulent cavity. The number of drainages is determined by the number of wound channels, taking into account the ways of spreading purulent infection on the neck and mediastinum. In the spread of purulent channels to the base of the skull, one of the drainages set as high as possible, with the spread of mediastinum drainage installed along the entire length of the wound canal with lateral apertures. In order to run in the wound, channels were introduced into thin catheters for continuous washing of purulent cavities. The catheters were attached to the drip system, through which to inject solutions of antiseptics (decasan, chlorhexidine). The number of antiseptic solutions

was injected to 1 to 2 liters per day. In this case, the intake of antiseptics was carried out through irrigation catheters and the outflow occurred through drainage tubes.

The use of cervical lesions in the PDM is not always effective, since the lack of surgical intervention using classical instruments and the lack of visual control over surgical manipulations. This is associated with a large depth of the wounded channel from the cervical access, narrow space for manipulation and anatomically dangerous placement of important formations in the upper mediastinum. As a result, in 15 (50%) patients we were forced to conduct repeated surgical interventions (RSI) due to insufficiently effective opening of the abscesses through the cervical access and the spread of purulent-inflammatory process below the bifurcation of the trachea. At the same time, the highest number of RSI was observed in upper PDM due to non-radical opening of abscesses only through cervical access. Among the main methods of RSI were the thoracotomy on the side of the lesion - in 9 (60%) patients, the VATS with additional mediastinotomy and drainage of mediastinum and pleural cavity - in 5 (33.3%), bilateral thoracotomy - in one (6.7%) patient.

Taking into account the negative experience taking into account the high frequency of RSI in patients with PDM, we believe that it is more effective to carry out additional surgical interventions aimed at preventing the spread of purulent process. In this regard, 9 (32.2%) patients with upper-anterior PDM and 9 (45%) patients with upper PDM, with doubts about the efficacy of percutaneous drainage and suspicion of the prevalence of purulent process below the tracheal bifurcation, were performed concurrently with cervicotomy additional surgical intervention. Thus, 2 (7.1%) patients with upper-anterior PDM and 3 (15%) with VM had thoracotomy on the side of the lesion with additional disclosure of the mediastinal pleura. In all cases, an additional criterion for indications for thoracotomy was the presence of fluid in the pleural cavity according to radiographic findings of thorax and ultrasound of the pleural sinuses. In 3 (10.7%) patients with upper-anterior PDM and 4 (20%) with upper PDM, we conducted additional disclosure of the mediastinal pleura of the upper mediastinum using the PBX. Indications for the implementation of the VATS, as an additional method of surgical intervention in upper-anterior PDM and upper PDM, we consider:

1. Not enough effective disclosure of mediastinum by cervical access;
2. Suspicion of the spread of purulent process below the bifurcation of the trachea;
3. Presence of exudative pleurisy or empyema of the pleura;
4. Violation of the integrity of the mediastinal pleura during conduction through the cervical access of the mediastinum;
5. Distribution of purulent process in the posterior mediastinum.

Suspicion for the spread of purulent infection below the bifurcation of the trachea is possible in the detection of CKT available infiltration of mediastinal fluid below bifurcation, if it is not impossible to establish the limits of the spread of purulent infection with cervical access.

The presence of exudative pleurisy and pleural empyema in patients with upper-anterior PDM indicates the infection of the mediastinal pleura or the spread of infection in the posterior mediastinum with an outflow blockade in the system

of odd and semi-odd vein. We believe that this is a direct indication to additional surgical interventions, namely thoracotomy on the side of the lesion or the VATS to visualize the spread of purulent inflammation in the mediastinum with their sanitation and drainage, to fill a constant constant outflow of purulent exudates from the pleural cavity.

In violation of the integrity of the mediastinal pleura as a result of the cervical access of the mediastinum, infection occurs in the pleural cavity. Therefore, it is necessary to conduct a VATS for the diagnosis of damage, conducting additional mediastinotomy (if necessary), and the provision of drainage of mediastinum in the place of perforation in order to prevent the spread of infection and remove the exudate from the pleural cavity.

With the spread of purulent process in the posterior mediastinum there is a rapid development of abscesses in the lower mediastinal segments, since the posterior mediastinum has no anatomical barrier for the spread of purulent-inflammatory process. It was in the spread of purulent process in the posterior mediastinum that we observed the largest number of RSI - in 6 (40%) out of 15 patients. Therefore, we believe that the spread of purulent process in the posterior mediastinum is a direct indication to the VATS in order to prevent the spread of pus in the lower mediastinum and the development of the total PDM.

Thus, in the group, which used only trans cervical drainage of the abscesses of the mediastinum, RSI was used in 15 (50%) patients (upper-anterior PDM - 8, upper PDM - 7). When using the VATS at the same time with trans cervical drainage for upper-anterior PDM and upper PDM when we found the relevant indications, we managed to reduce the number of RSI from 50% to 11.1%. Only in 2 (11.1%) patients we were forced to apply RSI, namely, thoracotomy on the side of lesion in the spread of purulent-inflammatory process in the lower divisions of the mediastinum with the development of total PDM - in one patient, and to carry out an additional VATS from the opposite side with the appearance for the 4th day from the moment of the first operation of purulent exudate in the opposite pleural cavity.

Conclusions.

1. The primary task in surgical treatment of patients with purulent descending mediastinitis should provide adequate disclosure and drainage of the causes of purulent infection on the neck.
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