Surgical Treatment Tactics for Spontaneous Pnevmotoraxe

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ABSTRACT

Treatment results of 102 patients with spontaneous pneumothorax are presented. The cause of CP in 68 (66.6%) was bullous emphysema of the lungs, in 10 (9.8%) - rupture of the postpneumonic cyst, in 7 (6.9%) - breakthrough of the echinococcal cyst into the pleural cavity, and in 17 (16.7%) - by unknown circumstances. Pleural puncture was performed in 12 patients with apical and 5 patients with moderate pneumothorax. Active drainage of the pleural cavity was performed in 12 patients with medium pneumothorax. Video-assisted thoracoscopic surgeries (VTS) were performed in 58 (56.9%) SP patients. Video-assisted atypical lung resection and pleurectomy through miniaccess was performed in 8 (13,8%) cases. It was found out that pleural cavity drainage in CP remains the main tactical method of treatment. The surgery of choice is VTS elimination of the cause of CP and obligatory pleurodesis.

Keywords: spontaneous pneumothorax, surgical treatment, pleural cavity, lungs

Introduction. To date, one of the current problems of thoracic surgery is the tactics of surgical treatment of spontaneous pneumothorax (SP), as there are many reasons leading to this process: mainly it is a rupture of bullae, thin-walled cysts of the lung, echinococcal cysts in the pleural cavity and other pathological conditions in the lung, which can lead to rupture of lung tissue, air penetration into interpleural space and collapsing lung[1,4]. Establishing the distinction between primary, secondary, traumatic, and iatrogenic pneumothorax is important for determining treatment strategies, but the subsequent distinction between primary and secondary becomes increasingly blurred, as further investigation in patients with primary pneumothorax may reveal undetected undiagnosed pulmonary pathology [2, 10]. There is no unified tactics for the treatment of SP up to now. Proponents of conservative methods (pleural punctures with air aspiration, drainage) emphasize simplicity, availability, safety and cheapness of these methods. However, the results of conservative treatment cannot be considered satisfactory, since 10-30% of patients experience recurrence of SP. Surgical treatment is more effective, as evidenced by much lower recurrence rates after treatment, 3.5-5.0% [3,6]. The tasks of surgical intervention are to eliminate the cause of pneumothorax and prevent recurrence of the disease, which are solved by resection of the bullous area of the lung or other methods of impact on bullae, as well as the impact on the parietal pleura to create pleurodesis - adhesion of visceral and parietal pleural sheets. These manipulations can be performed from standard

lateral thoracotomy approaches. However, with the development of modern minimally invasive surgical techniques, videothoracoscopy has become a universally accepted method in the treatment of SP. Using video toracoscopy one can perform both endoscopic surgeries using endostaplers, and video-assisted interventions with small operative accesses. In this case, all surgical manipulations required for the treatment of SP are performed, and minimally invasive surgical accesses significantly reduce the traumatic nature of surgery without reducing its quality [7, 8, 9].

Research Objective: Surgical treatment tactics for spontaneous pneumothorax

Material and methods. We analyzed the results of treatment of 102 patients with spontaneous pneumothorax. There were 87 men and 15 women. All patients were of working age. Pneumothorax on the right side was observed in 59 patients, on the left side - in 43 patients. More than 55% of all patients were workers of physical labor. There were 34 patients under 30 years of age, 64 patients under 40, and 4 patients were under 20 years of age.

The following types were revealed due to the degree of lung collapse: small pneumothorax (apical) in 12 (11.8%) patients, medium in 18 (17.6%), large in 34 (33.3%), and total in 38 (37.3%) patients. Bulleous emphysema was the cause of CP in 68 (66.6%) patients, in 10 (9.8%) - rupture of the postpneumonic lung cyst, in 7 (6.9%) - echinococcal cyst burst into the pleural cavity, and in 17 (16.7%) pneumothorax developed due to unknown circumstances.

In the anamnesis of our patients single recurrence was noted in 10 (9.8%), double recurrence - in 8 (7.8%) and triple recurrence - in 5 (4.9%) patients. Complicated pneumothorax in the form of hydropneumothorax was noted in 17 (16.7%) patients. Patients were referred to us mainly for a prolonged period: within a week of the process onset - 69; within a month - 23; within three months - 6; within more than 6 months - 4.

The main and decisive method of diagnosis was polyposition X-ray examination, which revealed the absence of pulmonary pattern in hemithorax to some extent. This study was performed in all our patients with suspected CP. Preoperative MSCT was performed routinely to assess the condition of the opposite lung. The purpose of clinical and radiological examination of a patient was to solve questions (presence of pneumothorax, tension pneumothorax, rigid pneumothorax, hydropneumothorax, determination of the opposite lung condition) in relation to the upcoming surgical treatment of SP.

Results and Discussion: Pleural puncture was performed in 12 patients with apical pneumothorax and 5 patients with medium pneumothorax, who mostly complained of sudden pleural chest pain with or without dyspnea, and some had pain at the tip of the shoulder and had minimal or even no symptoms. The remaining 12 patients with moderate pneumothorax underwent active drainage of the pleural cavity. Video-assisted thoracoscopic surgeries (VTS) were performed in 58 (56.9%) patients with spontaneous pneumothorax. It was a repeated CP in 23 (39,6%) of them and in whom conservative procedures were applied in the past. Video-assisted thoracoscopic surgeries were performed in 7 patients. And only 8 cases were operated through wide thoracotomy accesses.

The entire pleural cavity was revisited during VTS. Bulleous changes were most often revealed in the apical segments, and in 7 (12.1%) cases they were also found in other parts of the lungs. These changes had the appearance of cystic or bunch-shaped bullae. The source of air inflow was detected in 19 (32,7%) patients and looked like a defect in a bulla, or like a burst and collapsed bulla. In 6 (10.3%) cases no bullae were found, but apical fibrosis in the apical segments of the lungs was noted. When examining the pleural cavity special attention was paid to the condition of the parietal pleura, signs of inflammation in the form of hyperemia, fibrin prolapse, places of pulmonary-pleural adhesions and adhesions, exudate and fibrin found in the cavity were

removed. Pleural adhesions that prevented further manipulations in the pleural cavity were cauterized using an electrocoagulator.

Evaluation of visceral pleura condition was considered to be a very important stage of intervention. In those cases when several days or weeks had passed since the origin of SP there was visceral pleura thickening that prevented adequate lung spreading. Thoracoscopic decortication of the lung was performed in 9 (15.5%) patients. Video-assisted decortication allowed us to control this process very clearly and prevent damage to the cortical layer of the lung.During thoracoscopy the pleural adhesions were dissected or coagulated. Bullae and pulmonary tissue defects were diathermocoagulated and sutured.

Small bullae were coagulated or ligated using an endopetal. In 2 patients with spontaneous pneumothorax we could not find any changes on the lung during video-thoracoscopy, even with thorough examination. In isolated form adhesions and schwarts were detected in 3 patients. In these cases apical pleurodesis with diathermocoagulation was performed. The operation was terminated by insertion of a drainage into the pleural cavity through one of the available thoracoports and suturing.

Video-assisted atypical lung resection and pleurectomy were performed in 8 (13.8%) cases using the UO-40 stapling apparatus via minithoracotomy access. The mini-access was performed in the IV-V intercostal space. A 4-5 cm long skin incision was made along the intercostal space between the anterior and middle axillary lines. The anterior dentate muscle was dissected along its fibers and the rib surface was exposed. The broadest muscle of the back is retracted to the back if necessary. The intercostal space along the upper edge of the underlying rib is opened. Hemostasis of the subcutaneous tissue, anterior dentate and intercostal muscles is performed. The quality of hemostasis is monitored by examining the wound from the outside, as well as by a thoracoscope to control bleeding from the inner edges of the wound into the pleural cavity. Thus, in addition to the two available trocar accesses (ports) we created a third one - an incisional mini-access.

Hydropneumothorax was detected in 7 cases in our patients during X-ray examination. In all patients the operation was performed through minithoracotomy access after preliminary thoracoscopy, where a rupture of echinococcal cyst into the pleural cavity was revealed.In all cases the pleural cavity was sanitized with ozonized physiological solution, the chitinous membrane was removed and the residual cavity was capitonaged.

Also in 8 patients with hydropneumothorax MSCT showed thickening of the parietal and visceral pleura. During pleural puncture cloudy fluid was extracted and active aspiration revealed a rigid residual pleural cavity. Partial pleurectomy with lung decortication was performed through thoracotomy access in these patients. We managed to achieve recovery after VTS using pleural cavity drainage with active aspiration in all patients. It should be emphasized that within the first week recovery was achieved in 4 patients (50%), in the remaining four patients the lung was straightened by 9-10 days.

In order to prevent recurrence of pneumothorax after lung defect repair we performed limited pleurodesis under video control using available thoracoports and miniaccess with dissection of parietal pleura by thermocautery along the intercostal space. The internal surface of the chest wall (I-IV intercostal space) was formed as deplevrized areas in the form of furrows up to 0.5-1 cm wide.

Postoperative complications were noted in the group (n = 8) that underwent surgery through thoracotomy access: in 1 (12.5%) patient - residual pleural cavity and in 1 (12.5%) - pleuritis. There were no emergency conversions to thoracotomy. SP recurrences occurred in 5 (17.2%) patients treated with aspiration and drainage procedures(n = 29). Long-term results of treatment were traced in 58 patients who underwent VTS interventions. No recurrence of the disease was observed. MSCT is crucial in the identification of primary and secondary spontaneous pneumothorax[10]. However in collapsed lung the nature of destructive changes is difficult to

differentiate. Therefore, we recommend using this study after lung spreading.

Having obvious advantages and availability of the established techniques, video-othoracoscopy is a modern method of diagnostics and treatment of spontaneous pneumothorax, allows to detect the cause of its development, visually determine the presence and volume of lung lesion, severity of intrapleural adhesions and degree of lung collapse in 91.5-95% of patients. However, about 12% of operations are still performed using open surgical methods. This is because surgeons personally prefer open procedures in certain situations, such as recurrence or adhesions, or intraoperative conversion from minimally invasive techniques to thoracotomy. The minimally invasive approach is preferred over the open procedure because it is associated with less postoperative pain and faster recovery[1, 5].

We believe that with localization of bullous changes at the level of the lung apex, limited pleurodesis within I-IV intercostal space under video control using available thoracoports and miniaccess is sufficient. In widespread bullous emphysema in 7 cases pleurodesis was formed along the length from the pleural dome to the diaphragm. Deplevrization was performed by diathermic coagulation. We consider this method of pleurodesis to be preferable as it is not inferior to maroon pleurectomy in efficiency, but also technically simpler.

Conclusions. Video-assisted and video-assisted surgery through mini access with elimination of the cause of SP and obligatory pleurodesis was found to be the operation of choice. Aspiration and drainage procedures in SP remain the main preliminary tactical method of treatment.

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