THE UTILITY OF VIDEO-ASSISTED THORACOSCOPIC SURGERY IN THE MANAGEMENT OF THE FIRST UNCOMPLICATED EPISODE OF PRIMARY SPONTANEOUS PNEUMOTHORAX

Ivan Novakov

Department of Special Surgery, Medical University Povdiv, 4000, Bulgaria, Plovdiv, "Vasil Aprilov" str. 15; inovakov2003@yahoo.com ; +359887575487

ABSTRACT

Introduction. The option of surgery at the time of the first uncomplicated episode of primary spontaneous pneumothorax is now a matter of debate. **The aim** of this study is to present the utility of video-assisted thoracoscopic surgery (VATS) in the management of the first uncomplicated episode of primary spontaneous pneumothorax.

Marterials and Methods. Twenty-five patients [male – 21 (84 % / p <0,05); mean age – 24,3 (SD – 6,1) years; age range: 17 ÷ 35 years] with the first uncomplicated episode of primary spontaneous pneumothorax were included in this study (from March 2017 to April 2018). The size of pneumothorax was determined by radiological evaluation (thoracic X-ray). Video-assisted thoracoscopic examination of the entire pleural cavity was performed. Resection of blebs (in cases of such operative finding) and partial apical parietal pleurectomy were done.

Results. Right-sided pneumothorax was established in 16 (84%) patients. For 10 (40 %) of the patients pneumothorax was determined as a minimal and for the rest of them - as a large. Subpleural blebs were established in 8 of patients. No pathological changes on the lung surface were established for the rest of the cases. The mean hospital stay was 5.5 days with no postoperative complications.

Conclusion. The easy access to VATS with no postoperative complications, confirmed in this study, demonstrated the utility of mini-invasive surgery, even in the first episode of uncomplicated primary spontaneous pneumothorax.

key words: *spontaneous pneumothorax, video-assisted thoracoscopic surgery.*

INTRODUCTION

The best treatment of spontaneous pneumothorax remains unknown and continues to be debated [1, 2, 3]. Management options range from observation, simple aspiration, small-bore catheter insertion, and tube thoracostomy to video-assisted thoracoscopic surgery (VATS) and thoracotomy with bleb and/or bulla excision and pleurodesis [2, 3, 4, 5, 6]. Selection of the approach depends on the size of the pneumothorax, severity of symptoms, whether there is an open (persistent air leak) or closed (no air leak) pneumothorax, and whether the pneumo- thorax is primary, secondary, or recurrent.

The option for surgery at the time of the first uncomplicated episode is now a matter of debate. The aim of this study is to present the utility of video-assisted thoracoscopic surgery in the management of the first uncomplicated episode of primary spontaneous pneumothorax, based on our own results.

MATERIALS AND METHODS

Twenty-five patients [male – 21 (84 % / p <0,05); mean age – 24,3 (SD – 6,1) years; age range: 17 ÷ 35 years] with the first uncomplicated episode of primary spontaneous pneumothorax were included in this one-year study (from March 2017 to April 2018) realized at the Department of Thoracic and Abdominal Surgery, Medical University – Plovdiv.

The localization and the size of pneumothorax (according to the American College of Chest Physicians) were determined by erect chest radiographs [7].

Video-assisted thoracoscopic examination of the entire pleural cavity by a rigid 5-mm 30-degree scope (inserted through 10mm port in the 5th intercostals space at median axillar line) was performed, under general double-lumen endotracheal anesthesia of the patients. Scissors, grasping and dissecting forceps were used for the resection of blebs (in cases of such operative finding) and partial apical parietal pleurectomy, by one additional 5-mm port. At the end of the procedure, chest tube was placed through the port of the scope.

The hospital stay was determined. According to the accepted protocol, the patients were followed up one month (by two controlled examinations at the 15th and 30th postoperative days) and any eventual postoperative complications were recorded.

Statistical analysis was made by IBP SPSS Statistics program –version 20,0.

RESULTS

Right-sided pneumothorax was established in 16 (64%) patients – significantly more common than left-side localization ($p < 0,05$). For 10 (40 %) of the patients pneumothorax was determined as a minimal and for the rest of cases - as a large (fig. 1, 2, 3, 4).

Figure 1.
Figure 2.
Figure 3.
Figure 4.

Video-assisted thoracoscopic examination established subpleural blebs in 8 (32 %) of patients, which were resected (fig. 5, 6). No pathological changes on the lung surface were determined for the rest of the cases. Apical parietal pleurectomy, with cauterization of the bleeding thoracic wall points, was done in every one of the patents (fig. 7, 8).

Figure 5.
Figure 6.
Figure 7.
Figure 8.

The mean hospital stay was 5,84 days (SD – 1,14). There weren't recorded any postoperative complications during the period of patient's following.

DISCUSSION

Spontaneous pneumothorax occurring in a patient without an immediately obvious underlying lung disease is termed "primary spontaneous pneumothorax". The incidence of primary spontaneous pneumothorac is the greatest in tall, thin young males (younger than the age of 30 years), the fact that was convincingly confirmed by this study [1, 7, 8, 9].

The diagnosis of pneumothorax is best confirmed by erect chest radiographs through identification of the visceral pleura, which normally is not recognizable, and the presence of abnormal air in the pleural cavity. To determine the size of the pneumothorax, for the aim of this study, the American College of Chest Physicians classification was used [7]. It defines small (in which the visceral pleura is less than 3 cm from the chest wall), large (the distance is greater than 3 cm), and total (complete lung collapse) pneumothoraxes. Primary spontaneous pneumothorax occurs more commonly on the right side that was confirmed by this study, and in less than 10% of patients pneumothorax is bilateral [1, 2, 7, 8]. Bilateral and complete pneumothoraxes are complications of spontaneous pneumothorax, that's why they were accepted as criteria of exclusion in selection of the patients for this study, having as an object only "the first uncomplicated episode" [1, 2, 3, 4].

The VATS is currently the technique of choice in the surgical community as a surgical approach in patients with spontaneous pneumothorax. The option for surgery at the time of a first uncomplicated episode is now a matter of debate [5, 6, 8, 9, 10]. The aim of this study is not to compare the VATS with conventional surgical approach (thoracotomy) nor yet with tube thoracostomy with underwater seal drainage. The study aims only to present the utility of VATS in the management of the first uncomplicated episode of primary spontaneous pneumothorax.

According to advocates of using a video-assisted thoracoscopy at the time of the first episode of a spontaneous pneumothorax, this procedure will classify the patients with spontaneous pneumothorax in one of three categories: no obvious lung surface abnormalities, subpleural blebs, and bullous disease. Treatment is then selected according to the findings [8, 9, 10]. Blebs are small (<2 cm) subpleural collections of air contained within the visceral pleura, usually found at the apex of the upper lobes. Blebs rupture is accepted as the most common cause of a primary spontaneous pneumothorax [11]. This study demonstrated blebs only in 32 % of cases and for the rest of cases may be accepted that single bleb is ruptured which is no longer visualized.

Resection of blebs and obliteration of the pleural space (pleurodesis) by pleurectomy or pleural abrasion are the two major goals in the surgical treatment of primary spontaneous pneumothorax [10, 11, 12, 13, 14]. VATS is an excellent option for performing of these procedures. Parietal pleurectomy or mechanical abrasion of the parietal pleura creates an inflamed surface with secondary fixation of the lung to the endothoracic fascia (pleurodesis) that will prevent recurrence of pneumothorax [11, 12, 13, 14]. Pleurectomy limited to the apex creates sufficient adhesions and in the presenting study it was accepted as a procedure of choice for pleurodesis.

The chest wall pain is the most common patients' complaint after VATS for spontaneous pneumothorax [10, 11, 12]. The pain is secondary to trocar insertion and manipulation of the instruments in the intercostal space, which contributes to injury of the intercostal nerves. We haven't been recorded chest wall pain in our patients. This fact we explain with two circumstances: with relatively small group of patients and more importantly with placing the incisions anteriorly in wider intercostal spaces for the bigger trocar and using the posterior trocar for smaller instruments.

CONCLUSION

In conclusion, this retrospective study demonstrates the utility of video-assisted thoracoscopic surgery in the management of the first uncomplicated episode of primary spontaneous pneumothorax in several directions. At the first place, video-assisted thoracoscopy permits examination of the entire pleural cavity with establishing of subpleural blebs as obvious lung surface abnormalities. By video-assisted thoracoscopic surgery, subpleural blebs may be resected and apical parietal pleurectomy may be performed with the aim to prevent recurrence of the pneumothorax. Finally, video-assisted thoracoscopic surgery in first uncomplicated episode of primary spontaneous pneumothorax is well tolerated by patients with minimal postoperative discomfort.

REFERENCES:

1. Tschopp JM, Rami-Porta R. Management of spontaneous pneumothorax: state of the art. Eur Respir J 2006; 28:636–650.

2. Baumann MH. Management of spontaneous pneumothorax. Clin Chest Med 2006; 27:369–381.
3. Noppen M. Management of primary spontaneous pneumothorax. Curr Opin Pulm Med 2003; 9:272–275.
4. Henry M, Arnold T, Harvey J. BTS guidelines for the management of spontaneous pneumothorax. Thorax 2003; 58(Suppl 2):39–52.
5. Hwong TM, Ng CS, Lee TW, et al. Video-assisted thoracic surgery for primary spontaneous hemopneumothorax. Eur J Cardiothorac Surg 2004; 26:893–896.
6. Sedrakyan A, van der Meulen J, Lewsey J, Treasure T. Video-assisted thoracic surgery for treatment of pneumothorax and lung resections: systematic review of randomised clinical trials. BMJ 2004; 329:1008.
7. Kelly AM, Weldon D, Tsang AY, Graham CA. Comparison between two methods for estimating pneumothorax size from chest x-rays. Respir Med 2006; 100:1356–1359.
8. Margolis M, Gharagozloo F, Tempesta B, et al. Video-assisted thoracic surgical treatment of initial spontaneous pneumothorax in young patients. Ann Thorac Surg 2003;76:1661–1664.
9. Chang YT, Dai ZK, Kao EL, et al. Early video-assisted thoracic surgery for primary spontaneous hemopneumothorax. World J Surg 2007; 31:19–25.
10. Baumann MH. Management of primary spontaneous pneumothorax? Pro: blebs do cause primary spontaneous pneumothorax. J Bronchol 2003; 9:313–318.
11. Chang YT, Chou SH, Kao EL, et al. Video-assisted extrathoracic bleb excision: an ultra-minithoracotomy for primary spontaneous pneumothorax. Minim Invasive Ther Allied Technol 2007; 16:323–327.
12. Miller JD, Simone C, Kahnamoui K, et al. Comparison of videothoracoscopy and axillary thoracotomy for the treatment of spontaneous pneumothorax. Am Surg 2000; 66:1014–1015.
13. Atta HM, Latouf O, Moore JE, et al. Thoracotomy versus video-assisted thoracoscopic pleurectomy for spontaneous pneumothorax. Am Surg 1997; 63:209–212.
14. Kim J, Kim K, Shim YM, et al. Video-assisted thoracic surgery as a primary therapy for primary spontaneous pneumothorax. Decision making by the guideline of high-resolution computed tomography. Surg Endosc 1998; 12:1290–1293.

LEGENDS TO FIGURES:

Figure 1. Small right-sided spontaneous pneumothorax/ (lung surface is pointed by red arrows).

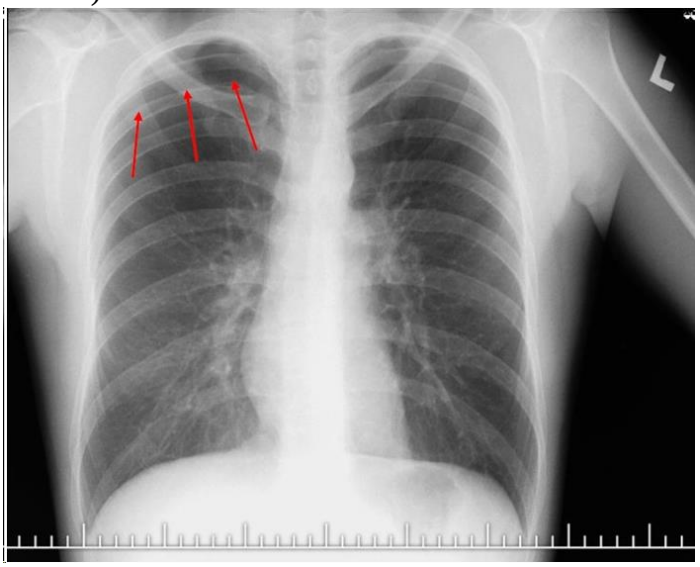

Figure 2. Small left-sided spontaneous pneumothorax/ (lung surface is pointed by red arrows).

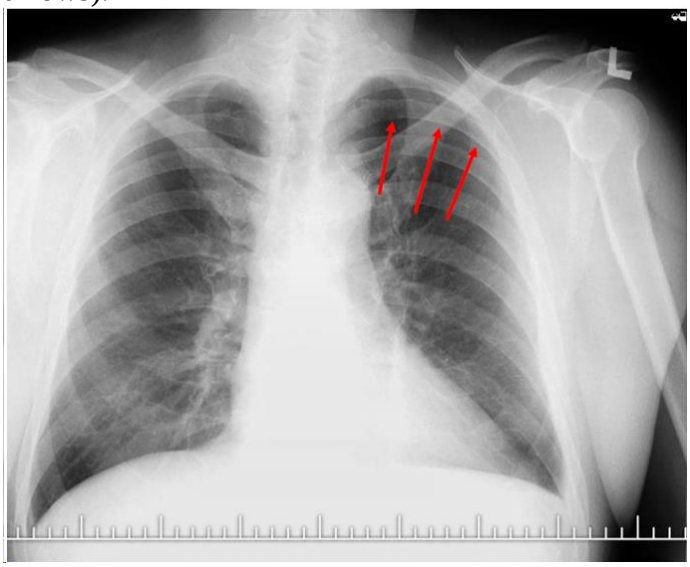

Figure 3. Large right-sided spontaneous pneumothorax/ (lung surface is pointed by red arrows).

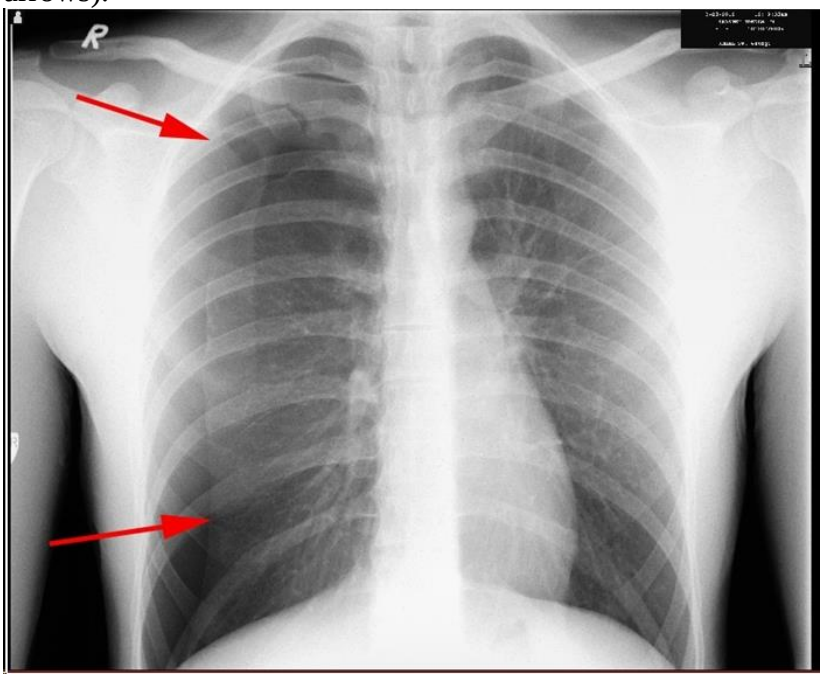

Figure 4. Large left-sided spontaneous pneumothorax/ (lung surface is pointed by red arrows).

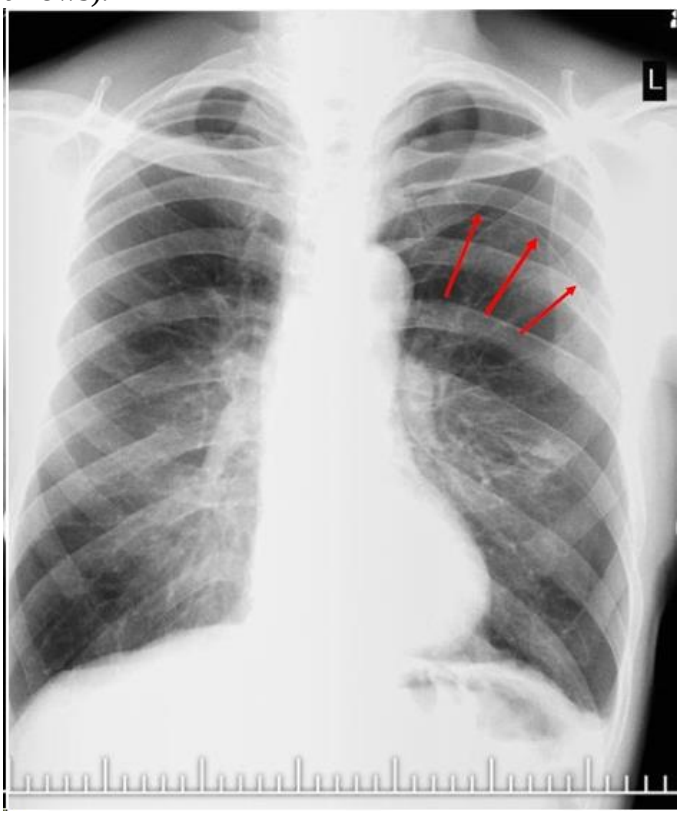

Figure 5. Video-thoracoscopic pleural examination: apical subpleural bleb (showed by black arrows).

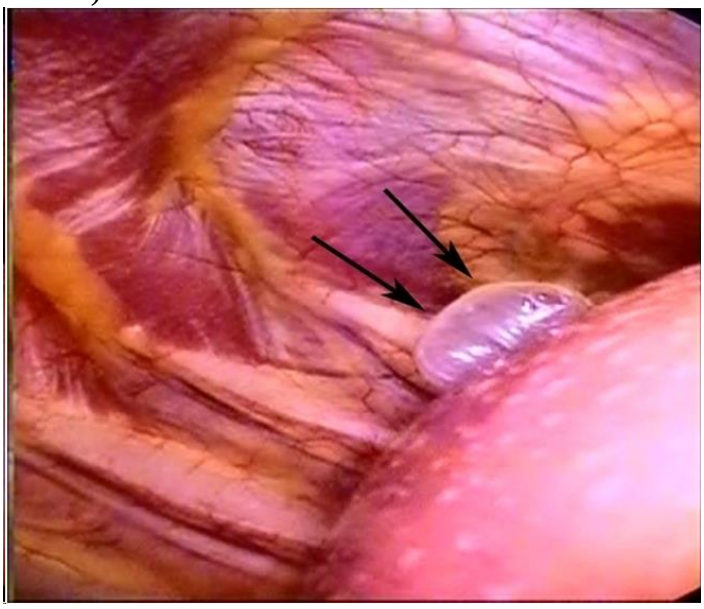

Figure 6. A complex of apical subpleural blebs: a view of their thoracoscopic resection.

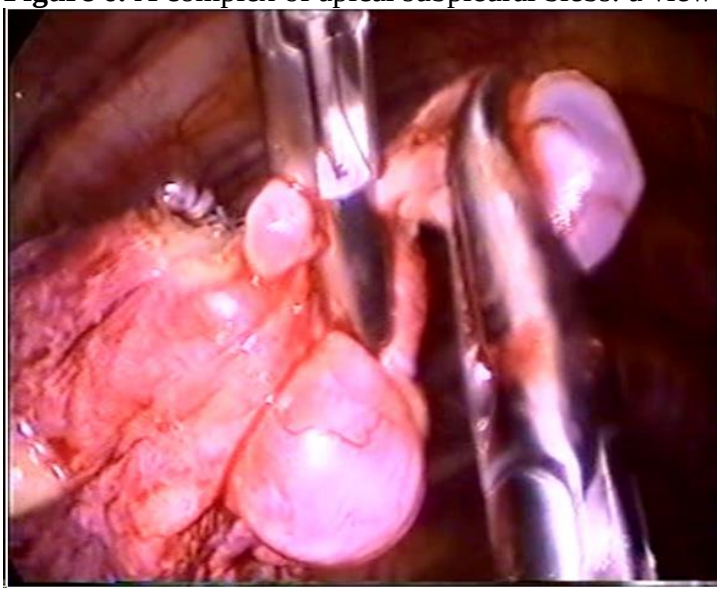

Figure 7. A process of video-assisted apical parietal pleurectomy.

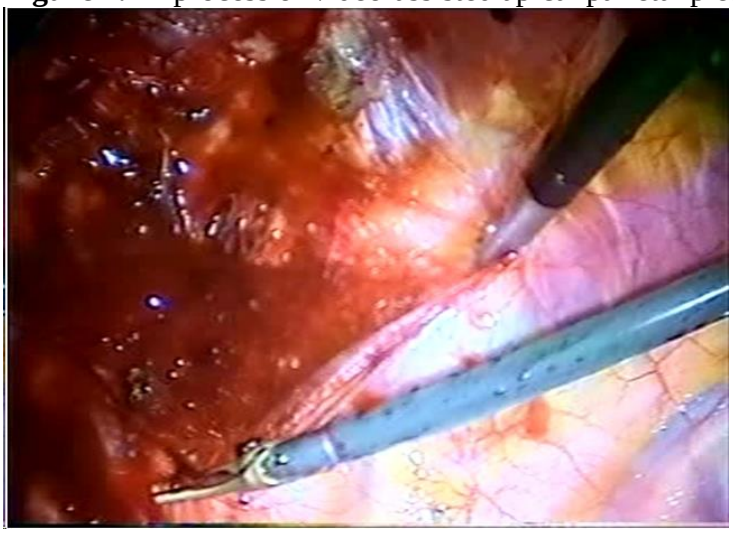

Figure 8. Thoracoscopic pleural cavity examination after partial pleurectomy: the border between parietal pleura and area without pleura is pointed by black arrows.