

CLINICAL APPLICATION OF NON-INTUBATED VATS METHOD IN MINIMALLY INVASIVE THORACIC SURGERY

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Abstract: *Non-intubated Video-Assisted Thoracoscopic Surgery (NI-VATS) has emerged as an alternative approach in minimally invasive thoracic surgery, avoiding complications associated with endotracheal intubation and one-lung mechanical ventilation. Preservation of spontaneous ventilation may reduce perioperative risks and enhance postoperative recovery. The aim of this study was to evaluate the clinical applicability, safety, and postoperative outcomes of NI-VATS in selected thoracic surgical patients. Parameters including operative time, postoperative pain, duration of hospital stay, complications, and recovery outcomes were analyzed. The findings suggest that NI-VATS is a safe and effective technique in appropriately selected patients and may contribute to shorter hospitalization, faster recovery, and improved patient comfort.*

Keywords: *Non-intubated VATS; minimally invasive thoracic surgery; spontaneous ventilation; thoracic anesthesia; postoperative outcomes*

Introduction

In recent years, with the development of Minimally Invasive Techniques in Thoracic Surgery, methods that provide patients with less trauma and faster recovery have begun to be preferred [1, 2, 7, 8, 9]. In this direction, Non-Intubated Video-Assisted Thoracoscopic Surgery (NIVATS) is attracting attention, especially in patients with poor cardiorespiratory performance, as well as in terms of reducing complications associated with intubation anesthesia and faster rehabilitation in the postoperative period [2, 4, 5, 9]. These operations, performed without the use of classical intubation and general anesthesia, have yielded successful results in terms of both safety and functional recovery, especially in selected pulmonary pathologies [1, 2, 3, 10]. In the current study, we aim to analyze the clinical applicability, results, and efficacy of the NIVATS technique, and to evaluate its efficacy and safety. At the same time, the difficulties encountered during the procedure, anesthetic approaches, and postoperative outcomes were also evaluated.

Experimental part

Material and method: This retrospective study covers the treatment of 17 patients with the modern Non-Intubated Video-Assisted Thoracoscopic Surgery (NIVATS) method at the Main Military Medical Directorate of the State Security Service during 2020–2025. The patients included in the study were one female and the others were male, and their age range was from 16 to 75.

In 12 patients, coagulation of apical bullae during NIVATS due to spontaneous pneumothorax was performed, in 1 patient, thoroscopic plication of a defect detected in the lung parenchyma was performed, in 2 patients, removal of the clot formed as a result of post-traumatic hemopneumothorax (Fig. 1 and 2), control of bleeding, and tube thoracostomy were performed, the operations lasted an average of 22 minutes.

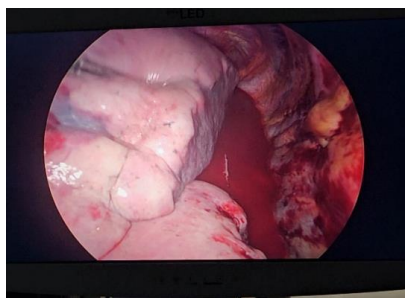


Fig. 1. Traumatic hemopneumothorax

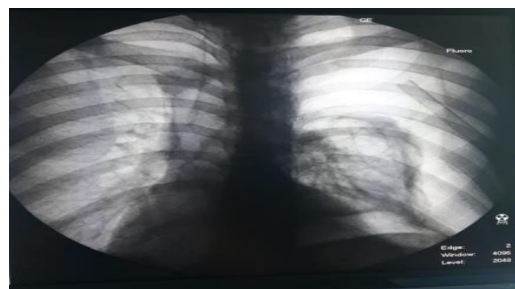


Fig. 2. Spontaneous pneumothorax

All operations were performed using the Non-Intubated Video-Assisted Thoracoscopic Surgery (NIVATS) method, without intubation, and under spontaneous breathing. Intravenous sedation and intercostal nerve block were used for anesthesia, CO₂ insufflation for lung collapse, glycopyrrolate to reduce oral and respiratory secretions, inhalation with 2% Lidocaine solution to reduce cough reflex, aerosolization of lidocaine into the pleural cavity, and left-sided Vagal nerve block in 2 patients. All operations were technically successful, and the patients' postoperative hospital stay was 2 days. There was no need for urethral catheterization or narcotic analgesics in the postoperative period, no complications were noted, and only 1 patient had a 4-day prolonged air leak. Patients were given fluids 2-5 hours after surgery, were able to stand up, walk, and begin feeding, and early mobilization was ensured.

Results and discussion

Specific clinical cases.

A 75-year-old male patient: was admitted to the clinic in critical condition with acute ST-elevation myocardial infarction, Fig. 2, right-sided total spontaneous pneumothorax, Fig. 3, and respiratory failure.

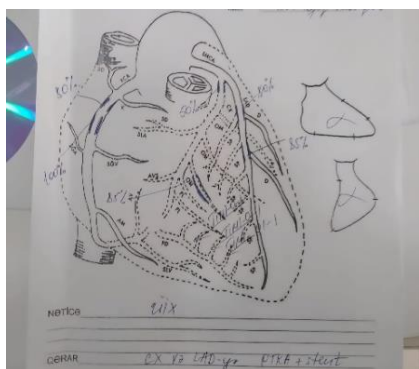


Fig. 3. Coronary artery stenosis

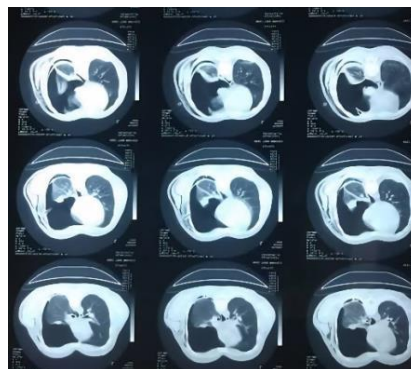


Fig. 4. Bullous rupture – related pneumothorax

Although the patient's pleural cavity was drained, the lung did not open, and respiratory failure gradually increased (tachypnea, hypercapnia, respiratory acidosis, oxygen-supported SpO₂ 78%. Ps: 118 v/min). Infectious indicators also increased (leukocytosis, CRP-85mg/l), and the risk of purulent empyema and sepsis elevated. The cardiorespiratory status was assessed at the ASA IV risk level, and Thoracoscopic coagulation of apical bullae, sanitation, and pleurodesis were performed without intubation, against the background of spontaneous breathing. Immediately after the restoration of respiratory function, coronary angiography and stenting were performed, and the patient's life was saved.

16-year-old teenager: He was admitted to the clinic in a serious condition with shortness of breath, choking, cyanosis, severe chest pain, and high anesthetic risk (ASA IV). The patient had

Congenital Stenosis of Pulmonary Artery, PAB 80 mmHg, SpO₂: 65%, Ps: 136 v/min. Kt – left-sided total pneumothorax, sharp shift of mediastinal organs to the right was detected, considering poor cardiorespiratory performance, Thoracoscopic coagulation of apical bullae during NIVATS, pleurodesis, and tube thoracostomy were successfully applied to improve spontaneous breathing. The patient was provided with early mobilization 6 hours after the operation, on the 3rd day, the pleural drain was removed, and he was discharged home without oxygen dependence (SpO₂: 95%, Ps. 86 v/min).

58-year-old female patient: acute respiratory syndrome caused by SARS-CoV-2 virus, bilateral pneumonia, left-sided pyopneumothorax, severe respiratory failure (hypercapnia, respiratory acidosis, oxygen-supported SpO₂ 88%, Ps 136 v/min), pleural empyema. The patient was treated in the intensive care unit for 120 days continuously. Although the pleural cavity was drained, the lung did not open, and empyema formed. Fig. 5. Anesthesiologic risk was assessed as ASA V. The patient was not intubated, and on the background of spontaneous breathing, NIVATS empyemectomy, partial decortication of the lung, sanitation, pleurodesis, and anterior and posterior tube thoracostomy were performed. 4 days after the operation, the patient was admitted to the Surgery Department, and on the 8th day, the anterior pleural drain was removed and he was discharged home with oxygen support (SpO₂ 94%, Ps 96 v/min).

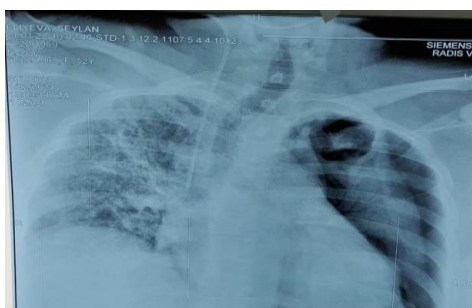


Fig. 5. Covid - 19 associated left pyopneumotorax

A 45-year-old male patient living on permanent oxygen support was admitted in critical condition with the diagnosis of: Idiopathic pulmonary fibrosis (IPF), bilateral bullous emphysema, left-sided total pneumothorax, subcutaneous emphysema, pleural empyema, respiratory failure (Ps 164 v/min, hypercapnia, respiratory acidosis, SpO₂ 58%, leukocytosis, CRP 108 mg/l). Although the pleural cavity was drained, the lung defect did not close within 28 days, and pleural empyema and purulent inflammation of the soft tissue around the drainage occurred. Since the anesthetic risk was assessed as ASA IV, the patient was not intubated, and on the background of spontaneous breathing, empyemectomy, partial decortication, sanitation, pleurodesis, and anterior and posterior tube thoracostomy were performed using the NIVATS method. On postoperative days 5 and 7, pleural drains were removed alternately, and the patient was discharged home with oxygen support (SpO₂ 94% Ps. 92 v/min).

Our studies and clinical observations have proven that the Non-Intubated Video-Assisted Thoracoscopic Surgery technique has a high level of safety and effectiveness in thoracic surgery. The results once again show that the NIVATS technique can be applied as a safe and effective surgical alternative, reducing the risk of anesthesia, especially in patients at high risk of anesthesia and reduced cardiorespiratory performance.

Conclusion

Non-intubated VATS represents a promising advancement in minimally invasive thoracic surgery. When performed in carefully selected patients by an experienced multidisciplinary team, it can be considered a safe and effective alternative to conventional intubated thoracic surgery. This technique may reduce postoperative complications, shorten hospital stay, and improve recovery

outcomes. Further large-scale prospective studies are needed to better define its long-term benefits and broader clinical applications.

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