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Case report

Cardiopulmonary resuscitation after video-assisted thoracoscopic surgery with subtotal thyroidectomy: Case report

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ABSTRACT

Introduction and importance: Postoperative complication of thoracic surgery often consists of bleeding, pneumothorax, pulmonary atelectasis, infection, etc.; however, concomitant diseases such as thyroid hormone disorder deserve to think about and summarized.

Case presentation: This case was reported as a rare postoperative cardiopulmonary arrested of a 46-year-woman who presented bilateral lung nodules with concomitant subtotal thyroidectomy 2 months ago with *Toremifene Citrate* to sustain thyroid hormones. 3D-VATS was allowed to be conducted after her preoperative examination and blood tests. Unexpectedly, she suddenly fell in the bathroom at *5 pm* the next day. Thirty minutes later, while finding cardiopulmonary arrest CPR endotracheal intubation assisted ventilation; in the meantime, that conducted vasoactive interventions for 50 min. Finally, the patient's heart rhythm recovered, and her vital sign index slowly tended to normal.

Clinical discussion: Cardiopulmonary arrested usually occurs in massive invasive surgery, sudden severe diseases such as stroke, myocardial infarction, or pulmonary embolism. Even if certain chronic physical diseases are related, clinical symptoms usually catch the surgeon's attention. Ultimately, the excluded major inducing reasons during the medical process in ICU; by contract, it is still to discuss the thyroid hormones disorder that could not convince us to explain this postoperative cardiopulmonary arrest.

Conclusion: Although this cardiopulmonary resuscitation for more than 30 min and following medical treatment in ICU was undoubtedly successful, it is necessary to focus on managing concomitant thyroid hormones during surgery and think about certain physiological changes if it was one of the reasons.

1. Introduction

Video-assisted thoracoscopic surgery (VATS) optimizes thoracic surgery with its character of minimal invasion, helps enhance postoperative recovery, and decreases certain perioperative risks deriving from concomitant diseases, including cerebrovascular disease, COPD, chronic renal insufficiency or endocrine diseases. The following special point on cardiac arrest for more than 30 min made us think about a rare cardiac arrest after *Uniportal-3D VATS with concomitant subtotal thyroidectomy* according to professional guidelines of cardio-pulmonary resuscitation. We reported a rare and continuous resuscitation case for 50 min, which cannot be exactly explained the reason for a thyroid hormone disorder.

2. Presentation of case

A 46-year-woman presented with no symptoms but had increased bilateral lung nodules in the chest CT re-examination and was admitted to our department on April 22nd, 2021(Fig. 1). Her surgical histories included modified radical mastectomy 11 years ago and Subtotal thyroidectomy (pathological result: tiny papillary carcinoma) 2 months ago with postoperative *Toremifene Citrate*. This preoperative evaluation of radiological examinations, blood tests, and endocrine levels allowed to prepare for thoracic surgery. As a mature surgery to treat lung cancer, Dr. Huang conducted a common 3D-VATS wedge-shaped resection of the left lower pulmonary nodules, upper lung apex, and S8/9 segment with 20 ml intraoperative blood loss under general anesthesia on April 23rd, 2021.

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On the first postoperative day, she could conveniently take a walk in the ward after the intrathoracic drainage was removed but vomited 200 ml after lunch and felt better with Anti-nausea treatment. At *5 pm*, she felt tachypnea, weakness of limbs, and suddenly fell in the bathroom. Immediately her husband assisted her in lying on the bed, and the nurse hearing help ran to the bedside and took the electrocardiogram monitor (*HR*:*107 beats/*min; *RESP*: *26beats/*min; *BP*:*98/43 mmHg*; *SpO2*:*97%*) and *blood glucose 15 mmol/L*. Thirty minutes later, her vital sign index decreased (*HR*:*30 beats/min*; *RESP*:*13 beats/min*; *BP*:*61/17 mmHg*; *SpO2*:*79%*), bilateral pupils dilated presented *4.5 mm*, and light reflection disappeared. Since *17*:*30*, our team started cardiopulmonary resuscitation (CPR), endotracheal intubation assisted ventilation; in the meantime did vasoactive intervention (epinephrine 1 mg, repeated 11 times & Dopamine Hydrochloride 20 mg), Sodium bicarbonate (250 ml, 2 times) to regulate acid-base balance based on blood gas test, and sodium lactate ringer's inj for 50 min. To reduce the risk of bleeding, bursting after pneumonectomy, and rib fracture, it is necessary to look out the direction to force and body stability while making the chest compressing action. In the final, the patient's heart rhythm recovered, and surgeons maintained her vital sign index slowly tending to normal with Dopamine Hydrochloride (*HR*:*124beats/min*; *RESP*:*32beats/min*; *BP*:*123/98 mmHg*; *SpO2*:*98%*), whereas it was anuria during the whole process. After the ICU consultant's comprehensive evaluation, she was transferred to the critical care ward. One and half months later, she was discharged in a wheelchair with 15 Glasgow coma scale (GCS) score. This report is under approval by this patient in the follow-up of the outpatient.

3. Clinical discussion

While doing CPR, we thought about the following hypotheses to explain the patient's symptoms: hypothyroidism, pulmonary embolism, cardiogenic shock, and cerebral stoke. The diagnoses except hypothyroidism was excluded according to subsequent pulmonary artery CTA, brain MRA, and ECG re-examination. Nevertheless, the perioperative hypothyroidism problem still deserves discussion because it's still rare. It was supplied regularly with Levothyroxine to manage optimal endocrine status and reduce the risks of altering mental status, postoperative aspiration, and even sodium flow.

As for hypothyroidism's influence on the comprehensive physical system, the diverse symptoms mainly include fatigue, lethargy, impaired cognitive function, hoarseness, cold intolerance, weight gain despite the loss of appetite, constipation, dry skin and alopecia, even the life-threatening myxedema coma. The mortality rate of severe hypothyroidism would reach 40% [1]; however, the beginning presentations such as lethargy, altered mental status, hypothermia, and bradycardia frequently were ignored. Even though subclinical hypothyroidism without obvious symptoms still increases the risk of heart failure. Contract to ordinary people, the hypothyroidism patients' cardiac output would fall off as much as 30% to 50% can stimulate the secretion of catecholamines and increase systemic vascular resistance resulting in diastolic hypertension [2]. Patients are exquisitely sensitive to sedating medications due to changes in the ventilatory response to hypoxia and hypercapnia along with depressed mental status [3]. One of the electrolyte abnormalities, especially sodium, would increase as the severity of potential hypothyroidism worsens. Furthermore, patients' volume status would decrease because fluid shifts into the extravascular space while increasing capillary permeability [4]. Meanwhile, catecholamine-resistant cardiac depression increases the risk of cardiovascular collapse, and severe generalized edema presents a risk of airway dysfunction. Even though these chronic disorders were managed, there are the risks of acute changes, severe chronic hypothyroidism, or myxedema coma that possibly result in a substantial perioperative risk of complications. Incomprehensibly, this thyroid hormone disorder cannot be exactly explained this cardiopulmonary arrested of the rare postoperative VATS, which deserves thought.

The standard CPR procedure effectively stimulates blood circulation, gas exchange, and cerebral blood supply for recovery from neural function. The bag valve mask is switched with endotracheal intubation to carry out highly effective rescue management. We should protect the chest wall and look out the compression direction and body stability during CPR to reduce the risks of bleeding in the thoracic operative region, areothorax after the pneumonectomy, and rib fracture. Vasoactive agents such as the β-epinephrine effect of epinephrine could increase myocardial oxygen, reduce myocardial perfusion, and even lead to arrhythmias of postoperative AF. Lee BK et al. demonstrated hypoxic-ischemic encephalopathy occurred in 45% to 70% of surviving CA patients characterized by severe neurological impairment and even death [5]. The dramatic decrease and imbalance between cerebral blood flow and oxygen uptake rate in the early period are related to ischemic hypoxic brain injury [6]. Whereas Dr. Greer elaborated on a review of the determination of brain death, and one of the critical points was if confounding factors cannot be eliminated, ancillary testing is performed (typically in the form of cerebral blood-flow studies that evaluate for the complete loss of cerebral circulation) [7]. Ryan Starr, as the major editor's Brain Death, emphasized no severe electrolyte, acid-base, or endocrine disturbance must be present while deciding to proceed with the diagnosis of brain death [8]. It's well-known that CPR is always applied to sudden medical cases in unfamiliar conditions. However, if thyroid hormone disorder was one pathogenic risk of cardiopulmonary arrest, whether it is still to insist on CPR without vital signs after more than 30 min in hospital. This report is arranged based on the '*SCARE 2020 Checklist*' [9].

4. Conclusion

In conclusion, VATS or tubeless VATS has been advanced as a minimally invasive method; however, it still faces rare severe

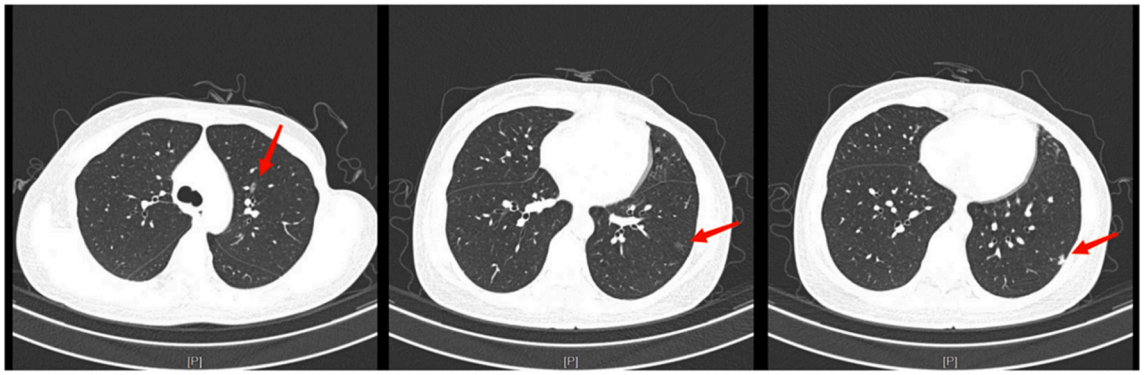

Fig. 1. The 46-year-woman presented left 3 lung nodules (the red arrow) which would have been resected during VATS in the chest CT re-examination.

postoperative complications, particularly with diverse concomitant illnesses. Furthermore, the endocrine disturbance was deserving of perioperative attention, persistent resuscitation, and complete evaluation before brain death.

Sources of funding

This case report does not have any sources of funding.

Ethical approval

This case report introduces a rare postoperative cardiopulmonary arrest; however, this thoracic surgery (3D-VATS) is common clinical treatment rather than first one with ethical approval.

Consent

This report is under approval by this patient in the follow-up of the out-patient.

Research registration (for case reports detailing a new surgical technique or new equipment/technology)

The surgical technique in this case report is a common method in our center rather than a first or new technique which needs research registration.

Guarantor

Dr. Huang is major participant in this case report and he is the guarantor for the reality and right of this paper.

CRediT authorship contribution statement

Dr. Huang is the major operator of this thoracic surgery and surgeon to this patient. And I am a participant in this clinical treatment and especially in the process of CPR.

Declaration of competing interest

We declare that we have no financial and personal relationships with other people or organizations that can inappropriately influence our work, there is no professional or other personal interest of any nature or kind in any product, service and/or company that could be constructed as influencing the position presented in, or the review of, the manuscript entitled “Cardiopulmonary Resuscitation After Video-Assisted Thoracoscopic Surgery With Subtotal Thyroidectomy: Case Report”.

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