

Nursing for the complete VATS lobectomy performed with non-tracheal intubation

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Abstract: Video-assisted thoracoscopic surgery (VATS) has without doubt been the most important advance in thoracic surgery. The general anesthesia before the tracheal intubation for VATS was often accompanied with tracheal mucosa and lung injuries, which were typically manifested as painful throat, nausea, vomiting, and other symptoms. However, the non-intubated anesthesia VATS can avoid these shortcomings due to its shorter anesthesia time, simpler steps, and quicker post-operative recovery. A total of 63 patients underwent VATS lobectomy under non-intubated anesthesia from July 2012 to July 2013. Good teamwork, proper pre-operative visit, and comfortable intra-operative position had ensured the success of these operations. In conclusion, adequate pre-operative preparation, careful nursing, and close cooperation can achieve a successful non-intubated anesthesia VATS.

Keywords: Video-assisted thoracoscopic surgery (VATS); anesthesia; non-intubated anesthesia; clinical nursing

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Introduction

In the past, lung surgery required a major open procedure, known as a thoracotomy. In order to gain access to the lungs, this approach involves making a large incision and spreading the ribs apart with retractors. With new technological developments, it is now possible to perform lung surgery via a less invasive approach, known as “minimally invasive pulmonary resection”, including two forms of minimally invasive or “key-hole” thoracic surgery: video-assisted thoracoscopic surgery (VATS) and robotic surgery (1). VATS has without doubt been the most important advance in thoracic surgery. No other single innovation has so totally revolutionized the way thoracic surgeons perform their craft, or so greatly improved the surgical experience for patients undergoing thoracic operations worldwide (2,3). The general anesthesia before the tracheal intubation for VATS was often accompanied with tracheal mucosa and lung injuries, which were typically manifested as painful throat, nausea, vomiting, and other symptoms (4,5). In contrast, the non-intubated anesthesia can avoid these shortcomings due to its shorter anesthesia time, simpler steps, and quicker post-operative

recovery (6,7). Nevertheless, adequate pre-operative preparation, careful nursing, and close cooperation were also required for a successful non-intubated anesthesia VATS. Thus, it is critically important to translate the “minimally invasive operation” into an integrated “minimally invasive process” that also involves both anesthesia and nursing.

Surgical cooperation

Pre-operative visit

One day before the surgery, a circulating nurse should review the medical records in the ward, learn the surgical plan, conduct pre-operative visit, introduce herself, and learn the patient's physical and mental status. Also, she should explain the advantages of the non-intubated anesthesia and the VATS as well as the backgrounds of surgeons and anesthesiologists that will be involved in this surgery. Other information including the operating room environment, surgical position, surgical procedures, and precautions should also be provided. She should share other successful stories with the patient, so as to relieve his/her

mental stress, stabilize emotion, and enhance confidence. The non-intubated anesthesia allows the patients to receive the surgery when they are waking, so as to alleviate their pre-operative anxiety.

Intra-operative preparation

The surgery needs to be done in a relatively large room, in which more instruments, equipment, and instrument tables can be installed and thus facilitate timely observations and salvage. The temperature and humidity of the operation room should be suitably adjusted. Lateral positioning cushion (90 degrees) should also be prepared.

Preparation of equipment and instruments

Before the surgery, the following equipment and items are prepared: 30 degree lens, thoracoscopic surgical instruments, monitors, camera and lighting systems, and high-frequency electric knife, multiple electrocautery hooks with different lengths, ultrasonic scalpel, suction cautery, and pleural automatic cutter & stapler with sufficient staple cartridges. Each surgical equipment and item must be carefully checked before the surgery.

Cooperation of the circulating nurse

The circulating nurse must carefully check the patient in the patients' waiting area before admitting him/her into the operation room. She should assist the patient to be moved onto the operation table, and establish intravenous access at the ipsilesional upper extremity. The patient is asked to take a 90 degree lateral position. A Gel cushion was put under the 4th to 5th ipsilesional thoracic ribs, so as to enlarge the intercostal space and reduce the intercostal nerve compression. The ipsilesional upper extremity is fixed with a hand bracket. Thoracic holders are placed at the pubic symphysis and sacral part to fix the patient. Patients under non-endotracheal anesthesia can have spontaneous breathing and may also move during the operation. The fixing brackets can accommodate one finger, so as to avoid any intra-operative injury.

Cooperation of the equipment nurse

Making incisions

The surgical approaches of the nonintubated VATS surgeries are same as the conventional thoracoscopic

surgery. Lobectomy is performed using two or three ports. The observation port is mainly located between the 6th-7th intercostal cartilages, whereas the operating port between the 4th-5th intercostal cartilages. In addition, the auxiliary port is located at the same cartilage as the observation port, forming an isosceles triangle with the other two ports. Under the assistance of the equipment nurse, an incision protection sleeve is attached to each port in the presence of lubricants. Along with a 30° thoracoscope, almost the whole thoracic cavity can be visualized. Once the incision is made, the equipment nurse hands a gauze pad to the operator (with a toothed oval clamp holding 1/4 of the pad) expose the surgical site by pressing the lung tissue.

Nerve block

Intrathoracic vagus nerve block is performed to suppress the cough reflex caused by the traction of lung tissue during the thoracoscopic operations. Under direct thoracoscopic vision, 3-5 mL 1% Lidocain was injected near the vagus nerve beneath the mediastinal pleura. The equipment nurse hands a endoscopic needle connected with a syringe containing 1% Lidocain to the operator, who then performs the vagus nerve block. Both the nurse and the operator must check the concentration and dosage of the drug.

Surgical procedures

During the surgery, the equipment nurse hands the operator a gauze pad and oval clamp for exposing the lung tissue. Also, the equipment nurse hands the endoscopic siphon head to the assistant to facilitate the exposure. The operator uses right angle clamp, fissure pliers, electrocautery hooks or ultrasonic scalpel to dissect the incomplete fissures. The nurse installs the Johnson & Johnson pleural automatic cutter & stapler and then hands it to the operator, who separates the incomplete fissures. During the lower lobe resection, ultrasonic scalpel is handed to the operator to separate the inferior pulmonary ligament, so as to slowly expose the inferior pulmonary vein. electrocautery hooks are handed to the operator to open the venous or artery sheath, thus skeletonizing the vessels. Thoracoscopic forceps are handed to the operator to finalize the vascular exploration. The pleural automatic cutter & stapler are handed to the operator to disconnect the inferior pulmonary artery and vein. Also, the lower lobe bronchus is disconnected with the cutter. During the resection of other lung lobes, the equipment nurse hands the vessel-separating clamps of different lengths and different radians to the operator in accordance with the operation steps; in addition, different

types of cartridges are selected based on the thickness of the lung tissues. After the lobectomy, endosurgical extraction bag is handed for collecting body tissues. Systematic lymphadenectomy is performed (or not) based on the frozen section pathological results. Leak testing is conducted following the anastomosis by injecting the prepared warm salt solution into the thoracic cavity. Chest tubes and chest drainage bottles are also prepared. The amounts of equipment, blood pads, and gauzes are routinely counted. If the results are correct, close the incision.

Cleaning and maintenance of equipment and instruments

The equipment and instruments used for VATS are sophisticated and relatively expensive. Proper maintenance can not only prolong the service lives of these equipment and instruments but also ensure their performances. Therefore, all these equipment and instruments must be kept in special counters and routinely maintained by specially assigned personnel.

Results

A total of 63 patients underwent VATS lobectomy under non-intubated anesthesia in our hospital from July 2012 to July 2013. Good teamwork, proper pre-operative visit, and comfortable intra-operative position had ensured the success of these operations. During the surgery, appropriate instruments were handed according to the surgical requirements. After the surgery, all the thoracoscopic equipment and instruments were properly cleaned, disinfected, and maintained. In 2 of these 63 patients, the non-ideal lung collapse affected the operations; resulting in the change in anesthesia mode; in another patient, endotracheal intubation was adopted due to intra-operative bleeding. In the remaining 60 cases, shrinking of the lungs was achieved by artificial pneumothorax and the exposure of the surgical fields was satisfactory. The surgery was smooth.

Discussion

Although VATS lobectomy under non-intubated anesthesia has still not been widely applied in China, it has demonstrated to be a safe and feasible technique (8). Due to the small operation space under the thoracoscope, the operator must be highly skillful and have rich clinical experiences (3,9). In addition, the surgery has minimally invasive approaches, and the types and lengths of the endoscopic equipment often differ (2). Thus, nurses in

the operation room must be highly skillful, and good communication is required among the medical team.

The operations of VATS are mainly performed under the thoracoscope, and the camera is equivalent to the surgeon's eyes. Thus, there are some specific requirements for the camera holder. A clear surgical field is the prerequisite for a successful operation. The thoracoscope needs to be soaked with hot brine before it enters the thoracic cavity. During the surgery, the equipment nurse must carefully protect the optical fiber and camera system of the thoracoscope and prevent any turnover. The contaminated lens must be soaked timely, so as to ensure the clearness and brightness of the surgical field.

Under non-intubated anesthesia, the operator needs to use specific instruments to compress the normal lung tissue to expose the surgical field, during which the equipment nurse will hand a folded gauze pad to the operator using a toothed oval clamp. Such a gauze pad can expose the lung tissue, and thus minimize any potential injury to the lung tissue; also, when used for compressing the bleeding site, it can temporarily stop bleeding. During the intrathoracic vagus nerve block, since the endoscopic puncture needle is longer than the conventional puncture needle, it may be less stable. Thus, we connect the endoscopic puncture needle, connecting tube, and a syringe; during the surgery, the nurse hands the whole system to the operator. By doing so, we increased the coherence of surgery, reduced post-puncture bleeding, and lowered the failure rate.

In conclusion, adequate pre-operative preparation, careful nursing, and close cooperation can achieve a successful non-intubated anesthesia VATS.

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