Perioperative Nursing Care for a Patient After Left Pneumonectomy: A Case Report

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Abstract

This article summarizes the nursing care measures for a postoperative patient following left total pneumonectomy. Through enhanced recovery nursing, pain management, observation and prevention of complications, and traditional Chinese medicine nursing care, the nursing staff aimed to accelerate patient recovery and shorten hospital stay, thereby providing novel insights for clinical nursing management of this condition.

Full Text

Perioperative Nursing Care for a Patient After Left Total Pneumonectomy

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Abstract

This article summarizes the nursing interventions for a patient following left total pneumonectomy. Through comprehensive measures including enhanced recovery after surgery (ERAS) protocols, pain management, complication observation and prevention, and traditional Chinese medicine (TCM) nursing, the care team accelerated the patient's rehabilitation and shortened hospital stay, providing novel insights for clinical nursing of this condition.

Keywords: left total pneumonectomy; post-pulmonary care; accelerated rehabilitation care
KEY WORDS: left total pneumonectomy; Post-pulmonary care; Accelerated rehabilitation care

Introduction

Lung cancer has surpassed all other malignant tumors in incidence in China and represents the leading cause of cancer-related mortality. By 2025, the total number of lung cancer patients in China is projected to reach one million, making it the country with the highest lung cancer burden globally [1]. Data from the past three decades reveal a staggering 465% increase in lung cancer mortality, with lung cancer currently accounting for 27% of all cancer deaths—a proportion that continues to rise at an annual rate of 26.9%. Among all lung cancer subtypes, lung adenocarcinoma is the most common, comprising approximately 40-50% of cases [1-2]. Lung adenocarcinoma originates in the bronchial glands and represents a subtype of non-small cell lung cancer (NSCLC) with the highest incidence in China [3]. Surgical resection remains the definitive treatment for lung adenocarcinoma, offering effective management for early-to-moderate stage patients by removing malignant lesions, performing lymph node dissection, halting cancer progression, and enabling prophylactic postoperative chemotherapy [3-4]. The five-year survival rate for early-stage lung adenocarcinoma after surgery is relatively high, and absence of recurrence within five years is considered curative, making postoperative care critically important. Our department successfully completed 20 left total pneumonectomy procedures between 2017 and 2023. This report details the postoperative nursing care for a patient who underwent left total pneumonectomy on March 1, 2023.

Clinical Data

The patient was a 64-year-old male, 175 cm in height and 65 kg in weight, admitted with cough and sputum production for over four months. Imaging revealed a left upper lobe space-occupying lesion, and fiberoptic bronchoscopy indicated a malignant tumor at the left upper lobe orifice, consistent with adenocarcinoma. The diagnosis was left upper lobe malignant tumor. Preoperative pulmonary function tests were normal, indicating tolerance for single-lung resection.

Upon initial admission on March 2, the patient's vital signs and clinical presentation were as follows: temperature 36.6°C, pulse 90 beats/min, respiration 20 breaths/min, blood pressure 116/89 mmHg. The patient was alert and in good spirits, able to cooperate with perioperative rehabilitation training. Pain score was 3, and Autar score (deep vein thrombosis risk assessment) was 15. The patient underwent video-assisted thoracoscopic surgery (VATS) left total pneumonectomy under general anesthesia. The procedure was successful, and the patient regained consciousness postoperatively with a left thoracic drainage tube placed and kept clamped.

On March 3, a bedside chest radiograph showed good expansion of the remaining lung with the trachea in midline position. Intravenous fluids were administered at 100 ml/h via infusion pump. Pain score was 2, and Autar score was 13. On March 4, the thoracic drainage tube was removed. The patient was instructed to protect the wound dressing and was guided through coughing exercises with

nebulization therapy. Pain score was 1, and Autar score was 12. On March 5, the patient had not had a bowel movement since surgery; after intervention, he passed soft yellow stool once. Pain score was 1, and Autar score was 10. On March 6, the patient demonstrated good recovery and was discharged according to medical orders, receiving discharge rehabilitation education and home care instructions.

Nursing Interventions

2.1.1 Exercise Training

Postoperative patients require frequent coughing and sputum expectoration. Effective coughing exercises facilitate early removal of respiratory secretions and evacuation of intrathoracic air and fluid, enabling earlier removal of the thoracic drainage tube and preventing postoperative pulmonary infection. First, patients were instructed in active coughing techniques [5]: (1) In sitting or supine position, the patient performs 5-6 deep breaths, then takes a deep inhalation, briefly holds the breath (approximately 2 seconds), and forcefully exhales. (2) At the end of exhalation, the patient performs consecutive coughs with an open mouth, generating high-velocity airflow to mobilize airway secretions to the pharynx for expectoration. (3) Family members may gently press on the patient's operative side chest wall during breathing and coughing to reduce chest wall vibration and incision tension, thereby alleviating pain. Second, patients were taught pursed-lip breathing [6]: inhale through the nose and exhale through pursed lips (as if whistling), slowly releasing air through the narrowed mouth opening. Typically, inhalation lasts 2 seconds, while exhalation is gradually prolonged to approximately 10 seconds. This patient was able to perform respiratory rehabilitation exercises in bed after regaining consciousness from anesthesia. On postoperative day 1, the patient was assisted with ambulation and guided through effective breathing training to promote lung re-expansion.

2.1.2 Optimizing Nutritional Status

Postoperative dietary recommendations emphasize light meals while avoiding hypoalbuminemia, with medium-chain triglycerides (MCT) as a primary component [7]. To effectively reduce nitrogen loss, a personalized nutritional plan was developed based on the patient's individual condition, providing 1.5 g/kg/day of protein with a macronutrient ratio of approximately 20:30:50 for protein, fat, and glucose to enhance immunity. Following pneumonectomy, increased respiratory rate due to pain and decreased pulmonary function, combined with fluid loss from coughing, sputum production, and pleural effusion, necessitates increased water intake. Patients are advised to consume 1500-2000 ml of water daily, using the absence of thirst and light-colored urine as indicators, to maintain moist respiratory mucosa and facilitate sputum expectoration [8].

2.1.3 Prevention of Pulmonary Artery Embolism

After regaining consciousness, patients can immediately begin active movement of fingers, wrists, toes, and ankles. Four hours postoperatively, under medical supervision, patients perform leg flexion and extension exercises every two hours [9]. Excessive straining during bowel movements may cause preformed thrombi to dislodge before dissolution, increasing pulmonary embolism risk. Therefore, maintaining regular bowel movements and preventing constipation are crucial for pulmonary embolism prevention [10]. To prevent postoperative constipation, this case employed topical medication combined with acupoint massage (Tianshu acupoint), enabling successful defecation on March 5 and reducing pulmonary embolism risk.

2.2 Pain Management

Pain can induce neurogenic hypotension, weak coughing, and shallow, rapid breathing that restricts chest movement [11]. Accurate and timely pain scoring provides a basis for clinical analgesic administration and represents the primary measure to reduce patient suffering and psychological burden. To minimize external factors and objective description errors, the medical team utilized the intuitive Numerical Rating Scale (NRS) to assess pain levels, yielding an initial score of 3. Following intervention measures, the pain score decreased to 1, with significant improvement enabling normal verbal communication [12]. Patient-controlled analgesia pumps are routinely used postoperatively; if efficacy is inadequate, appropriate analgesics are administered within 48-72 hours after surgery [13]. Medical staff should closely monitor the patient's respiratory status during this period to detect any respiratory depression.

2.3 Tube Fixation and Care

Postoperatively, the closed thoracic drainage tube was maintained in a clamped state [Figure 1: see original paper] and secured using a combination of figure-eight fixation and claw-shaped adhesive tape [Figure 2: see original paper] to prevent dislodgement. When the closed thoracic drainage tube is clamped, close attention must be paid to any changes in tracheal position. If the trachea deviates toward the healthy side, this may indicate excessive bleeding or fluid accumulation in the operative hemithorax, creating pressure exceeding that of the healthy side. In this situation, the medical team must be notified immediately, and the drainage tube should be opened promptly according to medical orders while continuing to monitor the patient's condition. Conversely, if the trachea deviates toward the operative side, this may result from excessive drainage of fluid and air from the operative hemithorax or overexpansion of the healthy lung, causing decreased intrathoracic pressure on the operative side. This condition also requires immediate physician notification, attention to abnormal ECG findings, utilization of infusion pumps, guidance for early patient mobilization, and symptomatic management based on identified causes.

For patients undergoing total pneumonectomy, postoperative monitoring should focus on the clamped status of the thoracic drainage tube, with regular percussion of the clamped hemithorax [14]. If the patient experiences respiratory distress, shortness of breath, or significant fluid accumulation is detected upon percussion, the physician should be notified immediately to assist with opening the thoracic drainage tube promptly, ensuring unobstructed drainage with negative pressure controlled between -6 and -10 cmH2O, and assessing pressure fluctuations based on respiratory status. If drainage volume is minimal but mediastinal shift is excessive, temporary clamping of the thoracic drainage tube may be necessary to adjust intrathoracic pressure and correct mediastinal swing [15].

[Figure 1: see original paper] Closed thoracic drainage tube in clamped state
[Figure 2: see original paper] Figure-eight fixation method

2.4 Observation and Nursing of Complications

Arrhythmia is a relatively common complication after pneumonectomy, frequently manifesting as atrial fibrillation or flutter, typically occurring within the first three postoperative days [16]. Research has identified multiple risk factors for postoperative atrial fibrillation, including advanced age (over 65 years), long-term smoking history, emphysema, prior arrhythmia, intraoperative blood loss, pericardial irritation or injury during surgery, forced expiratory volume in one second (FEV1) $ $1.5 L, and incomplete postoperative lung expansion. Preoperative cardiac assessment, meticulous surgical technique, and prophylactic preoperative beta-blocker administration can effectively reduce postoperative atrial fibrillation risk [17]. For postoperative patients, continuous infusion pump control of fluid administration rate at a constant speed, accurate 24-hour intake and output recording, and constipation prevention effectively reduce complication incidence.

Pulmonary infection represents another common postoperative complication [18]. The pathogenesis may involve inadequate postoperative pain control leading to decreased coughing and sputum expectoration capacity, resulting in sputum accumulation and infection [19]. Additionally, failure to perform postural drainage or timely bedside activity may contribute to pneumonia development. Furthermore, significant postoperative reduction in vital capacity and oxygenation system dysfunction may trigger acute respiratory distress syndrome, causing respiratory failure and increasing perioperative mortality risk [20]. Therefore, timely and effective pain control, promotion of coughing and sputum expectoration, and early postural drainage and bedside activity are crucial for postoperative patients. The incidence and severity of these complications increase with age and may require reintubation and mechanical ventilation.

2.5 Traditional Chinese Medicine Nursing

Traditional Chinese medicine considers diet essential for human health, nourishing the extremities and internal organs. The *Huangdi Neijing* states: "When food and drink enter the stomach, they disperse essence and qi, ascending to nourish the spleen. The spleen disperses essence and qi, ascending to the lungs, regulating water metabolism, descending to the bladder. Water and essence distribute throughout the body, flowing along the channels of the five viscera and six bowels, adapting to the four seasons and the yin-yang changes of the five viscera to maintain normal physiological function [21]." Therefore, postoperative patients may adjust their diet according to their condition to improve coughing, effectively regulate constitution, and promote immune function recovery. TCM four diagnostic methods are employed to assess emotional changes and identify emotion-related influencing factors, with appropriate psychological counseling implemented based on evaluation results [22]. According to the principle of five musical tones entering five viscera, Shang-mode music is selected with controlled volume to achieve emotional regulation. After pneumonectomy, patients experience some degree of qi and blood impairment, predisposing to dampness retention and constipation. Acupuncture stimulation of Tianshu acupoint [Figure 3: see original paper] combined with herbal medicine to regulate spleen and stomach function can promote intestinal motility and relieve constipation.

[Figure 3: see original paper] Tianshu acupoint

Conclusion

To improve postoperative outcomes and enhance quality of life for patients undergoing total pneumonectomy, this case demonstrates that implementation of enhanced recovery concepts, precise pain management, tube fixation care, and TCM nursing resulted in satisfactory patient recovery and high satisfaction with medical care. A nursing framework based on staged timelines and effective follow-up practice facilitates cardiopulmonary function recovery, reduces postoperative pulmonary complication risk, improves postoperative symptoms and quality of life, and promotes cardiopulmonary endurance enhancement. This experience provides valuable insights for future clinical practice and offers new perspectives for nursing care.

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Note: Figure translations are in progress. See original paper for figures.