Nursing Experience in a Patient with Spontaneous Pneumothorax Secondary to Pulmonary Bullae Complicated by COVID-19 (Postprint)

Authors: Jia Xuefei

Date: 2023-04-24T00:00:00+00:00

Abstract

This article summarizes the nursing experience of a patient with spontaneous pneumothorax caused by pulmonary bullae complicated by COVID-19. Routine nursing care encompassed measures including medication administration, isolation, nutritional support, and lifestyle management. Furthermore, tailored to the patient's condition, respiratory management, drainage management, and nursing interventions for gas evacuation and sputum drainage were implemented, which effectively reduced related complications and positively contributed to patient recovery.

Full Text

Nursing Experience of a COVID-19 Patient with Spontaneous Pneumothorax Caused by Pulmonary Bulla

JIA Xuefei
Department of Healthcare, Beijing Hospital, National Center of Gerontology; Institute of Geriatric Medicine, Chinese Academy of Medical Sciences, Beijing

Abstract

This paper summarizes the nursing management experience for a case of COVID-19 complicated by spontaneous pneumothorax caused by pulmonary bulla. Routine nursing care included medication administration, isolation protocols, nutritional support, and daily life management. Additionally, targeted interventions such as respiratory management, drainage care, air evacuation, and sputum excretion were implemented based on the patient's condition, which effectively reduced related complications and positively contributed to patient recovery.

Keywords: pulmonary bulla; spontaneous pneumothorax; COVID-19; respiratory function; sputum excretion

The COVID-19 pandemic represents the most serious public health emergency in recent years. Spontaneous pneumothorax occurs when increased intrapulmonary pressure causes rupture of pulmonary bullae, leading to symptoms such as chest pain, chest tightness, and dyspnea; in severe cases, shock may occur. Oxygen therapy and air evacuation are the most critical nursing interventions. Strengthening respiratory management in COVID-19 patients is essential, as effective airway management can correct hypoxia and improve prognosis. This article reports the nursing experience for a COVID-19 patient with spontaneous pneumothorax caused by pulmonary bulla.

1 Clinical Data

The patient was a male admitted with fever and dry cough. Chest CT performed on Day [date] indicated bilateral infectious lesions, suggestive of viral pneumonia. After admission, the patient received antiviral therapy, anti-infective treatment, and oxygen therapy, but continued to have intermittent fever accompanied by wheezing and decreased activity tolerance. On Day [date], he was transferred to the ICU where nucleic acid testing confirmed COVID-19, and treatment with anti-infective and anti-asthmatic therapy was continued.

As the lesions progressed and consolidation increased, the patient was transferred to a designated COVID-19 treatment hospital on Day [date]. Treatment included methylprednisolone, ribavirin, and oseltamivir for antiviral therapy; cefoperazone-sulbactam, levofloxacin, and moxifloxacin for antibacterial therapy; as well as immunoglobulin and fluid replacement. During hospitalization, the patient developed bilateral pneumothorax due to pulmonary bullae on Day [date], requiring bilateral closed thoracic drainage with continuous oxygen delivery via reservoir mask. The patient was placed on bed rest with cardiac monitoring and close observation of vital signs. Nutritional support, daily living care, and psychological nursing were also strengthened. The patient was encouraged to communicate with other patients and share his hospital experience with family via video calls to build confidence in recovery. Additionally, music therapy and functional exercises were implemented: appropriate relaxing music was selected before sleep under the guidance of a music therapist, and pulmonary function exercises were performed under the guidance of a respiratory therapist. After two consecutive negative nucleic acid tests, the patient was discharged on Day [date].

2 Nursing Care

2.1 Routine Nursing Care

Medication Nursing: Medications were administered strictly according to physician orders. Before medication, patients were informed about drug effects

and precautions to ensure rational drug use. During and after medication administration, nurses closely observed for adverse reactions, accurately documented findings, and promptly reported them to physicians.

Isolation Nursing: In accordance with the "Diagnosis and Treatment Protocol for Novel Coronavirus Pneumonia (Trial Version 7)" issued by the State Council, the patient was transferred to a designated hospital with appropriate isolation and protective conditions. The patient changed disposable surgical masks daily and was instructed on the importance of proper mask wearing technique. When coughing or expectorating, the patient was taught to cover his mouth and nose, wrap secretions in tissue paper, and discard them in yellow waste bags. Disinfectant was prepared in the room, and the patient was taught proper seven-step handwashing technique. The patient's activity range was restricted, and visits were prohibited.

2.2 Targeted Nursing Care

Oxygen Therapy Nursing: Oxygen therapy facilitates lung re-expansion in pneumothorax patients, typically delivered via nasal cannula or face mask at 1-3 L/min. In this case, due to spontaneous pneumothorax complicated by COVID-19, low-flow oxygen was administered via reservoir mask to promote alveolar expansion. Sequential oxygen therapy was implemented based on the patient's condition and disease progression, selecting an orderly and coherent oxygen delivery method according to physician orders.

Air Evacuation Nursing: Mild lung collapse does not severely impact the respiratory system and generally requires no intervention. In this patient, lung collapse reached approximately 30%, affecting pulmonary function to some extent. Nursing interventions included instructing and encouraging the patient to perform deep breathing exercises daily: slow deep inhalation followed by slow, uniform exhalation to relieve intrapulmonary pressure and promote pneumothorax resolution. According to the patient's actual condition, exercises were performed 3 times daily, with approximately 10 repetitions each time, while monitoring for chest pain or dyspnea. The initial air evacuation volume after chest tube placement was controlled at less than 1000 mL, and antibiotic therapy was administered concurrently.

Drainage Nursing: The patient had bilateral closed thoracic drainage tubes placed during hospitalization. Nursing staff performed regular dressing changes at the puncture site according to aseptic technique, using iodophor disinfection and sterile gauze coverage to prevent infection. The drainage tubes were regularly squeezed each shift, with continuous monitoring of tube patency, bubble formation and water column fluctuation in the drainage bottle, and fluid color to detect bleeding risk. The patient was instructed to change positions regularly to promote lung expansion. Drainage tubes were secured to the bed rail, and the patient was taught to avoid slippage, traction, or kinking when turning or getting up, maintaining strict tube closure. When changing the drainage bottle,

the tube was clamped with two hemostats, and the bottle was placed below bed level.

Nutrition Nursing: Upon admission, the Nutritional Risk Screening (NRS 2002) was used for nutritional assessment. Based on the results, a nutritional intervention plan was formulated: high-protein, high-calorie, high-fiber diet was provided, avoiding cold foods; the patient was encouraged to drink plenty of water and received milk, eggs, and fruits daily, with attention to water-electrolyte balance and maintenance of bowel regularity. As eating interrupted oxygen therapy and caused oxygen saturation to decrease, meal duration was strictly controlled to reduce exposure and infection risk.

Daily Living Care: Due to decreased immunity and bilateral pneumothorax, the patient experienced chest tightness, palpitations, and dyspnea after speaking or minimal activity. Nursing staff instructed him to maintain bed rest and avoid fatigue. The emergency call button was placed within easy reach for timely medical assistance, and a urinal and bedpan were provided at the bedside to reduce accident risk.

Fall Prevention: Upon admission, the Morse Fall Scale was used to assess fall risk. The patient was instructed to follow the "three 30-second" principle when changing positions and to move slowly, with bilateral bed rails provided to prevent falls.

Psychological Nursing: Research shows that over 30% of people develop psychological problems during public health emergencies. COVID-19 patients in isolation wards without family visits, combined with pneumothorax symptoms such as chest tightness and dyspnea, are prone to anxiety, tension, and fear. Nursing staff provided timely concern, answered questions in real-time to alleviate concerns, and encouraged communication with other patients and video sharing with family to build confidence in recovery.

Sputum Excretion Nursing: Sputum excretion is an important nursing measure to prevent airway obstruction and effectively expand alveoli. Before chest tube placement, the patient was positioned prone combined with mechanical vibration to enhance respiratory muscle strength and increase cough reflex. According to the patient's tolerance, sputum excretion care was performed 2 times daily for 15 minutes each, starting 2 hours after meals. In lateral decubitus position with the body leaning forward, percussion was performed from outer to inner, bottom to top. After vibration, the patient was encouraged to cough actively. After chest tube placement, the drainage tubes required secure fixation during sputum excretion.

3 Discussion

Spontaneous pneumothorax caused by pulmonary bulla has characteristics of acute onset and rapid progression. In this case, complicated by COVID-19, dyspnea symptoms were further exacerbated. In addition to active anti-infective

and antiviral treatment, targeted nursing measures are needed to promote patient recovery. Oxygen therapy and air evacuation nursing were important components of care for this patient. Sequential oxygen therapy was used, which ensured nursing quality while effectively reducing the risk of aerosol transmission. The patient's severe condition and impaired respiratory function required effective air evacuation nursing to prevent disease progression. Additionally, as the patient had indwelling closed thoracic drainage tubes, drainage management was essential to reduce infection risk. This patient had difficulty with sputum excretion, which could easily lead to airway obstruction. Therefore, before chest tube placement, prone positioning combined with mechanical vibration was used to strengthen respiratory muscles and enhance cough reflex to promote sputum excretion.

The treatment and nursing care of COVID-19 combined with other diseases will be a focus of future medical work. In this study, based on routine nursing care, targeted nursing measures were formulated according to the characteristics of spontaneous pneumothorax and COVID-19. Through active treatment and nursing, satisfactory outcomes were achieved, and the experience is summarized for clinical reference.

Conflict of Interest Statement: The author declares no conflict of interest in this article.

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