Blood Pleurodesis: Thoracotomy Patients and Air Leaks

A persistent air leak is not an unusual occurrence for a patient with a thoracotomy (Cerfolio & Bryant, 2008). However, air leaks that persist for more than 5 days increase hospital length of stay (LOS), risk of infection, and cost of care. Limited treatment options are available currently for patients with persistent air leaks. One treatment form, blood pleurodesis, requires nurses to give careful attention to preparing and assisting a patient.

A Medline search ranging from 1948 to 2009 was conducted using the following key words: blood pleurodesis, persistent air leak, nursing care. This search resulted in a number of medical articles describing blood pleurodesis. No literature was found regarding nursing care. Medline and CINAHL searches were performed in February 2012 using the same key words to assess more current literature. No articles relating to nursing care were found in this search.

Air Leaks: A Typical Occurrence

Patients returning from surgery following thoracotomy typically have a chest tube and drainage system in place. Noting an air leak during assessment of the drainage system is not unusual (Droghetti et al., 2006). The leak may result from minute tears of the lung parenchyma due to the mechanics of surgery. It usually resolves within the first 24-48 hours. To facilitate the re-expansion of the affected lung and closure of the air leak, the nurse assists the patient to cough, deep breathe, and ambulate frequently. In addition, the surgeon may order suction applied to the drainage collection system. A typical LOS is 5-7 days (Andreetti et al., 2007). An air leak that does not resolve within this period of time is considered a persistent air leak, and needs to be addressed (Droghetti et al., 2006).

A persistent air leak may take weeks to resolve (Droghetti et al., 2006; Rinaldi, Felton, & Bentley, 2009). During this time, cost of care increases for each additional hospital day. Equally important, the longer the chest tube is left in place, the greater the risk it will dislodge or disconnect. The patient’s risk of infection and discomfort also increases (Andreetti et al., 2007).

Because treatment options for a persistent air leak are limited, a physician may prefer simply to wait for the leak to close on its own. Applying suction may facilitate lung adherence to the chest wall. If the air leak is small, another option may be to send the patient home with a one-way valve, such as a Pneumostat™, in place. Similar to one-way valves used in the emergency department for treatment of a pneumothorax, a Pneumostat permits air to escape, yet provides the capability of checking for an air leak. The device is small enough to allow the patient more freedom of movement, and if the patient resides nearby, the opportunity to continue recovering at home. After the air leak has resolved, the valve and chest tube can be removed in the physician’s office (McKenna, Mahtabifard, Pickens, Kusuanco, & Fuller, 2007).

If the air leak does not stop, a patient may have to return to surgery. However, the physician may first choose to perform blood pleurodesis. Often used in the treatment of a chronic pneumothorax, pleurodesis removes the pleural space by causing the visceral and parietal pleural layers to bind together. Pleurodesis can be created through mechanical or chemical methods (Cho et al., 2009; Merritt, Singhal, & Shragar, 2010).

The surgeon performs mechanical pleurodesis by using a pad to abrade the inside of the chest wall. This creates an inflammatory response along the visceral and parietal pleura, causing the lung to adhere to the chest wall. Chemical pleurodesis can be performed during surgery, or at the patient’s bedside. This technique involves instillation of a sclerosing agent, such as doxycycline or talc, into the pleural space via the chest tube. The goal of chemical pleurodesis is also the production of an inflammatory response. The agent remains in place for 1-2 hours while the patient stays in bed, turning from side to side to aid in distribution. Afterward, the chemical is allowed to drain through the chest tube. It is important to note that chemical pleurodesis can cause considerable pain to the patient. In comparison, blood pleurodesis is performed at the bedside and is painless. In addition to being efficacious, it is a less expensive form of treatment (Andreetti et al., 2007; Ozpolat, 2010).

Blood pleurodesis is sometimes referred to as a blood patch. This term may be more familiar to the nurse, as blood patching is used to treat a headache resulting from a lumbar puncture (van Kooten, Oedit, Bakker, & Dippel, 2008). Blood patches to treat lumbar punctures, as well as air leaks following thoracotomy, use the patient’s blood in an attempt to plug a hole. In blood pleurodesis, the
patching effect is created by the formation of fibrin as it coats minute cracks or holes. In addition, blood creates an inflammatory response that assists the visceral and parietal pleura to adhere better, reducing any air leaks (Andreetti et al., 2007).

The Procedure

Blood pleurodesis is performed using sterile technique; contamination can result in empyema (Rinaldi et al., 2009). No standardized technique has been published for this procedure. However, Rinaldi and colleagues suggested a blood pleurodesis protocol which required the following equipment: “two 50 ml syringes, needle or cannula for phlebotomy, sterile gloves, sterilisation solution (chlorhexidine or iodine), drip stand, large saline flush, spare chest drain” (p. 260).

Using one or two 60 ml syringes, approximately 50-120 ml of the patient’s blood is withdrawn, preferably from a large bore venous catheter, and immediately injected into the pleural space via the chest tube. The chest tube is flushed quickly with 10-20 ml sterile saline to prevent clots forming in the tube (Rinaldi et al., 2009). Clamping the chest tube to prevent blood return is prohibited, as this may result in a tension pneumothorax. Instead, the chest tube drainage system is elevated on an intravenous (IV) pole to maintain water seal protection and also keep the blood in the pleural space. The patient is instructed to remain in bed 1-2 hours, rotating side to side every 15 minutes to facilitate distribution of blood over the affected lung tissue. Afterward, the chest drainage system is returned to the floor. The patient then may be allowed to get out of bed and resume previous activity. Results may not be evident for 24-48 hours, and the procedure may need to be repeated (Andreetti et al., 2007; Droghetti et al., 2006).

A Case Study

A 72-year-old male underwent a thoracotomy for the removal of a carcinoma of the right upper lung. Surgery was without complications, and the patient was transferred to the surgical unit. The receiving nurse noted an air leak in the water seal chamber of the chest drainage collection system. The nurse informed the surgeon, and the patient’s chest drainage system was left to water seal for the remainder of the day. The patient’s recovery period was without incidence. However, the air leak that developed on the day of surgery was still present on postoperative day 6.

Over the course of the patient’s hospital stay, the surgeon opted to let the air leak seal on its own. Suction was applied on postoperative day 2, with an unsuccessful water seal trial on day 5. The decision was made to perform blood pleurodesis on day 7. The nurse prepared the patient for the procedure by answering the patient’s and family’s questions, reassuring the patient that no pain was associated with the procedure. The consent form was read and signed. The nurse determined the patient’s large-bore, peripherally inserted central catheter was patent and blood could easily be withdrawn. The nurse then gathered necessary equipment and was present to assist the surgeon in the procedure. Afterward, the chest drainage system was elevated on the IV pole, and the patient remained on bed rest for 2 hours. The nurse outlined a turning schedule on the white board in the patient’s room and described the need for bed rest. The nurse also continued to monitor the patient’s respiratory status after the procedure because of the potential for a tension pneumothorax if blood had not been flushed completely through the chest drain. When bed rest was completed, the chest drainage collection system was removed from the IV pole and returned to the floor. The patient was assisted out of bed, the nurse assessed his tolerance of the procedure. Nursing assessment the following day revealed no sign of air leak, and chest x-ray indicated the lung had fully expanded. Suction was discontinued, and the patient was monitored for another 24 hours. On postoperative day 9, with complete resolution of the persistent air leak, the chest tube was removed and the patient was discharged from the hospital.

Conclusion

Caring for a patient who develops a persistent air leak after thoracotomy can be a challenge. Blood pleurodesis is one treatment option. The nurse can help ensure positive outcomes by becoming familiar with patient care requirements. 

REFERENCES


