

Management of Persistent Pulmonary Air Leak with the Drentech™ Simple System. Case Report

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ABSTRACT

Persistent pulmonary air leak affects between 10-15% of pulmonary surgical procedures, generally requiring management through the use of conventional chest drainage systems (water-sealed pleural chamber) of subjective interpretation due to poor detection sensitivity. of leaks, resulting in increased morbidity, hospital stay, and costs

KEYWORDS: Persistent pulmonary air leak, Necrotizing Pneumonia

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INTRODUCTION

Pulmonary air leak is a frequent problem in thoracic surgery, its prevalence on the 1st postoperative day is up to 26-54% (1,2). Persistent air leak is defined as that which remains on the 3rd day after surgery (3, 4)

A small group of patients with bacterial pneumonia does not follow the usual predictable course even under optimal conditions of medical treatment, developing a process of necrotizing pneumonia with segmental, lobar extension, even to the entire lung (5), it is decided in these patients the surgical management depending on its extension segmentectomy, lobectomy and/or debridement (5,6). When the necrotic process involves the periphery of the parenchyma, and the most central lung tissue is viable, surgical debridement is recommended, although this is associated with an increase in complications including bleeding and persistent air leak (6). The most important goal in the postoperative management of lung surgery is the adequate drainage of the pleural space of fluid and air.

The measurement or classification of leaks in traditional chest drainage systems are based on the appearance of "bubbles in a chamber" being inherently prone to subjective interpretation, observer variability, as well as clinical experience, prolonging endopleural tube removal and/or making your hasty withdrawal.

The appearance of new digital systems would finally manage to optimize the evaluation by identifying patients with a high risk of air leak for early intervention and/or their conversion

into a one-way valve, allowing outpatient management of the patient and early hospital discharge with adequate results. (7) Currently, there are few studies that evaluate the clinical impact of digital drainage systems compared to conventional ones. The report of this case managed with this therapy on an outpatient basis is made.

CLINICAL CASE

A 64-year-old male patient, dedicated to field activities, currently retired since he was 60 years old, marital status married, primary schooling, lives in a material house, has all the urbanization services, reports exposure to biomass twice a week. week approximately from the age of 15, unknown vaccination schedule. Pathological personal history: He only refers to an ankle fracture that required surgical management at the age of 32, the rest were asked and denied.

Under direct questioning, he refers to the onset of his illness at the beginning of November 2022 with episodes of cough without a predominance of hours with hyaline sputum, which was later accompanied by hemoptysis and dyspnea on medium exertion, unquantified feverish peaks, predominantly at night. , accompanied by pain in the right subcostal region. On 11/25/22, the patient was admitted to hospital with data on systemic inflammatory response, laboratory studies and laboratory studies were performed, reporting: Leukocytes: 23,000 cells/mm³, Neutral: 95%, platelets: 180,000 cells/mm³, Hb: 9.3 mg/ dl, Hct: 27%, a chest TV is performed (**Figure 1**) which reports a 50% pleural effusion with air-fluid

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level in the right hemithorax, thoracentesis is performed, draining 400cc of clear purulent fluid (**Figure 2**).

Medical management and antibiotic therapy based on carbapenem (Meropenem 1gr every 12 hours) is started, Pleural Fluid cytochemistry is performed, which reports DHL: 1762.0 U/L, Glucose: 38, Total Proteins: <2.0 Amylase: <30.0, as well as cytology which reports: Color: greyish, PH: 8, Appearance: Turbid, Total Cells: 80640 cel mm³, Segmented: 97%, Mononuclear Cells: 9%. Requesting evaluation for cardiothoracic surgery for endopleural tube placement, reporting lung entrapment with severe pleural thickening, for which surgical management was chosen. An open right thoracotomy was performed with a muscle-sparing technique on 11/26/22 (**Figure 3**), obtaining as findings: Lung entrapment, organized empyema with severe thickening of the parietal and visceral pleura, destruction of the lung parenchyma at the level of the middle lobe, in after surgery consequent to a large area of destruction on the middle lobe, bleeding in the layer appears as well as poor expansion of said lobe; not being possible to perform a resection of lung tissue as well as hemodynamic deterioration, it was decided to perform damage control by debridement and placement of surgical-type adhesive hemostatics, decortication, placement of 2 probes in the pleural cavity 28Fr anterior and 32Fr posterior and transfer to the care unit intensive care with endotracheal intubation and mechanical ventilation.

A simple control chest CT was performed the following post-surgical day to assess proper placement of drainage tubes. (**Figure 4**)

After 5 days, extubation was assessed without complications and he was admitted to hospital.

Persistent air leak is diagnosed, which evolves to be forced expiratory; being handled with suction water seal.

During his hospitalization with adequate evolution of septic symptoms but maintained expiratory air leak. After 3 weeks, it was decided to connect to a simple Drentech™ portable negative pressure system (**Figure 5**), being kept under surveillance for 2 more days and his discharge was decided on 12/22/22.

Surveillance was carried out by external consultation without complications for a period of 2 months and endopleural tube removal was scheduled on 03/24/23.

On the fifth post-surgical day, he shows adequate ventilation of the lung fields, maintaining a saturation by pulse oximeter of 97%, for which his discharge and follow-up appointment are decided. On 04/08/23, a follow-up appointment was made, he came with a simple CT scan of the control chest, reporting a bilateral reticular pattern of parahilar distribution and predominantly right, where a small irregular area of greater density was observed in the parenchyma compatible with a diagnosis of traction. of focal parenchyma (**Figure 6**) At Clinical Evaluation, well-ventilated lung fields, surgical wound scar in the right hemithorax with adequate evolution (**Figure 7**)



Figure 1. Pleural effusion of 50% right hemithorax



Figure 2. Purulent drainage from the right pleural cavity

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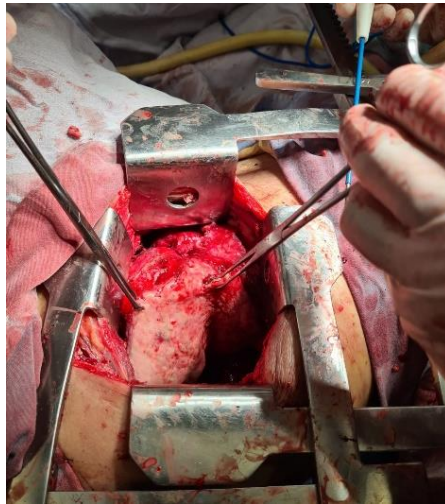


Figure 3. Right open thoracotomy

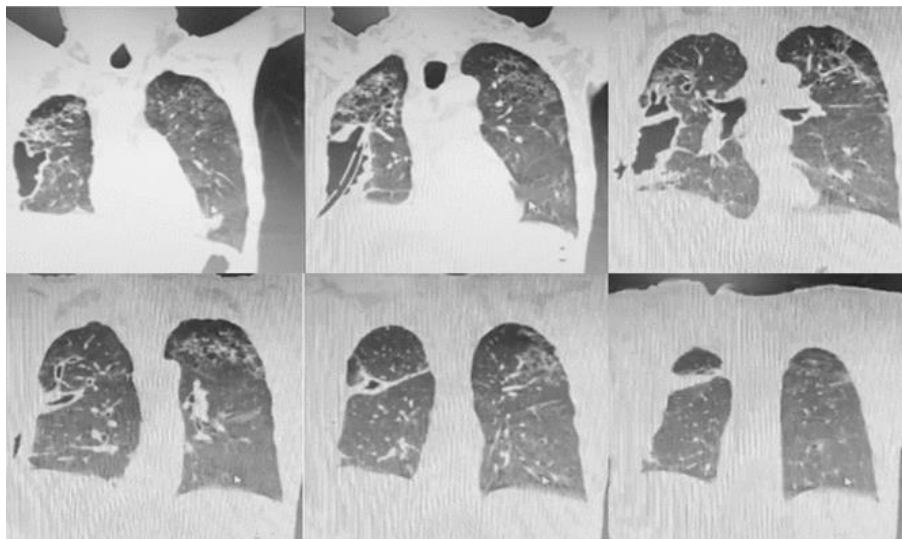


Figure 4. Simple CT of the Thorax on the 1st post-surgical day



Figure 5. Drentech™ Simple



Figure 6. Simple chest tomography 3 months after open thoracotomy



Figura 7. Cicatrización de herida de toracotomía derecha abierta

DISCUSSION

The postoperative management of a lung resection continues to be a challenge through the use of conventional chest drains, being a critical issue with non-standardized guidelines, depending on the surgeon's experience at the time of chest drainage tube removal (1).

Within cardiothoracic procedures, air leak occurs in up to 26-54% on the 1st postoperative day (1,3). A study of 20 children who underwent segmentectomy due to necrotizing pneumonia, presenting a leak as a complication, was published. persistent air in 20%. (7). The use of digital thoracic drainage devices has been useful in the management of patients undergoing thoracic surgery. Through a more objective evaluation of real air leaks, it has been possible to standardize the appropriate moment for the removal of the drainage tubes, as well as to identify the patients with the highest risk of persistent air leaks, promoting their early intervention and/or conversion to a valve. thus allowing early hospital discharge and outpatient management (8). In a multicenter prospective observational study of 117 patients undergoing VATS lung lobectomy for either benign or malignant disease at 3 high-volume centers in Italy between April 2017 and June 2018, reporting that digital devices influenced management clinical reporting in 13 of 25 patients

(52%) allowing early removal of the chest tube due to false positives for air leak compared to conventional drainage systems. (9).

In this patient, the presence of persistent air leak after decortication of lung tissue due to necrotizing pneumonia was identified, which was managed on an outpatient basis with Drentech™ type digital drainage, deciding the removal of chest tubes within a period of 90 days from its intervention. His evolution was favorable without prolonging his hospital stay, proving to be a therapy with adequate results.

CONCLUSION

Portable digital systems offer a conservative therapeutic measure and a significant reduction in hospital stay, in which the air leak cannot be solved, a case report is made, requiring a larger population to report adequate experience and power. standardize the management of said system.

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