



Bronchial intervention for persistent air leaks

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Pneumothorax is a common disease that is treated by various medical personnel because pneumothorax occurs in apparently healthy patients, and in patients accompanied with various lung diseases, systemic diseases, and thoracic interventions. The main specialists treating pneumothorax are emergency physicians, pulmonologists, and thoracic surgeons. Physicians in different fields are also involved, especially during the initial management. Therefore, clear indication of how to manage cases of pneumothorax must be provided, but this is not practiced.

Some well-known guidelines for the management of pneumothorax have been published; nevertheless, there is considerable variation in clinical practice worldwide (1). The deviation between clinical practice and guidelines is likely driven by results of previously performed clinical trials not being practical for clinical application. To address this issue, it is necessary to design clinical studies with treatment objectives and outcomes to evaluate, that will be relevant to clinical practice.

To standardize the management of pneumothorax, the following objectives for pneumothorax treatment can be proposed: (I) to recover from respiratory dysfunction; (II) to stop air leak; and (III) to prevent recurrence (2). These three steps individually do not constitute a practical strategy, but can be used to compare treatments and guide the investigation of outcomes, especially for future clinical trials. This three-step management plan appears to be useful for all types of pneumothorax. In cases without drainage, it is not easy to determine whether there is an air leak. Currently, a few approaches are used to address this question when drainage is absent. These include suspicion

based on the clinical findings, such as symptoms and decreased oxygenation; changes in lung collapse over time, as determined by chest radiograph; and measurement of intrapleural pressure (3).

Treatment of air leaks is an important objective in cases of pneumothorax, and is a worthy concept around which to focus pneumothorax management. As persistent air leaks are associated with prolonged hospital stays and high morbidity—including empyema and pneumonia—management of this condition is clinically important. Dugan and colleagues addressed the issue of air leak management using chest tube drainage without surgery (4). They successfully reviewed management practices and the issue of persistent air leaks on the incidence, risk factors, and treatment options for conservative management, chemical pleurodesis, autologous blood patch pleurodesis, and endobronchial/intrabronchial valves.

With regards to bronchial intervention, Dugan *et al.* focused on one-way bronchial valves placed with a flexible bronchoscope in segmental or subsegmental bronchi. The bronchial valves are expected to reduce airflow across an alveolar-pleural fistula and allow healing. Meanwhile, Endobronchial Watanabe Spigots (EWSs), which were not discussed, provide efficient treatment of persistent air leaks and favorable long-term outcomes (5). In comparing one-way bronchial valves with EWSs that simply occlude the bronchus contributing to an air leak, the advantage of the one-way valves is not readily apparent. When one-way valves are used for lung-volume reduction, the valves work to evacuate air from occluded lung segments; EWSs do not offer this capability. The insertion of EWSs into corresponding bronchi to treat

persistent air leak does not completely stop air leaks in patients with emphysema, owing to collateral air flow, a problem also associated with bronchial valves.

The purpose of bronchial intervention in pneumothorax management, whether one-way valves or EWSs, is to stop air leaks, not to recover from pulmonary dysfunction or to prevent recurrence. The prognosis for bronchial intervention depends on the presence of peripheral collateral ventilation (6). Therefore, in patients with persistent air leaks who usually have emphysema, bronchial intervention often requires the complementary use of chemical or blood patch pleurodesis. Bronchial intervention is a challenging area of pneumothorax management, and the efficacy of each treatment needs to be evaluated and compared in properly-designed clinical trials.

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