Spontaneous Pneumothorax

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Injury/Disease Demographics

- Spontaneous pneumothorax is a pneumothorax that occurs with no obvious precipitating factors (i.e. trauma).
- Typically occur in tall thin young men, smoking is an additional risk factor.
- Incidence of spontaneous pneumothorax is 7.4 per 100,000 and has a recurrent rate of 25-50%.

Clinical Presentation

- Most common complaint is sudden onset of pleuritic chest pain and mild dyspnea.
- Patients are usually at rest and may have been listening to loud music.
- Hypotension, hypoxia, and tracheal deviation (tension pneumothorax) are atypical in spontaneous pneumothorax (<1-2%).

Evaluation/Diagnostics/Imaging

- Physical exam can be normal depending on the size of the pneumothorax.
- An upright chest radiograph is the diagnostic tool of choice.
- CT imaging should be reserved for patients who may have signs of underlying pulmonary pathology on chest radiograph or those with ongoing air leak.

Role of Nonoperative Management and Associated Considerations

- A simple spontaneous pneumothorax (<2cm from chest wall to lung at apex) can be treated with oxygen administration and observation with follow up chest radiograph in 4-6 hours. At 4-6 hours if the pneumothorax is stable, then patient can be managed as an outpatient.
- Persistent pneumothorax should be drained with either a thoracic vent system (Heimlich valve), pigtail catheter, or a small caliber chest tube.
- Hemodynamically unstable individuals require urgent tube placement.
- Patient who are not candidates for operative intervention but have recurrence are candidates for chemical pleurodesis with doxycycline or talc via a chest tube.

Indications for Operative Intervention

- Recurrent spontaneous pneumothorax or ongoing air leak (>3-5 days) require operative intervention.
- Patients who live or work at altitude greater than 6000 feet (i.e. airline pilots or divers) and those who do not have immediate access to hospital care should have operative intervention at the first occurrence.

Pre-operative Preparation

- Chest CT should be obtained in all patients undergoing surgery.
- Patients should be positioned in lateral decubitus position and prepped as if requiring a thoracotomy.
- Single lung ventilation is not mandatory but is helpful for visualization. Bronchial blockers may be useful and obviate the need for double lumen endotracheal tubes.

Operative Techniques/ Intraoperative Considerations

- Video-assisted Thoracoscopy (VATS) is the preferred surgical intervention.
- The goal of VATS is two-fold:
    - Remove apical bleb
    - Pleurodesis
- Blebs are located at the apex of the lung and can be resected with an endoscopic stapler.
- Pleurodesis can be either mechanical or chemical:
    - Mechanical pleurodesis is the disruption of parietal pleura by abrasions.
    - Chemical pleurodesis involves installation of a tetracycline derivative (doxycycline) or talc into the pleural cavity; the subsequent inflammatory reaction causes adhesion of the lung to the chest wall.
- A pleural drain should be left in place at the conclusion of the operation.
- Thoracotomy is reserved only for cases in which VATS fails.

Postoperative Management/ Complications

- Pain control is critical since the patient has had disruption and inflammation of their parietal pleura which has somatic innervation.
- Chest drainage regardless of drain type should be continued until there is no air leak for 24 hours.
- Postoperative pneumothorax can occur after blebectomy, specifically if there was inadequate pleurodesis

- Empyema is a common complication, particularly when talc pleurodesis is done. This is often related to the sterilization process of talc.

Considerations for Special Populations

- Talc slurry can be used but one must recognize the risk for a large inflammatory response and ARDS associated with talc use.
- Smoking cessation should be pursued in all patients with spontaneous pneumothorax.

Suggested Readings

- Tschopp JM, Bintcliffe O, Astoul P, et al. ERS task force statement: diagnosis and treatment of primary spontaneous pneumothorax. Eur Respir J. 2015 Aug;46(2):321-35.
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