Pneumothorax

29/10/2009

Sotiris Papaspyros

Definition-Historical facts

- The presence of air or gas in the pleural cavity.
- Term coined by Itard, a student of Laennec, in 1803
- Laennec described the clinical picture of in 1819. He described most pneumothoraces as occurring in patients with pulmonary tuberculosis, although he recognised that pneumothoraces also occurred in otherwise healthy lungs, a condition he described as “pneumothorax simple”.
- The modern description of primary spontaneous pneumothorax occurring in otherwise healthy people was provided by Kjaergard in 1932.

Kjaergaard H: Spontaneous pneumothorax in the apparently healthy. Acta. Med Scand (Suppl) 43: 1-159, 1932.

Classification

- Primary spontaneous pneumothorax (PSP) occurs in people without underlying lung disease and in the absence of an inciting event.
- Secondary spontaneous pneumothorax (SSP) occurs in people with a wide variety of parenchymal lung diseases.
- Iatrogenic pneumothorax results from incursion into the pleural space secondary to diagnostic or therapeutic medical intervention.
- Traumatic pneumothorax results from injury, typically blunt or penetrating trauma.
- Tension pneumothorax develops when air is trapped in the pleural cavity under positive pressure.
- Catamenial.

PSP

- Typically observed in tall young people without parenchymal lung disease.
- Associated with the presence of apical pleural blebs lying under the visceral pleura, but the exact anatomic site of air leakage is often uncertain.
- Fluorescein-enhanced autofluorescence thoracoscopy (FEAT), a novel method to examine the site of air leak in PSP, shows FEAT-positive lesions that are normal when viewed under normal white-light thoracoscopy.
- Blebs and bullae (called emphysematous-like changes or ELCs) are related to the occurrence of PSP. Thoracic computerized tomography (CT) of patients with PSP shows ipsilateral ELC in 89% and contralateral changes in 80% compared to a rate of 20% among control subjects matched for age and smoking.
- More than 90% are smokers. The relative risk of PSP increases as the number of cigarettes smoked per day increases. More pronounced in female smokers.
- Lung inflammation and oxidative stress are hypothesized to be important to the pathogenesis of PSP. Genetic disorders that have been linked include Marfan syndrome, homocystinuria, and Birt-Hogg-Dube (BHD) syndrome.

SSP

Frequency of occurence

- Airway disease
  - COPD
  - cystic fibrosis,
  - Status asthmaticus
- Infectious lung disease
  - *Pneumocystis jiroveci pneumonia (previously known as Pneumocystis carinii pneumonia [PCP]) was a common cause of secondary spontaneous pneumothorax in patients with AIDS during the last decade. With the advent of highly active antiretroviral therapy (HAART) and widespread use of trimethoprim-sulfamethoxazole prophylaxis, the incidence of PCP and associated SSP has significantly declined.*
  - Necrotizing pneumonias (anaerobic gram- bacteria or staphylococcus)
- Interstitial lung disease
  - Sarcoidosis, Idiopathic pulmonary fibrosis, Langerhans cell granulomatosi,s Lymphangioleiomyomatosis
- Connective tissue disease
  - RA (pyopneumothorax), Ankylosing spondylitis, Scleroderma, Marfan's, Ehlers Danlos
- Cancer
  - Sarcoma, primary lung ca
- Thoracic endometriosis

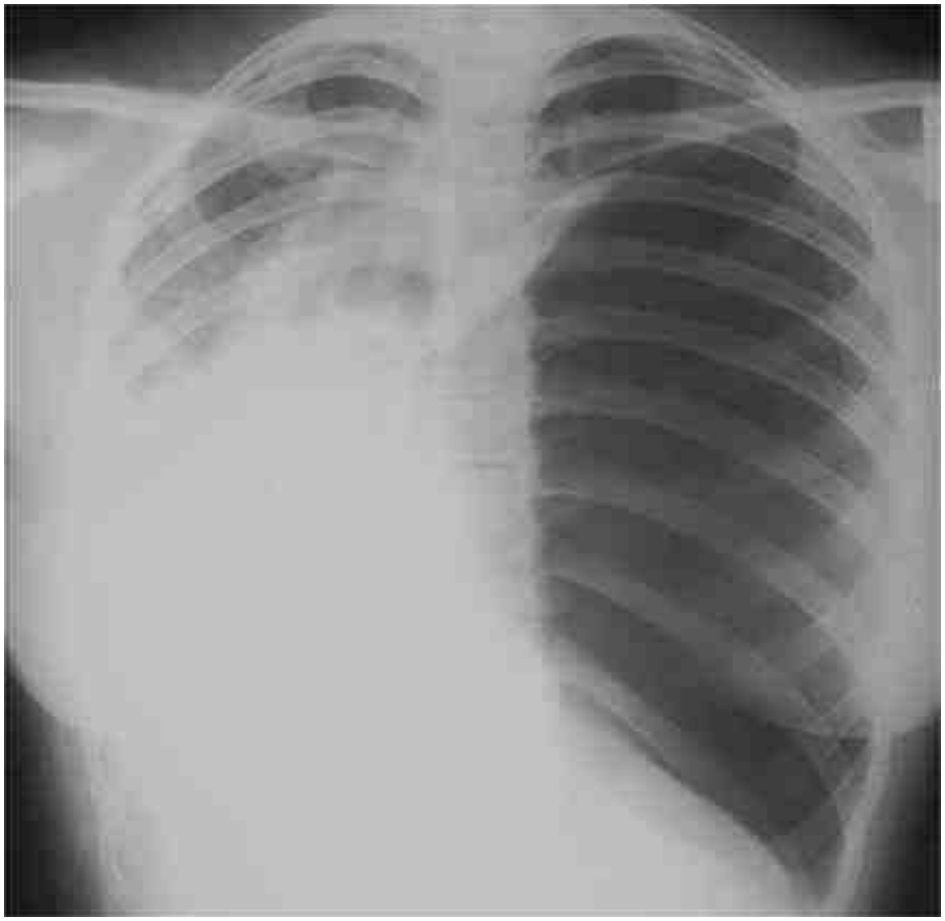
Iatrogenic

- Transthoracic needle aspiration.
- Therapeutic thoracentesis,
- Pleural biopsy,
- Central venous catheter insertion,
- Transbronchial biopsy,
- Positive pressure mechanical ventilationThe routine use of ultrasonography during diagnostic thoracentesis is associated with lower rates of pneumothorax (4.9% vs 10.3%) and need for tube thoracostomy (0.7% vs 4.1%). Similarly, in patients who are mechanically ventilated, thoracentesis guided by bedside ultrasonography without radiology support results in a relatively lower rate of pneumothorax.

Traumatic

- Penetrating and
- Non penetrating lung injuries
  - Complications include hemopneumothorax and bronchopleural fistula.
- Traumatic pneumothoraces can create a 1-way valve in the pleural space and can lead to a tension pneumothorax.

Tension



- Tension pneumothorax typically occurs in the intensive care setting in patients who are ventilated.
- With air trapping in the pleural space, positive pressure rises. This pressure compresses the mediastinum, decreasing venous return to the heart and reducing cardiac output.
- In addition, owing to ipsilateral lung collapse and contralateral lung compression, gas exchange is compromised, leading to hypoxemia.

Catamenial

- Occurring in conjunction with menstrual periods (catamenial refers to menstruation), believed to be caused primarily by endometriosis of the pleura.
- *Treatment is almost always surgical; most cases present during or shortly after menses, and the SP is usually right-sided.*
- *It occurs mostly in women aged 30-40 years*

Incidence-prevalence

- (PSP), the male-to-female ratio of age-adjusted rates is 6.2:1
- (SSP), the male-to-female ratio of age-adjusted rates is 3.2:1
- men, the age-adjusted incidence of primary spontaneous pneumothorax (PSP) is 7.4 cases per 100,000 persons per year. For women, age-adjusted incidence is 1.2 cases per 100,000 persons per year.6
- men, the age-adjusted incidence of secondary spontaneous pneumothorax (SSP) is 6.3 cases per 100,000 persons per year; for women, age-adjusted incidence is 2.0 cases per 100,000 persons per year.
- In patients with COPD, the incidence is 26 cases per 100,000 patients per year.

Age-recurrence rates

- PSPs occur in people aged 20-30 years. Peak incidence is in the early twenties, and PSP is rarely observed in people older than 40 years.
- SSPs occur more frequently in patients aged 60-65 years.
- Recurrences usually strike within the first 6 months to 3 years.
- The 5-year recurrence rate is 28% for primary spontaneous pneumothorax (PSP) and 43% for secondary spontaneous pneumothorax (SSP).

Recurrence

- Recurrences are more common among patients who smoke, patients with COPD, and patients with AIDS.
- Predictors
  - pulmonary fibrosis,
  - younger age,
  - increased height-to-weight ratio.
  - Bullous lesions found on CT scan or at thoracoscopy are not predictive of recurrence.

Clinical signs

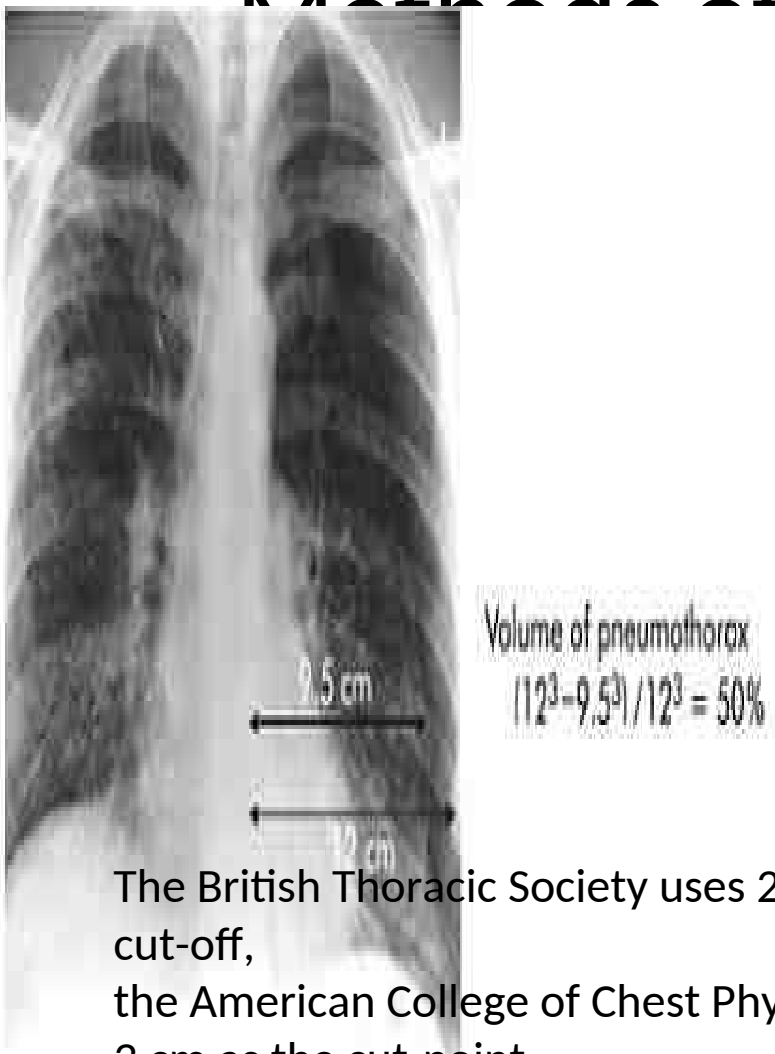
- Acute onset of chest pain and shortness of breath were present in all patients in one series.
- Typically, both symptoms are present in 64% of patients.
- Acute onset of chest pain - Severe and/or stabbing pain, radiating to ipsilateral shoulder and increasing with inspiration (pleuritic)

Risk factors

- PSP
- Smoking Of patients with PSP, 91% reportedly are smokers or were smokers. 102-times higher incidence rates in males who smoke heavily (ie, >22 cigarettes/d), compared to a 7-fold increase in males who smoke lightly (1-12 cigarettes/d).
- Tall, thin stature in a healthy person
- Marfan syndrome
- Pregnancy A 10-year retrospective series of 250 SP cases found 5 pregnant women, suggesting that pregnancy is an unrecognized risk factor.
- Familial pneumothorax has been described as an autosomal dominant inheritance with incomplete penetrance. Up to 10% patients with SP report a positive family history.

- SSP
- obstructive lung disease, Asthma
- HIV/AIDS with Pneumocystis jiroveci (PCP) infection, Pneumonia, Tuberculosis
- Bronchogenic carcinoma, Metastatic, Chemotherapeutic agents
- Cystic fibrosis (CF)Up to 18.9% of patients with CF have SP and have a high incidence of recurrence on the same side after conservative management (50%) or intercostal drainage (55.2%)
- marijuana and COCAINE.
- Interstitial lung diseases, Ankylosing spondylitis, Idiopathic pulmonary fibrosis, Sarcoidosis
- Lymphangioleiomyomatosis, Langerhans cell histiocytosis
- Acute respiratory distress syndrome (ARDS)
- positive pressure ventilation in ICU
- Thoracic endometriosis

Methods of size estimate



The Light-index is calculated as follows: size of PTX (in %) = (1 – DL3/ DHT3) x 100 where DLis the diameter of the lung measured at the hilar level and DHTis the internal diameter of the hemithorax measured at the hilar level. In general, a partial pneumothorax (apical,…) is defined as small.

The British Thoracic Society uses 2 cm as the cut-off,
the American College of Chest Physicians uses 3 cm as the cut-point,
the Light Index uses 15% of the thoracic volume on the posterior-anterior film as the cut point.

Imaging

CT

- CT scan is not recommended for routine use but can:
- Distinguish between a large bulla and a pneumothorax
- Indicate underlying emphysema or emphysemalike changes
- Determine the exact size of the pneumothorax, especially if it is small
- Confirm the diagnosis of pneumothorax in patients with head trauma who are mechanically ventilated

USS

- Ultrasonography has high sensitivity (95.65%), specificity (100%), and diagnostic effectiveness (98.91%) for pneumothorax when using CT as the criterion standard. The sensitivity drops in the ICU, especially in patients with acute respiratory distress syndrome (ARDS).
- Ultrasonography cannot be used to discriminate between a COPD-associated bleb and pneumothorax.

Management options

- Despite large areas of agreement on management of pneumothorax, a full consensus about management of initial or recurrent pneumothorax does not exist. Professional societies differ in their approach to management and hospitalization.Goals are
- to restore an air-free pleural space
- prevent recurrences.

Risk stratification

- Patient's presentation
- Asymptomatic (incidental finding): Treatment decisions are guided by estimate of long-term recurrence risk.
- Symptomatic but clinically stable: Treatment is guided by local resources and conventions for the site of care. The British Thoracic Society (BTS) advocates for simple aspiration and deferring hospitalization in primary spontaneous pneumothorax (PSP) as initial management if stable. A small bore catheter or chest tube placement is recommended by the American College of Chest Physicians (ACCP) Delphi consensus statement.
- Clinically fragile: Treatment is guided by local practice patterns for air evacuation and observation. Comorbid conditions may preclude observation because of decreased cardiopulmonary reserve.
- Life threatening: Pneumothorax that causes hemodynamic instability is life-threatening and must be treated immediately with tube thoracostomy. All documents and recommendations call for intervention if a patient is unstable.

RS2

- Likelihood of resolution
- Very likely to resolve - Small pneumothorax in a hemodynamically stable patient without significant parenchymal lung disease; small iatrogenic pneumothorax
- May resolve - Large pneumothorax in a normal lung (eg, PSP or iatrogenic pneumothorax)
- Unlikely to resolve - Secondary pneumothorax, enlarging pneumothorax (suggests a continuing air leak)
- Won't resolve, could be fatal - Tension pneumothorax; unrecognized air leak

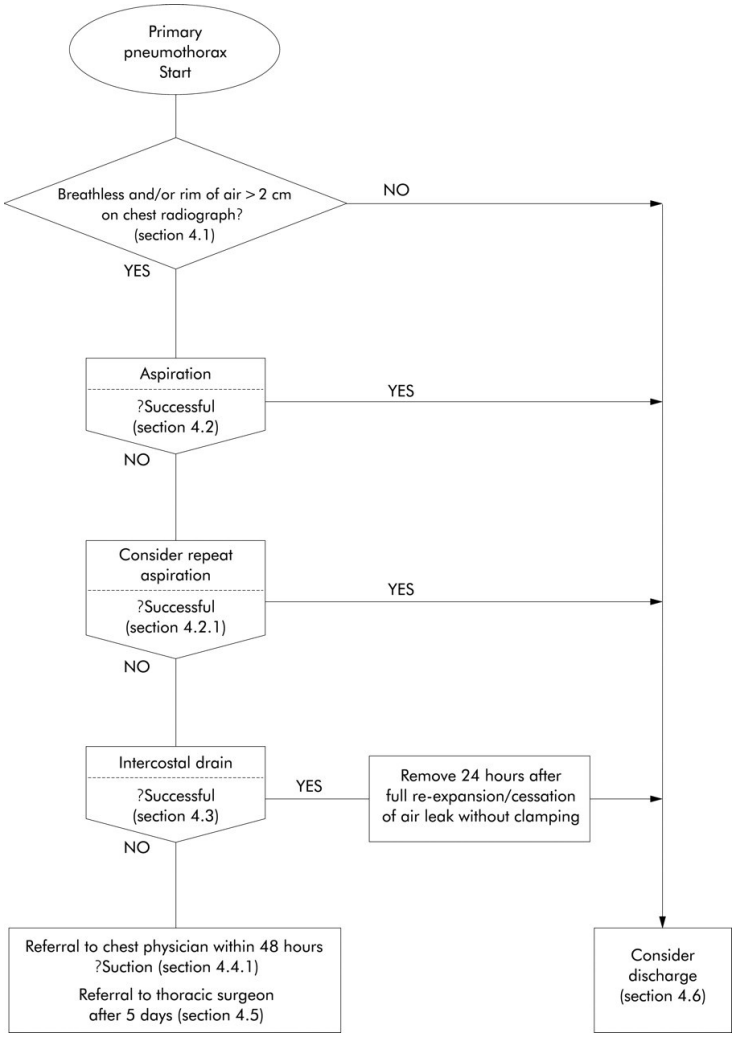
RS3

- Likelihood of recurrence
- Unlikely to recur (iatrogenic pneumothorax in normal lung)
- May recur, but will likely be clinically stable
- May recur and be clinically unstable but emergency care readily accessible
- Very likely to recur (diffuse and progressive pulmonary pathology; eg, lymphangioleiomyomatosis
- Recurrence could be life-threatening (poor cardiopulmonary reserve, limited access to emergency medical care)

Table 3—*Questionnaire Definition of Terms*

Terms	Definition
Spontaneous pneumothorax	No antecedent traumatic or iatrogenic cause
Primary spontaneous pneumothorax	No clinically apparent underlying lung abnormalities or underlying conditions known to promote pneumothorax (eg, HIV disease)
Secondary spontaneous pneumothorax	Clinically apparent underlying lung disease
Pneumothorax size	Determined by distance from the lung apex to the ipsilateral thoracic cupola at the parietal surface as determined by an upright standard radiograph
Small pneumothorax	< 3 cm apex-to-cupola distance
Large pneumothorax	≥ 3 cm apex-to-cupola distance
Patient age groups, yr	
Young	18–40
Older	≥ 40
Clinical stability	
Stable patient	All of the following present: respiratory rate, < 24 breaths/min; heart rate, > 60 beats/min or < 120 beats/min; normal BP; room air O_2 saturation, > 90%; and patient can speak in whole sentences between breaths
Unstable patient	Any patient not fulfilling the definition of stable
Drainage tubes	
Small chest tube or small percutaneous catheter	≤ 14F
Moderate-sized chest tube	16F to 22F
Large chest tube	24F to 36F
Simple aspiration	Insertion of a needle or cannula with removal of pleural air followed by immediate removal of the needle or cannula
Sclerosis (pleurodesis) procedure	
Chemical pleurodesis	Intrapleural instillation of a sclerosing agent through a chest tube or percutaneous catheter
Open or surgical pleurodesis	Pleurodesis performed with a thoracoscope or through a limited or full thoracotomy

Figure 1 Recommended algorithm for the treatment of primary pneumothorax.

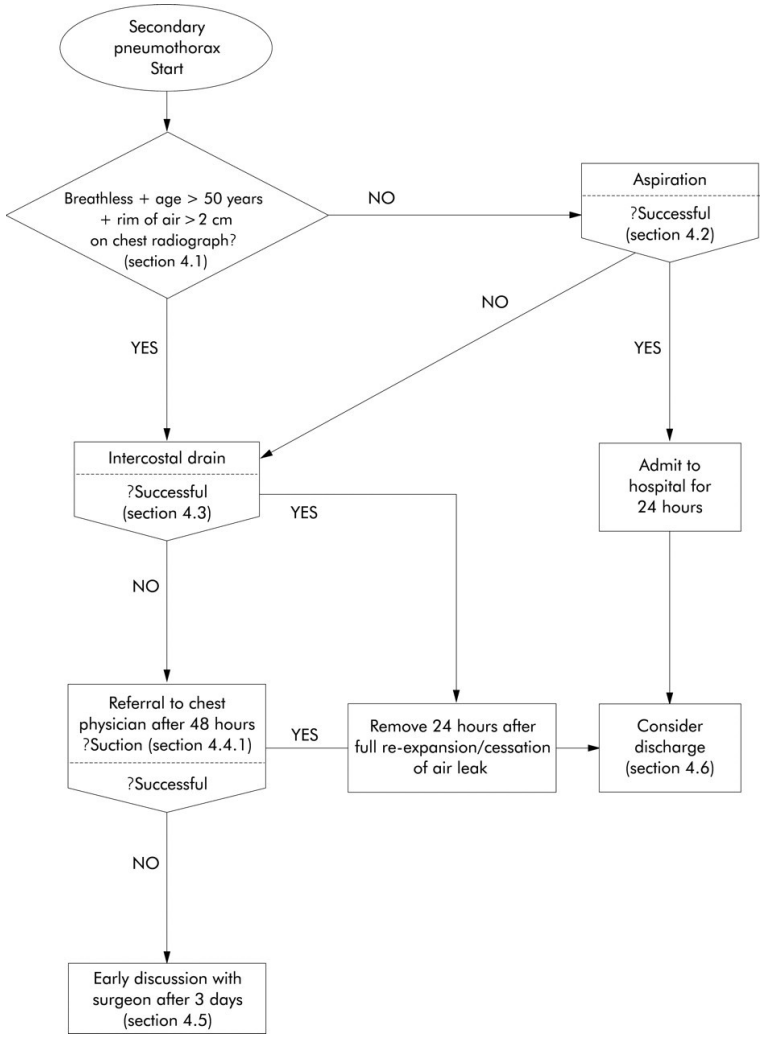


Henry, M et al. Thorax 2003;58:ii39-ii52

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THORAX

Figure 2 Recommended algorithm for the treatment of secondary pneumothorax.



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THORAX

Selection of site of care

- Outpatient care: This can occur in asymptomatic patients or those with a small pneumothorax and reliable follow-up.
- Emergency department (ED) care: ED care is changing. Prolonged periods of observation are less practical because of large patient volumes; efficacy studies of manual aspiration and placement of one-way valves are based in EDs in an attempt to address these practical issues.
- Inpatient observation: This site of care is generally selected when high-flow oxygen is needed, the pneumothorax is larger but the patient is stable, or comorbidities increase concern about risk or follow-up. The average hospital stay is 2.8 days.
- ICU: ICU treatment and observation is appropriate for patients who are unstable or intubated.

Options to restore an air-free pleural space

- Observation without oxygen: Simple observation is appropriate for asymptomatic patients with a minimal pneumothorax (<15-20% by Light's criteria; 2-3 cm from apex to cupola by alternate criteria) with close follow-up, ensuring no enlargement. Air is reabsorbed spontaneously by 1.25% of size pneumothorax per day.
- Supplemental oxygen: Oxygen administration at 3 L/min nasal canula or higher flow treats possible hypoxemia and is associated with a 4-fold increase in the rate of pleural air absorption compared with room air alone.
- Simple aspiration: In an earlier report, simple aspiration in 131 cases of small SP yielded successful results up to 87%.28 Other data describe more limited success in up to 70% cases. A more recent ED study supports needle aspiration as safe and effective as chest tube for PSP, conferring the additional benefits of shorter length of stay and fewer hospital admissions.
- Chest tube for air removal: A tube inserted into the pleural space is connected to a device with one-way flow. Heimlich valves are crucial in the care of patients with AIDS who have a median length of 20 days of chest tube placement.
- Thoracostomy with continuous (wall) suction: First-time SPS (including COPD) and traumatic pneumothorax typically require this approach. A small-bore catheter (eg, 7-14F) is safe to use in most patients, while a larger chest tube (24F) is also appropriate initially, and increasing suction pressure can be used if the lung fails to come up. A larger tube (eg, 28F) can reduce resistance in patients who are ventilated and at greater risk for air leaks. Air leaks resolve within 7 days of treatment 80% of the time, with an average hospital stay of 5 days. Keep the tube in place for 24 hours after the air leak ceases.

Interval of observation

- No protocols regarding serial radiography or imaging exist
- Monitoring pneumothorax size during this time is important.
- 0-6 hours: The ACCP Delphi consensus statement recommends observation in an ED for 6 hours, and discharge to home if a follow-up chest radiograph shows no enlargement of the lesion, in reliable patients. Emergency room observation with a repeat radiograph 6 hours later used to be common but may be used less often now.
- 24-96 hours: Additional follow up in 2 days is recommended, with preference given to a 24-48 hour follow-up radiograph in the outpatient setting.
- Outpatient follow-up during the 96-h (4-d) window is essential to distinguish between a resolved pneumothorax and one that needs evacuation. A CT scan at this time distinguishes between PSP and secondary spontaneous pneumothorax (SSP).
- 1 month: Full re-expansion can occur, on average, 3 weeks after the initial event.

Prevention of recurrent pneumothorax

- Observation: Observation is appropriate for iatrogenic pneumothorax in an individual with normal lungs who has responded to treatment with observation or simple aspiration.
- Simple aspiration or chest tube drainage of pneumothorax does not prevent recurrence. Recurrences have been reported to occur in up to 32% of PSP. Recurrent spontaneous pneumothorax requires more definitive treatment to prevent recurrence. Recurrence rates are higher with SSP than PSP.
- Pleurodesis: recurrence prevention rate of greater than 90%. Talc is the preferred agent by insufflation or as a slurry. Practice variation depends on local practitioner experience, resources, and success with approaches ranging from video-assisted thoracotomy (recommended by the ACCP) to surgical thoracotomy and pleurectomy (recommended by the BTS because of the absolute lowest recurrence rates)
- Nonsurgical pleurodesis: "Medical" thoracoscopy requires only local anesthesia or conscious sedation. less invasive and less expensive, but also less effective, particularly in inexperienced hands. Patient comorbidity plays a role in selection of appropriate intervention. Tetracycline and talc are well-studied effective agents for medical pleurodesis; Success rates for chemical are up to 91% vs. 95-100% in surgical techniques.

Indications for surgical intervention

- Persistent air leak for more than 7 days
- Recurrent ipsilateral pneumothorax
- Contralateral pneumothorax
- Bilateral pneumothorax
- First-time presentation in a patient with a high-risk occupation (eg, diver, pilot)
- Patients with AIDS often need this intervention because of extensive underlying necrosis.
- The risk of recurrent pneumothorax may also be unacceptable for patients with plans for extended stays at remote sites.
- Lymphangiomyomatosis, a condition associated with high risk.

VATS

- VATS is appropriate for recurrent primary spontaneous pneumothorax (PSP) or secondary spontaneous pneumothorax (SSP).
- VATS with resection of large bullous lesions is associated with a recurrence rate of 2-14%.
- In a meta-analysis of 12 trials that randomized 670 patients, VATS was associated with shorter length of stay (reduction 1.0-4.2 d) and less pain or use of pain medication than thoracotomy in the 5 out of 7 trials in which the technique was used for pneumothorax or minor lung resection.

Thoracotomy

- Insufflation of talc and thoracotomy has a recurrence rate of 0-7%.
- Talc is the preferred agent for pleurodesis. It can be administered by insufflation or as a slurry.

Literature update

Thoracoscopic parietal pleural argon beam coagulation versus pleural abrasion in the treatment of primary spontaneous pneumothorax☆

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Abstract

Objective: The obliteration of pleural space is useful to prevent recurrences of spontaneous pneumothorax. We retrospectively compared the results of pleural argon beam coagulation versus pleural abrasion in the treatment of primary spontaneous pneumothorax. **Methods:** Between 1996 and 2004, 136 patients underwent surgery for primary spontaneous pneumothorax, with 143 surgical procedures, all performed by VATS. Indications were recurrent pneumothorax in 107 patients, a complicated first episode in 29 and occupational activity in 7. Six patients were excluded because of postoperative histopathological diagnosis other than pulmonary emphysema. In 70 cases pleurodesis was performed with argon beam coagulation and in 67 by Marlex® mesh abrasion. These techniques were employed during two different periods. Median follow-up was 68 months in the Marlex® group and 41 in the argon group. The two groups resulted as being homogeneous for gender, age, smoking attitude and surgical indication. Statistical analysis was done with χ^2 and Fisher's test. **Results:** No postoperative mortality was observed. Mean recovery time was 5 days. There were three patients with postoperative bleeding who underwent re-operation. There were nine cases of prolonged air-leak, one needing surgical exploration. Nine recurrences were noted, all requiring surgery. Two recurrences were observed in the group treated by pleural abrasion (3.4%) and seven in the group treated by argon coagulation (10.7%). The Fisher's test failed to demonstrate a statistical significance between the two procedures in terms of recurrence rate ($p = 0.18$). Multivariate analysis yielded no risk factors for recurrences. Postoperative complications resulted as being equally distributed in both groups. **Conclusion:** After primary spontaneous pneumothorax, pleurodesis induced by argon beam parietal pleural coagulation resulted as being no better than that obtained by pleural abrasion in the prevention of recurrences. No benefits in terms of postoperative complications resulted by use argon beam coagulation.
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Keywords: Pneumothorax; Pleural abrasion; Argon beam coagulation

Institutional report - Thoracic general

Quality of life evolution after surgery for primary or secondary spontaneous pneumothorax: a prospective study comparing different surgical techniques☆

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Abstract

The objective of the present study is to evaluate quality of life (QoL) evolution after video-assisted thoracic surgery (VATS) and anterolateral thoracotomy (AT) for primary and secondary spontaneous pneumothorax, which has not been studied prospectively until now. From January 2003 to December 2004, QoL was prospectively recorded in 20 consecutive patients, using the European Organisation for Research and Treatment of Cancer (EORTC) QoL Questionnaire-C30 and the lung specific module LC-13. Questionnaires were administered before surgery and 1, 3, 6 and 12 months postoperatively (MPO) with response rates of 100%, 85%, 80%, 65% and 60%, respectively. In this prospective, non-randomized study, all patients had wedge resection and apical pleurectomy, 45% by video-assisted thoracic surgery (VATS), and 55% by anterolateral thoracotomy (AT). In general, patients QoL subscales improved after surgery. After VATS, pain (3 MPO $P=0.012$), dyspnoea (1 MPO $P=0.030$) and thoracic pain (1 MPO $P=0.038$) decreased significantly. After AT, a significant increase was seen in general QoL (1 MPO $P=0.036$, 3 MPO $P=0.034$, 12 MPO $P=0.025$), physical (6 MPO $P=0.025$) and emotional functioning (12 MPO $P=0.017$). Dyspnoea (12 MPO $P=0.042$) and coughing (6 MPO $P=0.046$) decreased after AT. After surgery, AT and VATS are comparable in QoL evolution with the exception of a significant difference at 1 MPO in physical, role and cognitive functioning ($P=0.002$, $P=0.002$ and $P=0.0018$, respectively) and dyspnoea ($P=0.041$) in favour of VATS. Comparing VATS and AT in QoL evolution, significant differences are seen in thoracic pain evolution in favour of VATS (6 MPO $P=0.037$). After surgery, AT and VATS are comparable in QoL subscales with exception of a significant difference at 1 MPO in favour of VATS. Dyspnoea and coughing improved after surgery.
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Keywords: Quality of life; EORTC; QLQ-C30; QLQ LC-13; Spontaneous pneumothorax; Thoracotomy; Thoracoscopy; VATS

Can chest ultrasonography assess pleurodesis after VATS for spontaneous pneumothorax?

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Abstract

Objective: Thoracic echography easily detects the sign of 'pleural sliding', due to the movement of the visceral pleura on the parietal pleura. This sign is absent when pleurodesis is present. This study was designed to test thoracic echography in the assessment of difference in pleurodesis obtained after abrasion or pleurectomy performed for spontaneous pneumothorax, mainly based on the presence or absence of the 'pleural sliding' sign. **Methods:** The population was composed by 10 patients, 5 submitted to VATS complete pleurectomy and 5 to VATS pleural abrasion. Thoracic ultrasonography was performed 4–6 weeks after surgery by an anesthesist trained in thoracic echography blinded to the pleurodesis technique used. Pleurodesis was defined as excellent if pleural sliding was absent in all the 9 considered points, effective when it was present in less than 3 points, poor when it was present in 3 points or more. **Results:** Pleurodesis was excellent in all the pleurectomy patients and in 1 abrasion patient. In one case, pleural sliding was present at one single explored point and in the last 3 cases there were two contiguous points of pleural sliding. Interestingly, one of these patients developed partial recurrence of pneumothorax 3 weeks after echography exactly at the level of recorded pleural sliding. **Conclusions:** Thoracic echography for the postoperative evaluation of pleurodesis is feasible and simple. An ideal pleurodesis is more likely after pleurectomy than after pleural abrasion. Areas of persisting pleural sliding are probably at risk of recurrence.
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Keywords: Chest ultrasonography; Spontaneous pneumothorax; Video-assisted thoracoscopy

Institutional report - Thoracic general

Uniportal video-assisted thoracic surgery for primary spontaneous pneumothorax: clinical and economic analysis in comparison to the traditional approach

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Abstract

We aimed to verify the clinical and economic effects of uniportal video-assisted thoracic surgery (VATS) in patients with primary spontaneous pneumothorax (PSP) compared to traditional three-port VATS technique. We analyzed 51 consecutive patients (23 three-port VATS and 28 uni-port VATS), treated by bullectomy and pleural abrasion, to detect differences between the two groups with regard to intraoperative management, postoperative course, pain, paraesthesia and costs. Data about pain and paraesthesia were collected by telephonic interview within a minimum follow-up period of six months. Compared to three-port VATS, patients treated by the uni-port VATS were discharged more quickly (3.8 days vs. 4.9 days, $P=0.03$) and experienced paraesthesia less frequently (35% vs. 94%, $P<0.0001$). No difference in chronic pain was observed between the two groups (numeric pain score: 0.6 uni-port vs. 1.3 three-port, $P=0.2$). Compared to three-port VATS, we found a significant reduction in postoperative costs for the patients operated on by the uni-port technique (€1407 vs. €1793, $P=0.03$), without any increase in surgical costs. In conclusion, uniportal VATS appears to offer better clinical (postoperative stay and rate of paraesthesia) and economic (postoperative costs) results than the standard three-port VATS for treating primary spontaneous pneumothorax.
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Keywords: VATS; Pneumothorax; Pain; Costs

Best evidence topic - Thoracic general

Is talc pleurodesis safe for young patients following primary spontaneous pneumothorax?

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Summary

A best evidence topic in cardiothoracic surgery was written according to a structured protocol. The question addressed was whether talc used for pleurodesis in young patients with a spontaneous pneumothorax has any long-term adverse effects. One hundred and eighty-one papers were identified using the search below. Eight papers presented the best evidence to answer the clinical question. The author, journal, date and country of publication, patient group studied, study type, relevant outcomes, results, and study weaknesses of the papers are tabulated. We conclude that talc pleurodesis in young patients with a spontaneous pneumothorax appears to have minimal long-term adverse consequences.
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Keywords: Evidence-based medicine; Thoracic surgery; Pneumothorax; Talc pleurodesis; Adverse events

Institutional report - Thoracic general

Treatment of primary spontaneous pneumothorax in Switzerland: results of a survey

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Abstract

Few trials to guide clinical management of primary spontaneous pneumothorax (PSP) exist. This study aims to reveal current practice in the management of PSP in Switzerland, to define the level of consensus and to provide evidence in guiding clinical practice. Questionnaires were sent to 355 departments of internal medicine and surgery in Switzerland and 114 (32.1%) were available for analysis. Recommendations based on the highest consensus are extracted. Good to very good consensus is reached in 63% of all management options. There is very good consensus for the management of clinically stable or unstable patients with small or large PSP, for the treatment of patients without chest tubes and the operative management of persistent air leaks and recurrence prevention. There is good consensus concerning the role of suction, the size of chest tubes, and the use of CT-scans. However, there is little consensus concerning chest tube removal and chemical pleurodesis. Good and very good consensus exists for most management options in the treatment of PSP in Switzerland. The given recommendations can be used as evidence in guiding clinical practice in circumstances where no evidence of higher levels exists.
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Keywords: Evidence-based medicine; Management guidelines; Primary spontaneous pneumothorax; Questionnaire

Residual apical space following surgery for pneumothorax increases the risk of recurrence

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Abstract

Objective: Residual air spaces on chest radiographs after pneumothorax surgery are not uncommon. We aimed to study their incidence and impact on surgical outcomes. **Methods:** Four hundred and twenty-seven patients [283 men and 144 women with a median age of 31 (14—96) years] underwent surgery for pneumothorax from 1995 to 2005 in a single unit. Video-assisted thoracoscopy was used in 225 cases (53%). Outcomes were: duration of intercostal drainage and hospital stay, recurrence, re-operation and referral to chronic pain clinic. **Results:** Median duration of intercostal drainage and hospital stay were 5 and 6 days, respectively. We found a recurrence rate of 6.6% ($n = 28$), re-operation rate of 2.8% ($n = 12$) and need for referral to pain clinic of 7% ($n = 30$). In 129 patients (30%) a small residual apical space (RAS) was reported on chest radiograph prior to discharge. Hospital stay and duration of drainage were longer in these cases ($p = 0.002$ and 0.02, respectively). On multivariate analysis RAS on chest radiograph was associated with increased risk of recurrence [hazard ratio 3.1 (1.4—6.8 95% CI)] ($p = 0.005$); but no need for re-operation or referral to pain clinic. Re-operation was associated with VATS surgery ($p = 0.001$) and when no abnormalities were identified at operation ($p = 0.04$). Referral to pain clinic was more common after open surgery ($p = 0.01$). **Discussion:** The risk of recurrence after pneumothorax surgery is low. But the presence of a residual apical space on chest radiography after surgery increases it significantly. Recurrence may be due to the failure to achieve early pleural symphysis.

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Keywords: Pneumothorax; Pleurectomy; Surgery

Primary Spontaneous Pneumothorax: One-Stage Treatment by Bilateral Videothoracoscopy

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Background. The goal of the study was to report our 7-year experience with single-stage bilateral videothoracoscopy for bleb excision and pleural abrasion in patients suffering primary spontaneous pneumothorax.

Methods. From November 1992 through June 1999, 12 men were operated on in our department. Preoperative chest computed tomographic scans were obtained for all patients. Operative indications included simultaneous bilateral pneumothorax (n = 2), contralateral recurrence (n = 1), ipsilateral recurrence with contralateral blebs or bullae, and job restrictions (n = 9).

Results. Mean age at operation was 26 ± 6 years. All patients had multiple blebs or bullae located in upper lobes, and 4 patients (33%) had pleural adhesions. All blebs or bullae were resected at operation. The mean number of staple cartridges was 5 per patient (range, 3 to 8). All patients had bilateral pleurabrasion. There were no perioperative complications and no conversion to thoracotomy. The mean operative time was 168 ± 17 minutes (range, 140 to 190 minutes). The mean drainage time was 5 days (range, 4 to 26 days) and the mean hospital stay was 7.7 ± 1.4 days for 11 of 12 patients. Postoperative complications included prolonged air leak (16.5%), incomplete lung reexpansion (25%), and pleural effusion (8.5%). One patient required reoperation on the right side through transaxillary thoracotomy within 1 month of videothoracoscopy for pleurodesis failure. Follow-up was 100% complete. Mean follow-up is 50 ± 34 months (range, 9 to 88 months) and no patient has had recurrence of pneumothorax. All patients except one returned to full occupational activity within 5 weeks of surgery.

Conclusions. Single-stage bilateral videothoracoscopy for bilateral bleb excision and pleurabrasion is a safe procedure that does not result in major complications and provides excellent long-term results. This approach could be considered in young patients with bilateral primary spontaneous pneumothorax, or in those requiring radical therapy for the prevention of ipsilateral and contralateral recurrences.

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Efficacy Study of Video-Assisted Thoracoscopic Surgery Pleurodesis for Spontaneous Pneumothorax

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Background. This study aims to assess the efficacy of video-assisted thoracoscopic surgery pleurodesis in the treatment of spontaneous pneumothorax with particular reference to the rate of recurrence after abrasion pleurodesis and postoperative neuralgia.

Methods. One hundred one patients who underwent 109 video-assisted thoracoscopic surgery pleurodesis procedures in the Austin & Repatriation Medical Centre between January 1992 and June 1998 were identified from a computerized database. The follow-up period was from 8 months to 7 years and 1 month (mean, 44.4 months). Patients were telephoned and asked as to whether recurrence occurred, and if so, when it occurred and how it was treated. They were asked to grade their current pain level from 0 to 6.

Results. Eighty-two patients were contacted, corresponding to 88 video-assisted thoracoscopic surgery pleurodesis procedures that were followed up (80.7%). There were five recurrences (5.7%). The pain level was rated as 0 in 64 cases (72.7%), 1 in 27 cases (23.9%), 2 in 1 case (1.1%), and 3 in 2 cases (2.3%).

Conclusions. These data suggest that video-assisted thoracoscopic surgery pleurodesis is a valid alternative to thoracotomy with pleurectomy for treatment of spontaneous pneumothorax with an acceptable recurrence rate and minimal amount of postoperative neuralgia.

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Can spontaneous pneumothorax patients be treated by ambulatory care management?

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Abstract

Objective: In the Emergency Department, it would be worthwhile to treat pneumothorax patients on an outpatient basis by utilizing a small-calibre catheter and Heimlich valve insertion. We evaluated this treatment and compared it with the closed thoracostomy. **Methods:** In this comparative study, the success rate, complications and recurrence rate of treating spontaneous pneumothorax patients by using a small-calibre catheter and Heimlich valve were compared with those of a similar-sized group treated by closed thoracostomy. **Results:** Pneumothorax was successfully treated on an ambulatory basis by using the small-calibre catheter and Heimlich valve in 20 patients (47%); this was less than the 42 patients (89%) who were successfully treated by closed thoracostomy. While no complications were encountered in the group treated using the small-calibre catheter and Heimlich valve, 11 patients in the group treated by closed thoracostomy developed complications. The medical expenses for the treatment involving the small-calibre catheter and Heimlich valve were less than those for closed thoracostomy. **Conclusion:** Prior to the treatment, the patients should be fully informed of the success rate of this treatment and the possibility of requiring closed thoracostomy in the event of treatment failure.
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Keywords: Pneumothorax; Thoracostomy; Emergencies; Outpatients; Crowding

Institutional review - Thoracic general

Is video-assisted thoracic surgery indicated in the first episode primary spontaneous pneumothorax?

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Received 10 February 2003; received in revised form 21 May 2003; accepted 14 July 2003

Abstract

Primary spontaneous pneumothorax (PSP) is a very common disease and recurrence is a major concern for the post-first-time victims. Owing to the convenience and popularity of video-assisted thoracoscopic surgery (VATS), should we still wait for recurrence before we perform this minimal invasive procedure to cure the disease? Between 1997 and 2002, 51 patients of PSP from the first episode received VATS the day after their admission at Kaohsiung Medical University Hospital. Forty-five patients (90%) were found to have blebs (mostly above the upper lobe). They all received wedge resection plus pleural abrasion. No mortality was recorded. The average postoperative hospital stay was 4 days. After a follow-up period of 38 months, no recurrence or complication was found. The patients are now living in good health. We found a high percentage of blebs. These are possible causes of subsequent recurrence. Surgical intervention with VATS for the first episode of PSP is safe, effective, and cosmetically excellent. The most important thing is that the fear of recurrence is finally resolved.
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Keywords: Spontaneous pneumothorax; Recurrence; Surgical indications

Institutional report - Thoracic general

Should surgical pleurectomy for spontaneous pneumothorax be always thoracoscopic?☆

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Abstract

Fifty-seven patients were studied over a period of three years to analyse the efficacy of surgical pleurectomy for spontaneous pneumothorax. Thirty-one and 26 patients underwent open and video-assisted thoracoscopic surgery (VATS) pleurectomy, respectively. VATS was the main modality used for primary spontaneous pneumothorax (PSP) (21 vs. 8). However, secondary spontaneous pneumothorax (SSP) was mainly managed with open pleurectomy (23 vs. 5). The median operating time was significantly longer in open group (72.4 vs. 55 min; $P=0.005$). The amount of analgesia required in the first five days was significantly more in open group (108 mg vs. 46.9 mg; $P=0.02$). Chest drainage was significantly more in open group (1027.1 ml vs. 652.8 ml; $P=0.04$). However, chest drain duration and hospital stay had no significant difference. VATS emerged as a cost-effective modality (£1770 vs. £3226). The ability to return to work was significantly earlier in VATS group in PSP patients (6 weeks vs. 10 weeks; $P=0.007$). There were 3 (5.27%) recurrences in VATS group for patients with SSP. This experience suggests that VATS pleurectomy is an appropriate modality for PSP. However, open pleurectomy is a viable alternative to treat SSP.
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Keywords: Primary spontaneous pneumothorax; Secondary spontaneous pneumothorax; Video-assisted thoracoscopic surgery; Open (postero-lateral thoracotomy); Parietal pleurectomy

Minimally Invasive Management for First and Recurrent Pneumothorax

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Minimally invasive techniques for treatment of pneumothorax should yield the standard of results set with open procedures: the operative morbidity should remain less than 15%, and the recurrence rate less than 1%. In the era before video-assisted thoracic surgery, two minimally invasive variants were used. Chemical pleurodesis resulted in an unsatisfactory recurrence rate of at least 15%. In contrast, pleurectomy and apical stapling performed through a transaxillary minithoracotomy compared favorably with larger thoracotomy approaches, and allowed a reduced hospital stay. Evaluation of video-assisted thoracic surgical operations for spontaneous pneumothorax is hampered by a lack of controlled studies. The general impression is that morbidity did not decline significantly; the main determinant of complications is the patient's underlying health status. However, published recurrence rates range from 5% to 10%, in spite of a shorter follow-up time span. Optimized results are achieved when classic principles combining apical wedge resection and pleurodesis are applied. Reduction of hospital stay is not only a result of the new technology, but also changing drainage and discharge policies. Reduction of cost is debatable, because many studies do not consider the cost of video equipment. The main advantage when compared with open thoracotomy is reduction of postoperative pain. The only two available controlled studies conclude that there is no obvious advantage of video-assisted thoracic surgery when compared with conventional limited-access surgery. The future role of video-assisted thoracic surgery in this disease remains to be determined by a large-scale prospective evaluation.

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Negative results - Thoracic general

Reoperations are common following VATS for spontaneous pneumothorax: study of risk factors

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Received 26 January 2006; received in revised form 6 May 2006; accepted 3 July 2006

Abstract

Objectives: To identify risk factors for reoperation following surgery for spontaneous pneumothorax. **Material and methods:** This is a retrospective clinical study conducted on 240 consecutive patients operated on for spontaneous pneumothorax in Lund University Hospital between January 1996 and December 2003. Patient information was gained from medical charts and operation reports. Logistic regression analysis was used to evaluate risk factors. Median follow-up was 54 months. **Results:** Video-assisted thoracoscopic surgery (VATS) was used in 93% of the patients, where bullectomy with or without pleurodesis/pleurectomy was performed in most cases. Conversion to anterolateral thoracotomy was required in 6 cases (2.3%). Operative mortality (<30 days) was 0.8% (0% after VATS). Altogether 35 patients (13.7%) required a reoperation. Twenty patients were reoperated on within one month from surgery, most often due to prolonged air leakage ($n=13$, 5.1%) and bleeding ($n=6$, 2.3%). Fifteen patients (5.8%) were reoperated on because of recurrent pneumothorax, on average 17 months (range 1–39 months) after the primary operation. Significant independent risk factors for reoperation were; young age, operations performed for secondary pneumothorax due to emphysema and recurrent pneumothorax. The risk was also increased in patients where wedge resection was not performed. However, the type of pleurodesis or pleurectomy was not related to increased risk. **Conclusions:** A considerable number of patients require reoperation after VATS for pneumothorax. Most reoperations are due to prolonged air leakage or recurrent pneumothorax. The risk for reoperation is increased in younger patients, patients operated for recurrent or secondary pneumothorax, and in cases where pulmonary wedge resection is not performed.
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Keywords: Pneumothorax; Recurrent pneumothorax; Surgical technique; Reoperations; Risk factors

Does a thoracic epidural confer any additional benefit following video-assisted thoracoscopic pleurectomy for primary spontaneous pneumothorax?

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Abstract

Objective: Video-assisted thoracoscopic (VATS) bullectomy and apical pleurectomy has become the preferred procedure for recurrent or complicated primary spontaneous pneumothorax (SPN). Although thoracic epidural analgesia is the gold standard after open thoracic surgical procedures, its use in the management of minimally invasive procedures in this young population has not been extensively studied. **Methods**: From 1997 to 2003, a single surgeon performed 118 consecutive VATS pleurectomies for primary SPN. The perioperative course, analgesic requirements, hospital stay and long-term complications were compared for 22 (18%) patients in whom a patient-controlled thoracic epidural was used for analgesia and 96 (82%) patients who did not receive an epidural (parenteral opioids). A four-point verbal pain score (0–3) was recorded hourly in every patient at rest and on coughing following surgery. **Results**: One patient required additional surgery for evacuation of haemothorax. There were no mortalities or other major complications in the series. Overall median hospital stay was 3 (range 1–10) days, the incidence of long-term pain at 3 months was 6%, and the long-term recurrence rate was 3%. Despite parenteral opioids being discontinued significantly earlier than epidurals, pain scores were similar in both groups. There were no significant differences in the duration of air-leaks, length of drainage, hospital stay, long-term pain and long-term paraesthesias between the two groups. **Conclusions**: Thoracic epidural analgesia does not contribute significantly to minimize neither perioperative nor long-term pain after VATS pleurectomy for primary SPN. The additional resource requirement in these patients is not justified.
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Keywords: Regional analgesia; Minimally invasive surgery; Postoperative care

Best evidence topic - Thoracic general

Does video-assisted thoracoscopic pleurectomy result in better outcomes than open pleurectomy for primary spontaneous pneumothorax?

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Summary

The question addressed by a best evidence topic approach using a structured protocol was whether pleurectomy using video-assisted thoracoscopic surgery (VATS) resulted in better outcomes than open pleurectomy for primary spontaneous pneumothorax. Altogether 45 relevant papers were identified of which nine papers represented the best evidence to answer the question. The author, journal, date and country of publication, patient group studied, study type, relevant outcomes, results and study weaknesses were tabulated. We conclude that VATS pleurectomy has been shown to be comparable to open pleurectomy in the treatment of spontaneous pneumothorax, with a meta-analysis and several RCTs showing reductions in length of hospital stay and analgesic requirements. Postoperative pulmonary dysfunction has also been shown to be reduced after VATS pleurectomy in two RCTs, although a third study found no significant difference. A concern may be a four-fold increase in the recurrence of pneumothorax following VATS pleurectomy as compared to open pleurectomy reported in a recent meta-analysis of four randomised and 25 non-randomised studies performed in 2007 and published in the Lancet, although a second meta-analysis of only the randomised trials did not show this difference.
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Keywords: VATS; Thoracic surgery; Pneumothorax; Evidence based medicine

Long-term lung function following videothoracoscopic talc poudrage for primary spontaneous recurrent pneumothorax☆

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Abstract

Objective: Some concern still exists regarding long-term lung function following videothoracoscopic talc poudrage for primary spontaneous pneumothorax (PSP). We evaluated lung function at 5 years in a series of 100 patients surgically treated for PSP. **Methods:** Out of 1065 patients treated for PSP by means of videothoracoscopic talc poudrage from September 1995 to January 2006, we consecutively enrolled 50 patients (33 males, 17 females, mean age: 24.22 years, median age: 24 years; range: 13–40 years) (group A) with no recurrence for functional evaluation with measurement of static and dynamic volumes (FEV1–FVC–TLC–RV), and DLCO at 60 months after surgery. Fifty patients (35 males, 15 females, mean age: 23.56 years; median age: 22.5 years; range: 16–37 years) underwent same pulmonary function tests 5 years after simple drainage for recurrent PSP because of refusal of surgery (group B). **Results:** Pulmonary function tests showed (mean % value ± SD for group A vs group B): FEV1 93 ± 6.6 versus 95.4 ± 6.4; FVC 98 ± 6.5 versus 100.1 ± 6.9; TLC 91.7 ± 7.7 versus 94.36 ± 5.8; RV 97 ± 7 versus 99.2 ± 4.9; DLCO 91.4 ± 2.8 versus 91.98 ± 4.2. No patient in both groups showed FEV1 < 80%. Analysis of mean difference of pulmonary function values was computed between group A and group B patients. **Conclusions:** No statistically significant differences in long-term lung function have been found between patients treated with pleural drainage only versus patients treated with videothoracoscopic talc poudrage for PSP. Lung function is not impaired by videothoracoscopic talc poudrage.
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Keywords: Spontaneous pneumothorax; Talc poudrage; Lung function; Videothoracoscopy

Video-assisted thoracoscopic management of recurrent primary spontaneous pneumothorax after prior talc pleurodesis: a feasible, safe and efficient treatment option

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Abstract

Objective: To assess the role of video-assisted thoracoscopic surgery (VATS) in the management of a recurrent primary spontaneous pneumothorax after a prior talc pleurodesis. **Methods**: From 1996 to 2002, we retrospectively reviewed all patients who were treated for a recurrent primary spontaneous pneumothorax after a previous talc pleurodesis. Data on the talc procedure and the recurrent pneumothorax, delay between both, and operative features were studied. Conversion rate to a thoracotomy and postoperative complications as well as long-term outcome were reported. **Results**: We collected 39 patients (28 male) with a median age of 25 years (15–41 years). The initial procedure consisted of thoracoscopic talc poudrage in all cases. The median delay between the talc procedure and the recurrence was 23 months [10 days–13 years]. Size of recurrence involved 10–80% of the hemithorax. The VATS procedure was successfully achieved in 27 patients (69%) while 12 required conversion to a thoracotomy. The main cause for conversion was the presence of dense pleural adhesion at the mediastinal part of the pleural cavity. Postoperative morbidity was limited to pleural complications in the VATS group ($n = 6$, 22%). Median follow-up was 26 months [10–38 months]. One patient treated by VATS developed a partial recurrent pneumothorax at 12 months with a favorable outcome without further surgery. **Conclusions**: Feasibility, safety and efficacy of VATS for management of recurrent primary spontaneous pneumothorax following thoracoscopic talc poudrage are strongly suggested.
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Keywords: Video-assisted thoracoscopy; Talc poudrage; Pneumothorax; Recurrence; Thoracotomy

Videothoracoscopic silver nitrate pleurodesis for primary spontaneous pneumothorax: an alternative to pleurectomy and pleural abrasion?

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Abstract

Background: The optimal surgical management of primary spontaneous pneumothorax (PSP) is still controversial, especially in terms of the technique to be used. The aim of this paper was to report our experience of videothoracoscopic silver nitrate pleurodesis (VATSNP). **Methods:** Between 1995 and 2004, all the medical records of the patients who had undergone silver nitrate videothoracoscopic pleurodesis (SNVTP) were reviewed. All the patients had systematic prospective clinical and radiological follow-up at 1 month. The last 250 patients were retrospectively recontacted for long-term follow-up. **Results:** Six hundred and three patients underwent SNVP. No intra-operative death or major complication occurred during or after the procedures. Mean operating time was 40.2 ± 10.7 min. The conversion to thoracotomy rate was 2.5%. Main postoperative complications were prolonged air leak (15.6%), partial residual pneumothorax (5.1%), pleural effusion (2.5%) and postoperative bleeding (2.0%). The follow-up was 100% complete 1 month after discharge; at 1 month, the recurrence rate was 0.5%. The last 250 patients were retrospectively recontacted with a mean follow-up of 2.9 ± 2.3 years (184 patients). The long-term recurrence rate was 1.1%. **Conclusions:** It is one of the first reports on the use of video-assisted thoracoscopic silver nitrate pleurodesis for PSP. We demonstrate safety and effectiveness of the procedure with long-term results comparable with standard open pleural abrasion or pleurectomy.
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Keywords: Pneumothorax; Pleurodesis; Silver nitrate; Video-assisted thoracoscopy

Suction Versus Water Seal After Thoracoscopy for Primary Spontaneous Pneumothorax: Prospective Randomized Study

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Background. The objectives of the study were to review our experience of video-assisted thoracoscopic apical pleurectomy and to evaluate whether suction or water seal is superior in the postoperative treatment of primary spontaneous pneumothorax.

Methods. One hundred consecutive patients undergoing thoracoscopy for primary spontaneous pneumothorax from January 1995 to December 1999 were prospectively randomly assigned after surgery to receive suction or water seal to their chest tubes after a brief period of suction.

Results. There were 50 patients in each group. The two groups were evenly matched for age and operation performed. The method of management was stapling of an identified bleb or apex of the upper lobe and apical pleurectomy. Postoperative prolonged air leak longer than 5 days occurred in 8 patients (8%), 7 in the suction group and 1 in the water seal group ($p = 0.03$). The mean duration of chest tube days was lower in the water seal group (2.7 days) than in the suction group (3.8 days; $p = 0.004$). The mean hospital stay in the water seal group was 3.7 days and in the suction group it was 4.8 days ($p = 0.004$). Mean follow-up was 48 months (range, 30 to 60) for all patients. Pneumothorax recurred in 2 patients (2%). The recurrences occurred in the first year.

Conclusions. Video-assisted thoracoscopic apical pleurectomy is effective and safe for treating primary spontaneous pneumothorax. Placing chest tubes on water seal after a brief period of suction shortens the duration of chest tube placement and hence the hospital stay.

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Video-Assisted Thoracic Surgical Treatment of Initial Spontaneous Pneumothorax in Young Patients

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Background. The treatment of primary spontaneous pneumothorax in young adults has been controversial. Conventional treatment consisting of chest tube thoracostomy may be associated with morbidity at the time of tube insertion, prolonged hospitalization, and interval operation in many patients. As spontaneous pneumothorax in young adults is usually associated with apical blebs, we hypothesized that video-assisted thoracic surgical (VATS) resection of the blebs at the time of the first pneumothorax may be an effective treatment associated with low morbidity and short hospital stays.

Methods. From July 1992 to February 2001, 156 young adults were treated for spontaneous pneumothorax. Within 12 hours of presentation to the emergency department patients underwent semielective VATS with bleb resection and pleuradesis. During follow-up patients were observed for recurrent pneumothorax.

Results. There were 69 men (44%) and 87 women (56%). The median age was 19 years old (range 14 to 38 years old). Patients were predominantly tall and thin. Patients were mildly symptomatic at the time of presentation. Apical blebs were seen in all patients and the presence of blebs was confirmed in the pathologic specimen. In 23 patients bleeding was associated with bleb rupture. There were no postoperative air leaks. The mean hospital stay was 2.4 ± 0.5 days. Follow-up ranged from 2 to 96 months (median 62 months). There were no recurrences on the index side.

Conclusions. VATS resection of apical blebs is associated with low morbidity and short hospitalization and provides an attractive alternative to the conventional treatment of initial tube thoracostomy and possible interval repeat thoracostomy or operation. VATS may be an effective first line treatment for spontaneous pneumothorax in young adults. Due to the pathophysiology of this disease, patients should be closely followed for the occurrence of pneumothorax on the contralateral side.

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Thoracoscopic Total Parietal Pleurectomy for Primary Spontaneous Pneumothorax

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Although the management of spontaneous pneumothorax through a thoracotomy traditionally included apical pleurectomy, thoracoscopic treatment of this problem does not generally include pleurectomy. Thoracoscopy in fact allows excellent exposure to perform total parietal pleurectomy, and we hypothesize that including total pleurectomy will reduce recurrences. We describe here the technique of thoracoscopic total parietal pleurectomy and the early outcomes afterward.

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Management of the Second Episode of Spontaneous Pneumothorax: A Decision Analysis

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Background. Optimal management for patients presenting a second episode of spontaneous pneumothorax remains controversial. The aim of this study was to compare two possible treatment strategies, video-assisted thoracic surgery (VATS) and conservative management, in order to assess which of the two was better adapted for the treatment of the second episode of spontaneous pneumothorax.

Methods. The authors propose a decision analytic model including a cost-effectiveness study to compare two clinical strategies: VATS (reference strategy) and conservative management (alternative strategy). Data were obtained from a Medline search for English language articles and cost estimates were derived from the financial and public health departments of our hospital. The model was analyzed to determine the baseline strategy leading to the highest expected effectiveness and the lowest expected cost.

Results. Conservative management offered a slight advantage in expected effectiveness value (99.99 vs 99.93 for VATS). VATS produced the lowest expected cost (€4347 vs €7536 for conservative management). The incremental cost-effectiveness ratio was €57,750. Within the ranges tested, the sensitivity analysis presented consistent results in terms of effectiveness and advocated conservative management as the best strategy. In terms of cost, with the exception of length of stay, the sensitivity analysis was insensitive in estimating the different probabilities, and favored VATS over conservative management.

Conclusions. In the management of the second episode of spontaneous pneumothorax, VATS offers substantial savings in cost for only a slight decrease in effectiveness, when compared with conservative management.

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Salvage for Unsuccessful Aspiration of Primary Pneumothorax: Thoracoscopic Surgery or Chest Tube Drainage?

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Background. Simple aspiration is recommended as first-line treatment for all primary spontaneous pneumothoraces requiring intervention. However, the optimal salvage treatment remains unclear when simple aspiration is unsuccessful for controlling symptoms. In this study, the safety, efficacy, and estimated costs of video-assisted thoracoscopic surgery (VATS) and chest tube drainage (CTD) were compared.

Methods. Between 2002 and 2007, 164 patients with a first episode of spontaneous pneumothorax were managed by simple aspiration. Among them, 52 patients underwent subsequent VATS (30 patients) or CTD (22 patients) due to unsuccessful aspiration. The demographic data and treatment outcomes of the two groups were collected through retrospective chart review.

Results. Postoperative analgesics use did not differ between groups. Complications developed in 2 of the VATS group (6.7%) and 6 of the CTD group (27.3%), with mean hospital stays of 4.8 and 6.1 days, respectively ($p = 0.034$). Patients in the VATS group had lower rates of overall failure, although the rates of immediate failure were not significantly different. After a mean follow-up of 16 months, recurrent ipsilateral pneumothorax was noted in 1 VATS patient and 5 CTD individuals ($p = 0.038$). The estimated total costs per patient were $1,273 in the VATS group and $865 in the CTD group.

Conclusions. Although associated with higher costs, VATS rather than CTD is the preferred salvage treatment for unsuccessful aspiration of the first episode of primary spontaneous pneumothorax, because of shorter hospital stay and lower rates of overall failure and recurrence.

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Chest-Tube Insertion

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INDICATIONS

Insertion of a chest tube is indicated in either emergency or nonemergency situations. Specific indications are listed in Table 1.[1-3]

CONTRAINDICATIONS

Published guidelines state that there are no absolute contraindications for drainage by means of a chest tube[1] except when a lung is completely adherent to the chest wall throughout the hemithorax.[2] Relative contraindications include a risk of bleeding in patients taking anticoagulant medication or in patients with a predisposition to bleeding or abnormal clotting profiles. Whenever possible, coagulopathies and platelet defects should be corrected with the infusion of blood products, such as fresh frozen plasma and platelets.

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Table 1. Indications for Chest-Tube Insertion.

Emergency
Pneumothorax
In all patients on mechanical ventilation
When pneumothorax is large
In a clinically unstable patient
For tension pneumothorax after needle decompression
When pneumothorax is recurrent or persistent
When pneumothorax is secondary to chest trauma
When pneumothorax is iatrogenic, if large and clinically significant
Hemopneumothorax
Esophageal rupture with gastric leak into pleural space
Nonemergency
Malignant pleural effusion
Treatment with sclerosing agents or pleurodesis
Recurrent pleural effusion
Parapneumonic effusion or empyema
Chylothorax
Postoperative care (e.g., after coronary bypass, thoracotomy, or lobectomy)

Best evidence topic - Thoracic non-oncologic

In patients with first-episode primary spontaneous pneumothorax is video-assisted thoracoscopic surgery superior to tube thoracostomy alone in terms of time to resolution of pneumothorax and incidence of recurrence?

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Summary

A best evidence topic in cardiac surgery was written according to a structured protocol. The question addressed whether video-assisted thoracoscopic surgery (VATS) was justifiable for first-episode primary spontaneous pneumothorax (PSP). Altogether 183 papers were found using the reported search, of which nine represented the best evidence to answer the clinical question. The authors, journal, date and country of publication, patient group studied, study type, relevant outcomes and results of these papers are tabulated. We conclude that VATS has superior outcomes in terms of recurrence rates of pneumothorax (from 0 to 13% according to several studies for VATS vs. 22.8 to 42% for tube thoracostomy alone), duration of chest tube drainage (CTD) (4.56 vs.7.6 days) and mean hospital stay (from 2.4 to 7.8 days vs. 6 to 12 days for CTD) with first-episode PSP compared with conservative treatment. Additionally, even if VATS is associated with an average increased cost of $408, this is mitigated by the reduced length of stay and decreased pneumothorax recurrence, both resulting in a reduction of cost of 42% compared to conservative approach. These findings were not replicated in an article considering primary VATS (PV) vs. secondary VATS (SV) as the best treatment modality for PSP in children. Although the total treatment length of stay was significantly shorter for PV vs. SV (7.1 ± 0.96 vs. 10.5 ± 1.2, $P = 0.04$), morbidity from recurrent pneumothorax after VATS occurred more frequently after PV than SV (4/14 vs. 0/20, $P < 0.05$). In this article the observed recurrence rate was 54%. Performing PV on all patients with PSP would increase cost by $4010 per patient and require a recurrence rate of 72% or more to financially justify this approach, therefore, the increased morbidity and cost do not justify a strategy of PV blebectomy/pleurodesis in children with SP. Instead, secondary treatment is recommended. Lastly, two articles also examined the rate of recurrence of VATS compared to open thoracotomy (OT). The range was from 0 to 7.7% for OT vs. 10.3 to 13% for VATS, a non-statistical difference.
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Keywords: Thoracic surgery; Video-assisted; VATS; Primary spontaneous pneumothorax; First-episode pneumothorax

Uncorrected Proof

Thank you