
33. Pneumothorax and pleural effusions

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Ecstasy induced pneumomediastinum and pneumothorax – new causes, new questions

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We report a 17-year-old woman who was admitted due to sudden onset of dyspnea, chest pain, and cough.

No history of respiratory disease was evident and she denied taking regular medication. In addition to a history of medical support because of mental disorder occasional ecstasy intake was recorded.

Except of soft tissue emphysema of the chest physical examination was unremarkable.

Arterial blood gas analysis showed an elevated PaO₂ of 105 mmHg (13.9 kPa) and a decreased PaCO₂ of 27 mmHg (3.59 kPa).

Clinical laboratory parameters were within normal ranges with the exception of an elevated number of leucocytes (16.5 G/l of peripheral blood).

Computed tomography (CT) of the chest demonstrated bilateral soft tissue emphysema of the chest, extending to the neck and the back, involving the spinal canal. Furthermore pneumomediastinum and bilateral pneumothoraces could be verified. By contrast swallow a rupture of the oesophagus could be excluded. Bronchoscopy in generalized anaesthesia showed no abnormalities of the airways.

Since condition of the patient was stable conservative management without positioning of a thorax tube was decided.

Four days later after a follow-up chest X-ray showing regression of the pneumothoraces, the pneumomediastinum, and the soft tissue emphysema the patient was discharged.

At follow-up visit nine months later she was without symptoms. Chest X-ray and lung function tests consisting of blood gas analysis, spirometry and bodyplethysmography showed normal results.

An association between ecstasy and bronchial obstruction which increases the intrathoracic pressure and therefore the probability of pneumothorax, pneumomediastinum, and emphysema of soft tissue has not been investigated.

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Implementation of current guidelines in the management of spontaneous pneumothorax

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Background: There is paucity of data with regards to the management of primary and secondary spontaneous pneumothorax.

Methods: A study was conducted to evaluate whether patients with either primary or secondary spontaneous pneumothorax were managed according to current British Thoracic Society guidelines.

Results: 56 consecutive patients with spontaneous pneumothorax were assessed over a 12-month period. In patients with primary spontaneous pneumothorax,

84% were inappropriately managed with intercostal drain insertion. 79% of these patients merely required simple aspiration and 5% warranted observation alone. For patients with secondary spontaneous pneumothorax, 50% were incorrectly managed with simple aspiration when intercostal drain insertion was required. Complications occurred in 32% of patients who had intercostal drain insertion. 77% and 85% of patients with primary and secondary spontaneous pneumothorax respectively were referred to a chest physician regardless of outcome. The mean hospital stay for patients with primary and secondary spontaneous pneumothorax was 4 and 22 days respectively.

Conclusion: The vast majority of patients with primary spontaneous pneumothorax were needlessly exposed to intercostal drain insertion. Implementation of the British Thoracic Society guidelines is crucial in order to avoid unnecessary patient discomfort and procedure related complications. It should also reduce the number of inappropriate referrals to a chest physician.

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Recurrent spontaneous pneumothorax in uterine leiomyoma of uncertain malignant potential

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A 46 years old female presented to emergency department complained of progressive dyspnea and chest pain of 7 days duration. The patient had a history of hysterectomy with unilateral oophorectomy for uterine leiomyoma of uncertain malignant potential 5 years earlier. The chest radiograph demonstrated pneumothorax (PNX) on the right side and some rounded opacities in both lung fields. The CT scan of the chest confirmed the PNX of the right lung, several masses of varying sizes as well as thin-walled cysts involving all the lobes of the lungs. The patient treated by pleural drainage. Transthoracic needle biopsy of a right lung mass was performed. The microscopic findings of the lung tumor revealed spindle cells that lacked evidence of necrosis and performed minimal index of mitosis and immunohistochemical studies showed the same phenotype as that of the uterine tumor. Ten days later the patient developed PNX at the left lung and treated with pleural drainage. After complete expansion of the lungs the patient treated with talc pleurodesis on the left side and with chemical pleurodesis (bleomycin) on the right side. During the next two years follow up the patient experienced two right-side spontaneous PNXs that required introduction of a thoracic tube. Benign metastasizing leiomyoma (BML) is a rare entity which involves a spectrum of smooth muscle tumors that are also called leiomyomas of uncertain malignant potential or low grade leiomyosarcomas. BML usually presents with multiple pulmonary nodules, rarely cavitated, whereas thin walled cysts have not been described. Physicians should be aware that BML can present with PNX due to metastatic pulmonary cysts.

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Care of intercostal chest drain in the management of spontaneous pneumothorax: impact of guidelines

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Intercostal chest drain (icd) insertion is a common procedure. British Thoracic Society (BTS) revised its guidelines in 2003 advising on the care of icd in the management of spontaneous pneumothorax (SP). We sought to determine the practice comparing it with the national guidelines.

A survey was carried out in 2002 whereby consultant physicians in the northern region involved with the management of SP were sent a questionnaire to seek their approach and repeated in 2005.

101 replies were received in 2002. Of those 79 were sent the same questionnaire in 2005 with 40 replies returned. In a dyspnoic patient with primary SP, icd was chosen initial treatment by 1% for small, 13% for moderate and 62% for large sized SP and it remains similar in the two surveys. For a dyspnoic patient with secondary SP the use of icd was 9%, 59% and 88% respectively in 2002 and more so now: 20%, 74%, and 100% respectively. Pre-medication is used by 17%. Blunt dissection through the pleural layer was opted for by 68% in 2002 versus 44% now; a quarter continues to puncture the pleura by trocar. 51% now prefer a small and 46% a moderate bore tube vs. 42% and 51% respectively. 72% physicians applied purse string sutures previously, but 54% use it now. 37% clamped the tube prior to its removal vs. 18% now. No one routinely used suction. Should the tube fell out and further icd needed over 40% would use the track left by the preceding tube. Availability of local guidelines has increased from 39% to 56% but the awareness of the BTS guidelines remains similar (63%).

We found that adherence to the BTS guidelines is improved but continues to remain poor; a third of physicians are still not aware of those guidelines.

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Reliability in estimation of pneumothorax size based on digital chest x-ray uptakes

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In treatment of pneumothorax the patient's symptoms and the size of the pneumothorax make the basis for criterias for intervention. Several methods are developed to estimate pneumothorax size based on chest x-ray outprints. Rhea et.al. (Radiology 1982; 144: 733-6) developed a method using average interpleural distance between the chest wall and the collapsed lung measured in three defined sites (apex (A), middle upper (B) and middle lower half (C) of the thorax). Formula pneumothorax % = $4.95 + (8.8 \times A + B + C) / 3$. No data is available on the intra- and interobserver reliability of this method based on digital uptakes. We wanted to test the intra- and interobserver reliability of the Rhea method, using the random rater model of Eliasziw et al (Phys. Therapy 1994; 74: 777-788). Three pulmonologists viewed 80 digital chest X-ray uptakes from cases of pneumothorax included in a clinical intervention study. The readings were repeated in a random order two weeks later. The estimated pneumothorax sizes varied from 5 to 100%. The differences between the two measurements of the pulmonologists varied between 0 and 10% for all the X-rays but three in which the corresponding figures varied between 11 and 29%. The intra-observer reliability was 0.94 (one-sided 95% Confidence interval (CI): from 0.89 up), and the inter-observer reliability was 0.98 (one-sided 95% CI from 0.96 up). In conclusion, the Rhea Method for estimating pneumothorax size of digital chest x-ray uptakes has a high intra- and inter-observer reliability. The method is however hampered in a few cases where the outline of the collapsed lung is difficult to define.

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Chest drain use at a UK district general hospital: are national guidelines being followed?

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Rationale: In the UK, there are national guidelines on the insertion of chest drains (British Thoracic Society [BTS] 2003.) We reviewed all cases (medical and surgical) where a chest drain was placed in a District General Hospital between April 2000-April 2004 and assessed whether these guidelines are being followed.

Results: 147 cases (total 168, 21 excluded- penetrating trauma.) 63 effusion, 73 pneumothorax, 11 hydro- or pyo-pneumothorax. Drain type: 95 conventional, 45 seldinger, 7 not recorded (NR)

Consent: 10 verbal, 3 written, 134 NR

Site (BTS recommends mid axillary line, 5th intercostal space): 34 (23%) mid axillary, 31 (21%) other, 82 (56%) NR. 27 (18%) 5th intercostal space, 35 (24%) other, 85 (58%) NR

Drain Size (BTS recommends small bore, 10-14 gauge): 21 (14%) size 10-14, 77 (52%) larger size, 49 (34%) NR

Aseptic Technique: 95 (65%) yes, 52 (35%) NR

Local Anaesthetic (BTS recommends 3mg/kg lignocaine): 2 (1%) general anaesthetic, 77 (52%) NR. Of the remaining 68 (46%) median dose of lignocaine was 100mg

Ward (BTS recommends management on specialist wards): 85 (58%) respiratory ward, 17 (12%) medical non respiratory, 45 (30%) surgical.

Chest Xray post drain insertion: 122 (83%) yes, 3 (2%) no, 22 (15%) NR

Conclusion: Documentation, particularly of consent, is poorly recorded. There is wide variation in the drain site and the drains inserted may be larger than necessary. Less local anaesthetic is given than recommended. This hospital now has its own guidelines on chest drain insertion, which should improve some of the shortfalls. However, we suspect that there is wide variation in the practice of this common procedure nationally, despite the availability of easily accessible guidelines.

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Pneumothorax in cystic fibrosis patients on non invasive positive pressure ventilation

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Background; Long term non invasive positive pressure ventilation (NIV) is being increasingly used in cystic fibrosis, usually as a bridge to transplantation. Pneumothorax is a potential complication of NIV use. Pneumothorax in cystic fibrosis is a common complication and is associated with increased morbidity and mortality. **Aim:** To assess if the use of long term non invasive ventilation (NIV) increases the risk of pneumothorax (PTx) in Cystic Fibrosis (CF) patients in our CF centre.

Methods: We reviewed all CF patients commenced on long term NIV (for more than eight hours per day) between 2000 and 2005. We assessed the incidence of PTx, management and outcome.

Results: 42 patients (17 female, 25 male; age range 17 to 56 years) had long term NIV during the study period. Their mean FEV1% predicted was 24%. Length of time on NIV ranged from 1 to 40 months (mean 9.5 months, median 5 months). 11 out of 42 had a history of PTx prior to NIV. 5 out of these 11 patients (45%) had a recurrence of PTx, occurring from 1 to 36 months after starting NIV. All

patients were on pressure preset ventilators with a mean inspiratory pressure of 22. Three out of the five patients had conservative treatment (observation) and the PTX resolved. Two patients had chest drains, and one of them required a surgical pleurodesis.

Conclusion: All patients who had a PTX on NIV had a past history of PTX. In our CF centre, 56% of patients have more than one PTX. In the NIV group, 45% of patients had a recurrence after commencing NIV. We therefore feel that use of NIV does not increase the risk of PTX in CF patients.

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Pneumothorax in cystic fibrosis: management and outcome

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BACK GROUND Pneumothorax (PTX) is a common complication in cystic fibrosis (CF) and is associated with increased morbidity and mortality. We wanted to review the impact of having PTX in our CF population.

AIMS To review the management of PTX in CF and to assess outcome and identify potential risk factors or associations

METHODS We carried out a retrospective observational study on CF patients who had a PTX between 1998 and 2005. Data was collected from clinical notes and our CF database. Information was obtained on date, side, size and management of PTX, age at first PTX, change in lung function post PTX and CF related complications.

RESULTS There were 71 pneumothoraces in 39 patients during the study period. 6 PTX occurred post portacath insertion. 5 patients were on non invasive ventilation. There was no difference in incidence by sex or side of PTX. 56% of patients had more than one PTX. 82% of patients were over 20 years of age. Two thirds had an FEV1% predicted of less than 30%. A third of all patients had allergic bronchopulmonary aspergillosis (ABPA). The majority of small, asymptomatic PTX (<20% in size) were managed conservatively and resolved. Aspirations had a 50% failure rate. 40% of the PTX which required intercostal chest drains proceeded to surgical intervention. 17/39 (44%) of patients have died - time from PTX to death ranges from 1 to 75 months, median 18 months. 22 are still alive, with a survival range from 2 to 96 months, median 27 months.

CONCLUSION Pneumothorax is a common complication occurring more frequently in older CF patients, with poor lung function. There is a high recurrence rates and a significant number require surgical intervention. There appears to be a strong association with ABPA.

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Etiologic profile of secondary spontaneous pneumothorax: about 20 cases in Tunisia

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The secondary spontaneous pneumothorax (SSP) arises on a pre-existent respiratory pathology, in subjects aged beyond fifty years, with an important mortality rate (17%). The purpose of our study is to determine etiologic profile as well as clinical, radiological, therapeutic and outcome particularities of the SSP. We led a retrospective study on files; 20 patients were brought together, hospitalized between January 2002 and August 2005 for SSP. The average age of our patients is about 48 years. A history of smoking superior to 30 packages / years is found in half of cases. Main aetiology found is: emphysema in 12 cases, an infectious pneumopathy in 4 cases, and tuberculosis in 2 cases and a lung cancer in 2 cases. The treatment by drainage was sufficient in 12 cases. Surgery was used in 8 patients; it consists essentially of a pleural symphyse with or without bubbles resection. The evolution was favourable without following recurrence, except two deaths reported in the patients having a lung cancer. The treatment of the PSS remains controversial. Thoracic drainage is always indicated. In case of failure or of recurrence after a conservative treatment, a chemical pleural symphyse or by talc, through video - thoracoscopy is indicated. However an etiologic treatment must be started as soon as possible.

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Usefulness of cytology and blind needle pleural biopsy (BNPB) histopathology findings in malignant pleural effusions

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Preface: Pleural effusion is common clinical finding, but often a diagnostic problem. As it is recommended by the BTS algorithm diagnostic guidelines, cytology of pleural effusion is among the first steps in differential diagnosis, and BNPB afterwards in case of negative cytology, primarily because of its lower accuracy (1).

Aim of study: We rewied our results of these diagnostic procedures in malignant pleural effusions.

Methods: Thoracentesis for cytology followed by BNPB for histopathology were done in 136 patients with underlying malignant diseases.

Results: Negative cytology and/or histology findings were in 35 pleural effusions (25,7%). Positive cytology and histopathology findings at the same time were in 51 cases. Only cytology and only histopathology were positive in other 21 and 29 effusions respectively. Sensitivity of pleural fluid cytology was 52,9% (72 cases), and histopathology 58.8% (80 cases). Positive cytology and/or histopathology were in 101 cases indicating overall sensitivity of 74,3%.

Conclusion: In our series sensitivity of BNPB was slightly higher than cytology in malignant pleural effusions. Overall sensitivity of 74,3% suggests that thoracentesis followed by BNPB are useful in diagnosis of malignant pleural effusions.

1. NA Maskell, RJA Butland. BTS guidelines for the investigation of a unilateral pleural effusion in adults. *Thorax* 2003;58:118.

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Spontaneous bacterial empyema in cirrhotic patients: pathogenic mechanisms and diagnostic tools

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This work assesses the role of complements (C3, C4) and opsonization in the pathogenesis of spontaneous bacterial empyema (SBE) in cirrhotic patients and that of C-reactive protein in its detection.

Patients & Methods: Twenty five hepatic hydrothorax patients were included. Pleural fluid (PF) and serum were analyzed for total proteins (TP), albumin, LDH, glucose, polymorph nuclear leukocytic count (PMNL), C3, C4, opsonic activity and high sensitive C-reactive protein (CRP). All patients were on prophylactic antibiotics. SBE was diagnosed when pleural fluid PMNL was > 250 cells/mm³ and positive culture OR >500 cells/ mm³ and negative culture after exclusion of pulmonary infections.

Results: Fourteen patients (Group I) were diagnosed as SBE and 11 patients had no SBE (Group II). Levels of C3 and C4 were significantly less in PF in SBE than in serum but was not significantly different between groups I and II whether in serum or effusion. In both groups, opsonic activity was significantly decreased in both serum and effusion in all patients with no significant difference between both groups. CRP did not significantly change from controls in both groups in effusion but increased in SBE than controls in serum with no significant difference between both groups in either samples. TP in effusion didn't vary between both groups and was of no diagnostic utility.

Conclusion: SBE is under diagnosed. Defective local C3, C4 and opsonic activity can share in its pathogenesis. High sensitive CRP should be tested early before therapeutic interventions since routine PF parameters have limited diagnostic efficacy.

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Pleural effusion caused by choriocarcinoma metastaticum pleurae – case report

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Pleural effusions are a frequent manifestation of primary and secondary malignant diseases. Nevertheless, pleural affection, as a consequence of malignant tumors associated with pregnancy, is seldom seen.

We shall present a case of haemorrhagic pleural effusion and haemorrhagic shock in a 23 years old, female patient.

The patient K.M., age 23, was admitted at the Pneumology and Allergy Clinic because of a non-differentiated pleural effusion in the right haemithorax, reaching the VII rib. On the second day of the hospitalization she presented with a sudden worsening of the general condition, an intensive chest pain, haemorrhagic shock and loss of consciousness. After successful reanimation, a pleural drainage was performed, and 2500 ml of blood were evacuated from the right haemithorax. Thoracic surgery was indicated. The intraoperative finding showed infiltrative changes of the pleura, the lung tissue and the surrounding lipid tissue. The changes had macroscopic presentation of a pulmonary infiltrative process. The histopathologic examination of the material obtained during surgery confirmed Choriocarcinoma metastaticum. The patient was not aware of her pregnancy. She revealed undefined metrorrhagia during the previous 3 months, which were treated as hormonal dysbalance by her gynecologist. The patient was referred to an oncologist and was treated with chemotherapy. Excellent remission was accomplished.

Conclusion: during diagnostic procedures of pleural effusions, conditions which rarely affect pleura must not be omitted.

E400**The use of bronchoscopy in the investigation of pleural effusions of unknown aetiology (PEUA)**

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The value of bronchoscopy (BPY) in the investigation of unexplained pleural effusion is doubtful. The ERS/ATS statement on the management of malignant pleural effusions advised that BPY should not be undertaken routinely in patients with PEUA unless the presence of endobronchial lesions are suspected. We audited the use and outcome of BPY in our patients with PEUA who had BPYs.

Methods: All BPY reports between Aug 04 to Aug 05 were reviewed. Patients who underwent BPY when the main indication was PEUA were identified. The case notes and x-rays were reviewed.

Details of 5 patients with abnormal bronchoscopy

Patient	Bronchoscopy findings	Final diagnosis	Diagnosis achieved by
1	Inflamed mucosa	Lung cancer	Pleural fluid cytology
2	Abnormal mucosa	Lung cancer	Bronchial biopsy
3	Extrinsic tracheal compression	Mesothelioma	VATS
4	Inflamed mucosa	Mesothelioma	Thoracotomy
5	Small mass at bronchus	Lymphoma	Lymph node biopsy

Results: 365 BPYs were carried out during the study period. In 23 patients the indication was pleural effusion. Following case notes and x-rays review, 4 patients were excluded due to the presence of other indications justifying BPY. The mean age of the remaining 19 patients (15 males) was 64 (range 31-81) yrs. In 5 patients (26%) abnormalities were found at BPY (see table). Bronchoscopic samples were not helpful in 4 of these 5 patients. In only one patient (5.3%) the final diagnosis was achieved by BPY alone. **Conclusion:** This audit confirms the low yield of BPY in the diagnosis of PEUA. The lack of local facilities for other diagnostic methods e.g. thoracoscopy may have contributed to the continuing use of BPY. Plans are now in place to introduce thoracoscopy service at our institution.

E401**Chemical pleurodesis for malignant pleural effusion, a comparative study**

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Background: Malignant pleural effusion is a common complication of primary and metastatic pleural malignancies. It is usually managed by drainage and pleurodesis. There is no consensus as to the best method of pleurodesis.

Objectives: to compare the effectiveness, side effects, and cost of different chemical pleurodesis agents used in patients with malignant pleural effusion.

Methods: Between July 2003, September 2005, 75 patients with malignant effusions were randomized into 5 groups, talc slurry 5gm, tetracycline 500mg, and bleomycin 1 iu/kg, iodopovidone 20cc of 10% solution and tube drainage only (control). Tube thoracotomy was done for all patients through which agents were administered:

Results: tetracycline, talc slurry, iodopovidone, and bleomycin resulted in comparative success rates of 80%, 80%, 66.6%, 73.3%, at 30 days and, 66.6%, 73.3%, 60%, 66.6% at 60 days respectively while tube alone was much lower 40%, 26.7% respectively. Chest tubes were removed after an average of 7.2 ± 1.4 days for tetracycline, 7 ± 0.8 for talc slurry, 7.6 ± 0.9 for iodopovidone and 6.4 ± 1.5 for bleomycin respectively with no significant difference, but was significantly longer in chest tube only group 11.2 ± 1.6 days. Chest pain was greater in tetracycline group, dyspnea was greater in talc group, and fever was more common in iodopovidone group. No significant difference existed among groups regarding, pleural fluid characteristics, malignancy distribution, or pleural fluid cytology.

Conclusion: Since in this study, talc slurry, tetracycline, iodopovidone, and bleomycin achieved comparable success rates, we suggest that the cost and drug availability are important factors in choosing a sclerosing agent in developing countries.

E402**Enzyme diagnosis of pleural effusions**

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The activity of adenosine deaminase (ADA), total lactate dehydrogenase (LDH) and two of LDH's isoenzymes (LDH 1 and LDH5) was determined in parallel in the pleural fluid and blood serum of 89 patients with pleural effusions: parapneumonic, tuberculous, neoplastic, and congestive. Data analysis showed some natural changes associated with effusion's etiology.

A statistically significant parameter for the group of patients with tuberculosis was the increased LDH concentration in the serum (362.7U/l). The highest LDH concentration in pleural effusions was observed in patients with lung cancer (476.5 U/l) while the lowest one occurred in the group with congestive effusions (82.7U/l). Due to the higher LDH5 concentration in pleural effusions the LDH1/LDH5 ratio was lower in these effusions than in blood serum (this value was highest

in tuberculous patients >1.69 and lowest in patients with congestive effusions <1.0). Another parameter of statistical importance for the group of patients with tuberculosis was ADA, which value was extremely high (42.9U/l). ADA and LDH values may serve as additional markers in differential diagnosis of some pleural effusions.