

CASE REPORT

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Massive surgical emphysema due to coughing at local anesthetic thoracoscopy

Avinash Aujayeb

ABSTRACT

Local anesthetic thoracoscopy (LAT) is a popular tri-modality approach used in the investigation and management of unexplained exudative pleural effusions. No international guidelines exist, and practice is widely variable. We describe a case of a patient with an exudative pleural effusion whose radiology was concerning for malignancy. Severe coughing during LAT caused an air leak, massive surgical emphysema (SE) which required a large bore chest drain and a small bore subcutaneous drain. Surgical emphysema eventually settled, and the patient was discharged to start systemic anti-cancer therapy.

Keywords: Chest drain, Local anesthetic thoracoscopy, Medical thoracoscopy, Surgical emphysema

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INTRODUCTION

Surgical emphysema, in the context of LAT and without a corresponding air leak from either a visceral pleural tear is usually considered benign and does not require intervention. However, if the air leak post-LAT is big, massive SE will require large bore drainage and subcutaneous drainage via adapted so called “blowholes.” Such a case is presented and this has not been described before in medical literature.

CASE REPORT

A 72-year-old female presented to the Accident and Emergency with a history of increasing breathlessness, weight loss, and fatigue. There was no chest pain, and no other symptoms on systematic enquiry. She had a 40-pack year smoking history, had stopped smoking 10 years ago, and could walk up to a mile without stopping before she started developing symptoms. She was a retired nursing assistant with no historical asbestos exposure. Her past medical history only included osteoarthritis. Her regular medications were atorvastatin 20 mg once a day, and Vitamin D replacement.

At presentation, she had a normal cardiovascular examination, had no clubbing and lymphadenopathy or peripheral oedema. Respiratory examination revealed stony dull percussion to the right hemithorax. A chest radiograph showed a very large right pleural effusion (Figure 1), which was confirmed on thoracic ultrasound. Hematological and biochemical parameters were all within normal limits, specifically the plasma lactate dehydrogenase (LDH) levels were 351 U·L⁻¹ (unit per liter) and his total protein was 62 g·L⁻¹ (normal range 60–80 g L⁻¹) [grams per liter]. 1.5 liters (L) of straw-colored fluid was removed—this revealed an exudate (fluid protein 42 g L⁻¹ and LDH 1230 U L⁻¹) and cytology was negative with a predominant lymphocytic picture. A computed tomogram was performed which showed large pleural based masses (Figure 2A and B).

Local anesthetic thoracoscopy is offered locally and is the preferred method for investigating and managing an unexplained exudative effusion and allows direct visualisation of targets for biopsy. As per routine practice,

an erector spinae block was performed and the patient was laid in the lateral position to allow access to the right pleural space. Target controlled anesthesia was started with propofol and fentanyl. 10 milliliters (mL) of 1% lignocaine was inserted at the 5th intercostal space in the mid axillary line with direct ultrasound visualization. Pleural fluid was easily aspirated, and a 1-centimeter (cm) incision made. A tract was made to the pleural lining with blunt forceps and a 7-millimeter (mm) port inserted (Richard Wolf GmbH). The patient was allowed 20 breaths as per normal practice to allow for the artificial pneumothorax to form, and to equalize the pressures between the atmosphere and the A small suction catheter was inserted through the port to enable drainage of fluid. As soon as suction started, the patient started to cough. 50 micrograms (mcg) of fentanyl were given to mitigate against the cough, but the effusion started to spurt out of the trocar with coughing despite increasing the suction to maximum. 3 L of straw-colored fluid was removed, and there was a considerable, incalculable amount which just came out of the patient onto the floor. Examination of the pleural space thereafter showed no adhesions, and normal looking visceral and parietal pleura. There were however large lobulated masses in the right costophrenic recess (Figure 3A and B). Multiple direct biopsies were performed with no complications, but the patient kept coughing during the biopsies, thus requiring multiple pauses during the procedure whilst the coughing settled. A further 50 mcg of fentanyl was given to try help with this—the patient was not in pain and was adequately sedated at that point from the propofol. Surgical emphysema was felt at the time of the biopsy around the port. Indwelling pleural catheters (IPC) for fluid management are routinely placed at LAT in our centre (of note IPCs have a French Gauge [Fr] of 16), and an IPC (Rocket Medical Plc) was placed directly through the original port and connected to an underwater chest drainage bottle. There was mild bubbling into the water. At the same time, the anesthetist reported that the SE had extended to the patient's neck.

There was no question of an iatrogenic visceral pleural leak, as the visceral pleural was not biopsied. There was no equipment failure, and there were no gases that were being insufflated. A 24 Fr drain was thus inserted in the intercostal space just below the IPC using blunt surgical dissection. This was connected to an underwater seal and demonstrated mild bubbling. The patient was woken up and transferred to recovery where a chest radiograph was performed. Figure 4 shows the 2 well sited drains, lung expansion with the pleural effusion drained and marked surgical emphysema. After an hour or so, both drains stopped bubbling which suggested that any air leak had resolved (note that we do not use digital suction devices locally). The patient felt well, was in no pain and had normal respiratory rate and oxygen saturations of 94% when breathing room air. There was SE palpable around her drains, on her chest and her neck. One hour later, on re-examination, the drains were still swinging but not

bubbling, but the SE had increased somewhat around her neck. She now complained of some voice change, and thus a 2 cm longitudinal cut was made over the 2nd intercostal space on the right anterior chest. Air was massaged out by hand through the cut, and a 12 Fr Seldinger drain inserted subcutaneously. This was connected to an underwater seal bottle with immediate bubbling.

There was rapid improvement in her clinical condition. The IPC was capped off the next day and a few hours later, the large bore drain was removed. 48 hours later, the subcutaneous drain was also removed when it stopped bubbling, and the patient was discharged shortly thereafter. Biopsy results showed a small cell lung cancer, and chemo-radiotherapy has since started. A chest radiograph three weeks later showed full resolution of all the surgical emphysema (Figure 5).

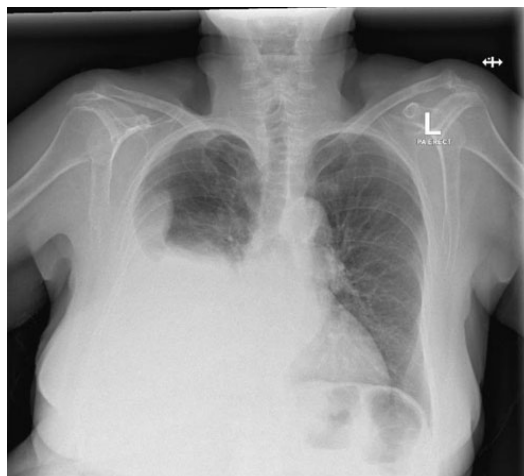


Figure 1: Chest radiograph showing large right pleural effusion.

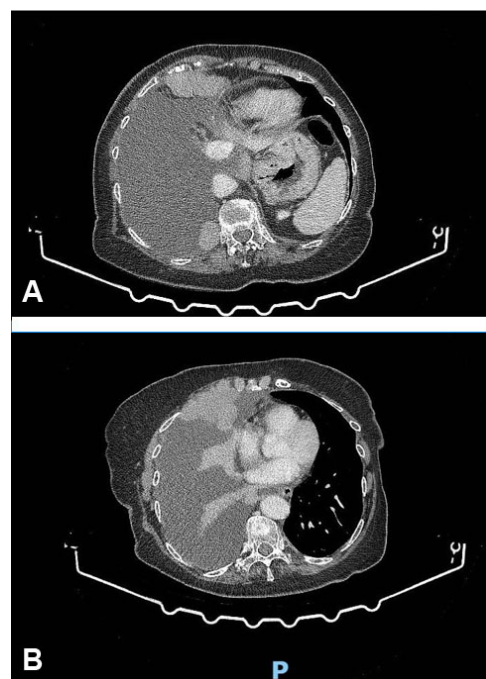


Figure 2: (A and B) CT scan slices showing large pleural masses with pleural effusion.

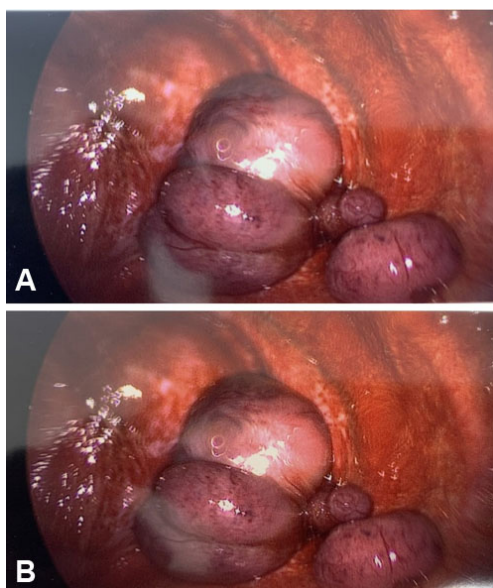


Figure 3: (A and B) Thoracoscopic pictures showing large pleural lobulated masses on the parietal surfaces and in the costophrenic recess.



Figure 4: Chest radiograph showing surgical emphysema, with reduction in the pleural effusion and well sited drains.

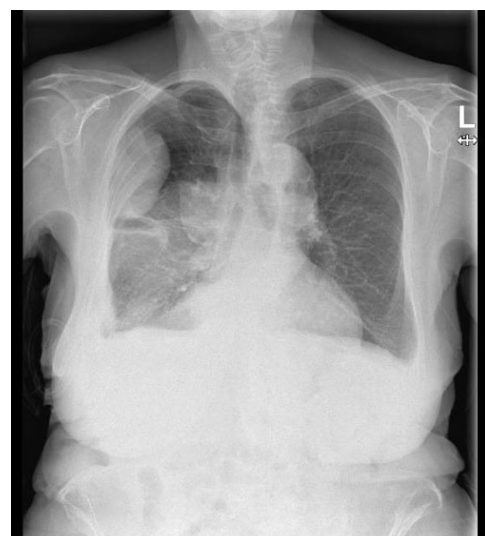


Figure 5: Chest radiograph a few weeks later showing full resolution of the surgical emphysema.

DISCUSSION

We describe a routine thoracoscopy case for an unexplained exudative pleural effusion, which generated significant surgical emphysema and required multiple interventions. This has not been described before in the literature and from a survey of experienced thoracoscopists, is exceedingly rare. Local anesthetic thoracoscopy is a very safe procedure, with a mortality rate of less than 1%, which is almost zero now due to use of medically calibrated talc. Immediate risks associated with LAT are bleeding, surgical emphysema, and visceral puncture [1]. Knowledge of where to biopsy (over a rib, away from intercostal arteries) makes bleeding very rare, and the ubiquitous use of thoracic ultrasound has reduced the risk of visceral perforation to zero [2]. Surgical emphysema post thoracic procedures is very common, and we have reported before on outcomes relating to that phenomenon [3]. In a multicentric retrospective cohort of 256 patients undergoing LAT, the rates of SE were 25% (suggesting that it is very common), but we also showed that in the absence of an air leak, SE is of no clinical importance is considered a benign phenomenon [3]. However, in this patient, the massive surgical emphysema was a cause for concern and needed intervention.

One of the causative factors here was the cough of the patient. Uncontrolled cough is a contraindication to LAT [2], and there was no cause for concern about cough at the anesthetic pre-assessment of the patient. Cough during LAT can usually be mitigated by sedation and administration of opiates such as fentanyl or remifentanyl. They both have antitussive effects by acting on brainstem opioid receptors [4–6]. This was tried here, but to no effect. Increasing doses were not thought to be beneficial and the patient was already under deep sedation with propofol, which is our local practice. We hypothesize that the intractable cough was caused by a combination of lung re-expansion after drainage of a high-pressure pleural effusion and combined with the possibility of the tumor affecting the peripheral branches of the vagus nerve. The explosive coughing caused a significant pressure difference alveolar space, the pleural space and the atmosphere potentially rupturing some alveolar tissues. Thus, air traveled along the mediastinal perivascular sheath and went into the subcutaneous space. This has been described once in a patient post video-assisted thoracoscopic surgery (VATS) [7].

The management of the surgical emphysema post LAT or VATS depends on the clinical condition of the patient [7–9]. Often, without an air leak, it is benign and will resolve as it is a simple by product of the thoracic procedure [3]. If associated with an air leak, then continuous drainage with an underwater seal container is required. Depending on the amount of air leak (these can range from minor to massive), small bore drainage (typically drains less than 20 Fr in diameter) are usually sufficient. As the air leak was felt to be big here, a large bore drain was inserted. It seemed that the air leak had

settled quite quickly as both drains stopped bubbling (they were still swinging and otherwise patent)—often the lung, being such a pliable organ, as it re-expands causes any small tears to spontaneously close. We hypothesized this is what happened here. However, the subcutaneous air was rising in the subcutaneous tissues and thus went onto the neck, causing the voice change. Evacuation of this air was required, and blow holes are described in the literature as a safe, effective, and simple measure [10]. We did not have access to a vacuum dressing which is also described, but a subcutaneous drain can just as effective [11, 12].

One of the contraindications to LAT is uncontrolled cough, and the above is one of the reasons why. In our case, sedation, analgesia, and antitussive medication with propofol and fentanyl (in increasing doses) were given as per our standard practice. Uncontrolled cough has not been an issue in over a decade of doing LAT. We tried unsuccessfully to control the cough, but in retrospect wonder one some other technical aspects of LAT. The patient had a large pleural effusion, and this was under high pressure. There are no guidelines suggesting this, but some expert opinions would suggest that large effusions should have an aspiration before LAT and thus relieve the pressure. When the incision for the port is made, occasionally the incision is too large for the thoracoscopy port which is 7 mm in diameter. This might have also been the case as then any air during coughing could thus escape out into the subcutaneous tissues. There is no reliable way of checking this as the hole was closed at the end of the procedure when the IPC was inserted.

We would thus recommend “tapping down” large effusions so that they are not under pressure, and making sure the initial incision for the LAT is just wide enough for the port to ensure an adequate seal.

CONCLUSION

Cough after or during thoracic surgery such as LAT or VATS can cause significant surgical emphysema, which can require intervention. A knowledge of preventative measures and what can interventions be performed is important.

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Author Contributions

Avinash Aujayeb – Conception of the work, Design of the work, Acquisition of data, Analysis of data, Interpretation of data, Drafting the work, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Guarantor of Submission

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Written informed consent was obtained from the patient for publication of this article.

Conflict of Interest

Author declares no conflict of interest.

Data Availability

All relevant data are within the paper and its Supporting Information files.

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