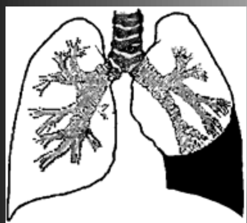
International Pleural Newsletter



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MEDICAL THORACOSCOPY

Flex-Rigid Pleuroscopy: Pros and Cons

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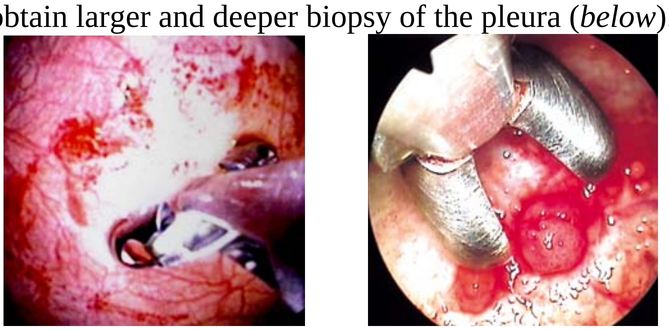
The flex-rigid pleuroscope (model LTF-160, Olympus, Japan) has a 7 mm outer diameter, 22-cm rigid shaft, and 5-cm flexible distal tip (*see below*). It is a promising diagnostic and therapeutic instrument for

physicians managing patients with exudative pleural effusions of unclear etiology and recurrent malignant effusions requiring pleurodesis[1].

Flex-rigid pleuroscopy is performed on spontaneously breathing patients in the bronchoscopy suite or operating room using moderate sedation. Procedures include parietal pleural biopsy, evacuation of free flowing and loculated pleural effusions, removal of thin fibrinous adhesions, evaluation of lung expandability, examination of diaphragm and parietal pleural surfaces, and pleurodesis with talc or other agents.

Advantages of this instrument are: **(1)** flexion-extension of the distal tip that is similar in handling to that of the flexible bronchoscope; **(2)** a 2.8 mm working channel for delivery of topical anesthetic, aspirating fluid, application of forceps and standard bronchoscopic accessories; **(3)** good quality video image; **(4)** compatibility with a light source and video processor used for flexible bronchoscopy and gastrointestinal endoscopy at no additional cost - the price of a flex-rigid pleuroscope is similar to that of a videobronchoscope; **(5)** ability to aspirate fluid under direct visualization; **(6)** good maneuverability of the flexible tip around adhesions which often obviates the need for a second point of entry except to guide chest tube placement, control post-biopsy bleeding, or to break down adhesions using accessory instruments; **(7)** talc pleurodesis can be performed at the same time of pleural examination following complete evacuation of fluid. Moreover the pleuroscope allows administration of 1% lidocaine by means of a spray catheter over the pleural surfaces prior to talc poudrage to reduce pain related to the procedure[2]; **(8)** The 7mm-flex-rigid pleuroscope inserted through a 8mm inner diameter flexible trocar (*see left*) allows air to enter the pleural space as fluid is removed, thereby keeping the lung partially collapsed. Large volumes of fluid can thus be evacuated without excessive risk of re-expansion pulmonary edema.

Deficiencies of the flex-rigid pleuroscope exist. **(1)** The working channel is small. Thick pus or blood can obstruct the channel; alternative modes of aspiration should be available during the procedure. **(2)** Breaking down dense adhesions is difficult with the flexible forceps, although an electrosurgical knife is a possible alternative. **(3)** Flexible forceps lack the mechanical strength of the rigid optical forceps to obtain larger and deeper biopsy of the pleura (*below*).



(a) 2mm flexible forceps (b) 5mm rigid optical forceps

The smaller forceps does not necessarily imply that the diagnostic accuracy of this technique is inferior to that of rigid thoracoscopy. In fact, investigators have described excellent yield[3,4]. **(4)** Excessive bleeding after biopsy, though rare, may not be readily controlled with the pleuroscope as illumination becomes poor and the suction channel becomes obstructed by blood. This should prompt the pleuroscopist to quickly apply external compression, create a second point of entry for other instruments such as electrocautery or a peanut wand to tamponade the bleeding site, and consider lung reexpansion for the same reason.

Thus, even though pleuroscopy is akin to chest tube insertion, the pulmonologist intent on performing flex-rigid pleuroscopy should be knowledgeable about thoracic anatomy, and confine biopsies strictly to the parietal pleura overlying a rib. Despite its minor shortcomings, the flex-rigid pleuroscope offers the pulmonologist a familiar tool and a coveted view of the pleural space.

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Thoracoscopic Sympathectomy

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Thoracoscopic sympathectomy is defined as the anatomical interruption of the thoracic sympathetic chain by means of thoracoscopic techniques. The level of interruption depends upon the indication and the desired therapeutic effects (eg T3 for treatment of essential palmar and T4 for essential axillar hyperhidrosis)[1].

Thoracoscopic approach is now the standard for sympathectomy. Open surgical approaches have become obsolete whereas percutaneous ablation approaches are not widely used because of lower efficacy and higher complication rates. Most thoracoscopic sympathectomy techniques have been described by surgeons and employed three-entry port unilateral video-assisted thoracoscopic surgery under single-lung, double-lumen ventilation, followed by post-operative chest drainage. Recently, a less cumbersome, simplified one-time bilateral surgical approach using clipping or diathermy cauterization, single-lumen intubation, and smaller diameter trocars, is favored[2]. Noteworthy, thoracoscopic sympathicolysis using simple medical thoracoscopic instrumentation and techniques can safely be performed by trained interventional pulmonologists[1,2].

Indications: Accepted indications for thoracoscopic sympathectomy include refractory essential hyperhidrosis (palmar, axillar, facial), and – in selected cases – facial flushing, vascular disorders of the upper limbs (eg Raynaud's phenomenon, acrocyanosis, arterial insufficiency, Buerger's Disease), causalgia, thoracic outlet syndrome, some cardiac disorders (eg prolonged QT syndrome), and chronic pancreatic pain syndromes[1].

Equipments and techniques: Few comparative studies have been performed on this subject and standard guidelines on equipments and techniques are lacking. In general, thoracoscopic sympathetic interventions (whether performed by surgeons or interventional pulmonologists) are nowadays performed in a one-day setting, under general anesthesia. A one-time bilateral procedure using one to three small diameter trocars should be standard of care. The sympathetic chain can be dissected and then resected, cauterized, interrupted or clipped. The level and extent of anatomic interruption depends upon the clinical indication, and should also be kept to a minimum. For instance, sympathetic interruption can be limited to the T3 level for essential hyperhidrosis.

Results and complications: Although very few comparative studies are available, short- and long-term results are excellent in hyperhidrosis patients: relief of palmar, axillar and/or facial sweating is obtained in >90% of cases[1]. Recurrence rates vary between 5 and 10%, but repeat interventions are often successful. Sporadic (<1%) complications include Horner's syndrome, complicated pneumothorax, and hemorrhage necessitating conversion to thoracotomy. No procedure-related mortality has been reported. Compensatory sweating occurs in the majority of patients after sympathetic interruption, and may be related to the level (eg T2 interruption) and extent (eg if extensive-level interruption) of sympathicolysis.

However, compensatory sweating is generally no more than a nuisance, and does not affect overall patient satisfaction. About 1-2% of patients however regret the intervention afterwards[3-7].

Conclusion: Thoracoscopic sympathectomy or sympathicolysis today is a minimally invasive and well accepted intervention for patients with a variety of autonomic nervous system disturbances. Essential hyperhidrosis patients, and well selected patients with other disorders, can be helped with this procedure, which can be performed by surgeons or interventional pulmonologists. Short- and long-term results are excellent. Severe complications are extremely rare, and side-effects usually limited to a certain (but acceptable) degree of compensatory hyperhidrosis.

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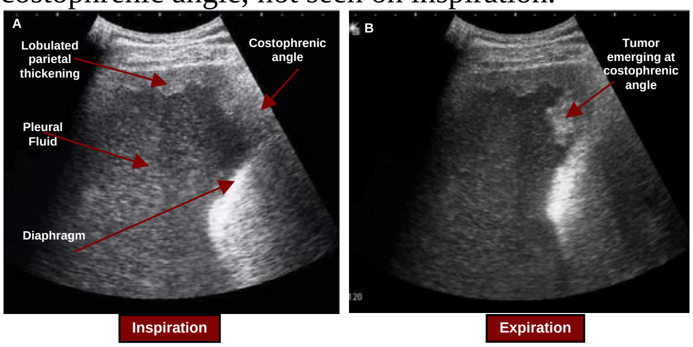
If you have any comment on the Newsletter or interesting cases of pleural disease, contact: Ms Emma Hedley ***emma.hedley@orh.nhs.uk***

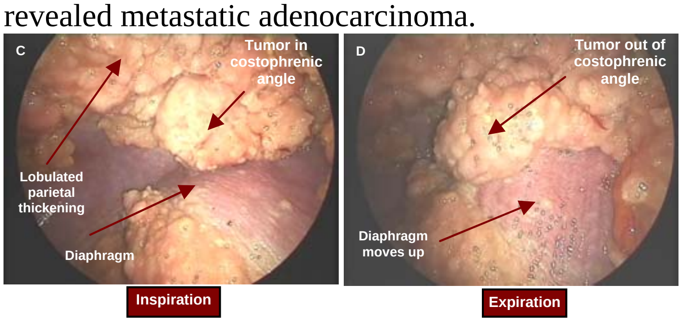
IMAGES OF THE PLEURA

A disappearing tumor in a patient with a large right pleural effusion:

Initial ultrasound (A) on inspiration of this patient showed a pleural effusion, irregular parietal pleural thickening (suspicious of malignancy) and a thickened diaphragmatic surface. Ultrasound on expiration (B) revealed tumor emerging from the costophrenic angle, not seen on inspiration.



Direct vision under thoracoscopy (C) confirmed a mobile area of tumor in the costophrenic angle, which is pushed out, during inspiration (D), of the costophrenic angle by the diaphragm as seen on ultrasound. Multiple biopsies of the lobulated areas revealed metastatic adenocarcinoma.



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Thoracoscopic Pleurodesis

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The major thoracoscopic pleurodesis techniques include administration of talc suspensions ('slurry') or talc poudrage (powder), and pleural abrasion by video assisted thoracic surgery (VATS). Animal studies comparing abrasion with talc have shown mixed results. Since combining large series of talc poudrage in pneumothorax revealed >93% success[1], the potential advantage of VATS may be limited.

In 2007, the use of thoracoscopic talc poudrage for pleurodesis remains controversial for several reasons: (i) questions on the effectiveness of talc over other substances; (ii) fear of talc-induced adult respiratory distress syndrome (ARDS); (iii) cost of thoracoscopy compared to bedside chest tube pleurodesis; and (iv) preferred use of indwelling pleural catheters instead of pleurodesis for management of malignant effusions in some centers.

None of these factors should deter physicians from talc poudrage. To begin with, talc is the most effective agent. Tetracycline while effective in controlling pleural effusions at 30 days, often fails later on, resulting in a success rate of <50%[1]. Silver nitrate and iodoprovodone appear promising in small human studies, but require validation in large series. In comparison, talc poudrage is a time-honored approach with immediate effectiveness >90% pleurodesis[1] and 80-90% success in long-term relief. In addition, talc poudrage is the only pleurodesing technique reported to be effective in low pleural pH effusions[2].

Two studies[3,4] have shown only non-significant trends favoring poudrage over slurry, but both studies excluded patients who possibly had a trapped lung. A major argument for talc poudrage over slurry is that the lung which has limited expansion due to adhesions may be freed up by lysis of the adhesive strands during thoracoscopy. Thus the very patients likely to have greater benefit from poudrage than from slurry were not included in those studies.

ARDS has been reported with the use of talc (especially >5g). In one study, 9% of VATS patients treated with abrasion plus talc developed ARDS compared with no cases after talc poudrage without abrasion[5]. Recently a multi-centered study found success in only 65% (slurry) & 74% (poudrage) of patients with malignant effusions after talc pleurodesis, and 8% & 4% of patients developed ARDS respectively[3]. This study comprised of >100 surgeons performing VATS using non-standardized talc from many undefined sources, which may have contributed to the lower success and higher complication rates. In contrast, using Luzenac talc known for its purity & calibration to a mean diameter of 26 uM, no cases of ARDS were seen among 360 patients in a single center study[6] or in 558 prospectively studied patients in 14 centers in Europe and South Africa[7].

There are no controlled studies comparing cost of talc poudrage with other pleurodesis approaches. We estimated it cost $4000 per patient to perform talc poudrage. Although indwelling catheter is of growing popularity, no prospective studies with cost analyses and quality of life assessment have compared its use against talc poudrage.

In conclusion, poudrage with calibrated talc is safe and effective. In countries where calibrated talc is not available, only talc preparations with a proven record or those with known mean diameters in the 20uM range should be used.

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CASE REPORT

Cirrhotic Chylothorax

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A 73-year old male with hepatitis C and cirrhosis was admitted with dyspnea and a large right pleural effusion (*right*). Serial large-volume paracentesis had been performed in the preceding six months after diuretics were discontinued due to precipitation of hepatic encephalopathy.

Upon physical examination, the patient appeared chronically ill, afebrile, and had a grade I hepatic encephalopathy. Blood tests showed a bilirubin level of 1.65mg/dL, albumin 3.4g/dL, and INR 1.01. Abdominal ultrasonography revealed a coarse echotexture of the liver and a minimal amount of ascites. A CT scan of the chest showed the right pleural effusion with no mediastinal or lung abnormalities. An attempt of paracentesis was unsuccessful. Thoracentesis yields an opalescent fluid (*left*) with a leukocyte count of 200/μL (84% lymphocytes), total protein 0.9 g/dL (serum 6g/dL), LDH 100U/L (serum 439U/L), cholesterol 18mg/dL (serum 133mg/dL), triglycerides 180mg/dL (serum 55mg/dL), ADA 11U/L, and pH 7.51. Bacterial cultures and cytological analysis were unremarkable.

The patient underwent therapeutic thoracentesis which removed seven liters of fluid over the following three days. He was not considered a suitable candidate for liver transplantation, transjugular intrahepatic portosystemic shunt or video-assisted thoracoscopy. Since pleural fluid recurred rapidly despite dietary sodium restriction, two consecutive pleurodesis procedures (the first using 500mg of doxycycline and the second 5g of talc slurry) were performed, but without success. Subsequently, the patient developed a hepato-renal syndrome and died on the 17th hospital day.

In a series from Spain, cirrhosis accounted for 5 of 24 (20%) chylothoraces.[1] In contrast, only 10 of 203 (5%) patients with chylothorax seen at the Mayo Clinic had a chronic liver disease.[2] Chylothorax in cirrhosis results from the trans-diaphragmatic passage of chylous ascites, which in turn may result from leakage of lymph from ruptured small splachnic lymphatics as a result of portal hypertension. The biochemical characteristics of a transudate in a chylous effusion may help identify chylothorax of cirrhotic origin, although rarely heart failure, nephrotic syndrome and superior vena cava thrombosis can produce transudative chylous effusions.[3]

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