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.

Keywords: Chest ultrasonography; Spontaneous pneumothorax; Video-assisted thoracoscopy

1. Introduction

The surgical treatment of spontaneous pneumothorax is based on two principles: the resection of parenchymal blebs or bullae and the obliteration of the pleural cavity [1]. The presence of lung abnormalities can be easily checked during video-thoracoscopic exploration. On the contrary, efficacy of pleurodesis can be only evaluated indirectly by the rate of recurrence after surgery.

The recurrence is a rare event depending from the type of technique, slightly higher after pleural abrasion than after pleurectomy [2,3] and higher for apical pleurectomy compared to total pleurectomy [4].

No information is available on the extent of pleurodesis in patients not developing recurrence. Are their pleura completely and uniformly obliterated or in some cases restituto ad integrum restored a normal relationship between the parietal and the visceral pleura? Nor chest X-ray or CT scan can answer this question.

In the recent years, real-time chest ultrasonography gained acceptance in many indications for chest wall, lung and pleural pathologies [5]. One of the easiest sign to identify during chest sonography is the movement of the visceral pleura compared to immobility of the parietal pleura. This sign of 'pleural sliding', firstly described in veterinary medicine [6], is used to exclude the presence of pneumothorax when present and to suspect atelectasis, fibrosis or pleural adhesions when absent [7].

When pleurodesis is effective, the 'pleural sliding' sign is absent by definition. This study was designed to evaluate the feasibility of pleurodesis assessment by chest ultrasonography. We report our preliminary results.

2. Material and methods

The study was performed between June and September 2005. The population was composed by 5 consecutive patients submitted to VATS complete pleurectomy and 5 consecutive patients submitted to VATS pleural abrasion. Apical blebs or bullae were resected by the use of endoscopic staplers. The technique of pleurodesis used was pleural abrasion unless for patients requiring pleurectomy for professional reasons of failure of previous
pleurodesis attempt. Pleural abrasion was performed by rubbing with a pledget of wide-mesh polyglycolic acid gauze attached to the tip of a standard curved dissector, abrading the entire parietal pleura surface [8]. Complete pleurectomy consisted in parietal pleura stripping from the first rib to the diaphragm, reaching posteriorly the sympathetic chain and anteriorly the internal mammary artery.

Patients had the chest ultrasonography performed 4–6 weeks after the operation by an anesthesist trained in thoracic echography (JD) blinded to the pleurodesis technique used. A 3.5 MHz linear array transducer (EUB-415 CFM, Hitachi) was used in all the cases.

During ultrasonography, the patient was sitting with arms elevated and the hand positioned behind the neck. The probe was positioned in the intercostal space at 9 different predefined points, 2 on the hemiclavicular line (II and IV intercostal space), 3 on the midaxillary line (II, IV and VI intercostal space) and 4 posteriorly on the midline between the spine and the scapula (II, V, VII and IX intercostal space).

Echographic findings were classed following Lichtenstein guidelines [7] as follows: pleurodesis (PD) when the pleural sliding was absent and the lung was seen after the pleural line (the ‘comet tails’ sign), pneumothorax (PX) when pleural sliding was absent and no lung was detected after the pleural line (the ‘stratosphere sign’), fluid (FL) when a liquid component was detected.

Pleurodesis was defined excellent when pleurodesis was confirmed in all the 9 considered points, effective when it was confirmed in more than 6 points, poor when it was confirmed in 6 points or less.

Follow-up information were obtained by direct referring physician contact on November 15, 2004.

3. Results

The population was composed by 9 males and 1 female. Mean age was 36.8 ± 17.9 years, lower for the pleural abrasion group (36.8 ± 17.9 versus 47.6 ± 18.7). In all the cases, the postoperative period was uneventful.

Surgical details and results of chest ultrasonography are listed in Fig. 1. In pleurectomy cases pleurodesis was excellent in all the cases because the absence of pleural sliding was noted in all the explored points. In case of pleural abrasion, 3 patients showed a pleural sliding of 2 contiguous points and 1 patient on 1 single point. Only 1 patient had an excellent pleurodesis in this group.

With a median follow-up of 13 weeks, one case of partial recurrence was recorded 7 weeks after surgery (case 6, Fig. 2). Interestingly, the recurrence was exactly at the level of a persistent pleural sliding zone showed by postoperative chest ultrasonography.

4. Discussion

Preliminary results from this study show that evaluation of postoperative pleurodesis by chest sonography is feasible. As expected, pleurodesis obtained by pleural abrasion is less homogeneous then pleurodesis after complete pleurectomy.

The observed case of recurrence confirmed that area of pleural sliding are at risk of further pneumothorax. The potential advantage from this technique is that the identification of zone with ineffective pleurodesis can probably quantify the risk of recurrence.

It is possible that chest ultrasonography performed during the first postoperative days could early identify zone at risk of ineffective pleurodesis. In these cases, the technique could allow percutaneous pleurodesis techniques like targeted intrapleural talc injection meanwhile the drain is still in place.
References


