Imaged thoracoscopic lung biopsy is a technique utilized to operate on the intrathoracic organs without making a formal thoracotomy incision. Eleven patients underwent lung biopsy with this procedure and each had markedly reduced postoperative pain. Each patient resumed preoperative activity levels within one week of discharge from the hospital. Besides thoracotomy and thoracoscopy, imaged thoracoscopic surgery provides another option for approaching the intrathoracic organs. (Chest 1992; 102:60-62)

Lung biopsy, usually indicated for progressive pulmonary disorders, has generally required a thoracotomy to acquire adequate lung tissue. The morbidity can be significant in this fragile group of patients.

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A new technique, imaged thoracoscopic surgery, has recently been utilized to obtain appropriate specimens of lung without performing a traditional thoracotomy (Fig 1).

METHODS

Patients

Eleven patients recently underwent lung biopsy utilizing imaged thoracoscopic surgical techniques. The five female and six male patients ranged in age from 27 to 77 years.

Indications for biopsy included diffuse interstitial pulmonary infiltrates, massive bullous disease, and suspected metastatic breast carcinoma. Many patients were severely dyspneic preoperatively.

Technique

All lung biopsies were performed using specific tools (a Wolf 10-mm, 0 Panoview Diagnostic Telescope, Dynomics model 5600 camera and camera head, Dynomics Auto-Brite Illuminator II, and a medical grade video monitor). General anesthesia was administered through a double-lumen endotracheal tube, and all patients were placed in the lateral position.

After the chest is prepared and draped and the lung from which a specimen is to be taken is collapsed, a 2-cm incision is made over the seventh intercostal space at the midaxillary line. The chest is entered carefully using blunt dissection. Digital palpation determines the presence or absence of adhesions. If none is present, a 12-mm operating port is inserted through which the diagnostic telescope is passed. The entire thorax is then carefully explored utilizing projects images on the video monitor. Two operating ports are then created, one along the anterior axillary line at the fourth intercostal space measuring 5 cm and a second along the posterior axillary line through the fifth intercostal space 2 cm in length. The anterior operating port is made larger to admit the stapling device. Both incisions are extended into the chest cavity using image visualization. An appropriate portion of lung is chosen for biopsy corresponding to the preoperative roentgenographic findings and imaged inspection. A ring forceps is then passed through the posterior port, and the selected area of lung grasped. A 30-mm stapler (Ethicon Proximate) is inserted into the chest through the anterior operating port. The portion of lung from which the specimen is to be taken is drawn through the jaws of the stapler, which is then closed and fired. With a scissors, the tissue is divided along the outer edge of the staple line, and the specimen is removed.

A second specimen, from a different area, is obtained in a similar manner.

The lung is then slowly reexpanded under direct vision examining the staple line for hemostasis and air leaks. The telescope and port are removed, and a No. 20 French chest tube is placed through this opening. The operating ports are closed in layers with interrupted absorbable sutures. An absorbable subcuticular suture is placed in the skin.

RESULTS

All procedures were successful in obtaining adequate tissue for pathologic and microbiologic examination. Extubation was accomplished in the recovery room for each patient. In 10 of the 11 patients, there were no postoperative air leaks in the chest tubes, and these tubes were all removed by postoperative day 3. The patient who underwent concomitant bullous ablation had his chest tube removed on postoperative day 7. Pathologic findings included bronchiolitis oblit-

![Figure 1. Instruments passed through small incision in chest wall. Ribs are not spread.](http://journal.publications.chestnet.org/pdftoolkit.axd?d=56168625&i=21130122)
erans, refractile foreign body, lymphangitic carcinoma, interstitial fibrosis, hypersensitivity pneumonia, and lymphoma.

**DISCUSSION**

Presently, lung biopsy specimens are obtained by performing a thoracotomy. In most instances, the patients requiring a biopsy are in a state of debilitation and have marginal pulmonary reserve. Although most thoracic surgeons use a limited anterior thoracotomy to reduce postoperative morbidity, it gives limited visualization and access to the thorax resulting in random sampling of one or two lobes at the site of incision. Additionally, there is significant postoperative pain. Traditional rigid thoracoscopy, although less traumatic, has not been helpful in obtaining adequate lung tissue for diagnosis. Visualisation and access to intrathoracic organs are very limited. Except for the surgeon, all other members of the surgical team are excluded from participation in the operation. Due to these factors, thoracoscopy has been used very infrequently by thoracic surgeons. Its main benefit has been to avoid a thoracotomy incision in selected patients. Because of our experience with thoracoscopy, we tried to obtain lung biopsy specimens using this technique with limited success.

With the advent of video optics and its successful application in varied surgical specialities, we applied this technology to develop an approach to thoracic surgical procedures. When coupled with single lung anesthesia, the surgeon, his assistants, and the entire operating room team have a panoramic view of the thorax and its contents (Fig 2). With the addition of several appropriately placed 2.5- to 5-cm incisions between the ribs through which to operate, we were able to perform numerous surgical procedures without making a formal thoracotomy incision (Fig 3).

Imaged thoracoscopic surgery was successfully used to perform lung biopsies in 11 patients. The advantages include excellent visualization of the entire lung surface, chest wall, and mediastinum; the ability to take a biopsy specimen from specific lesions or regions of lung; and small incisions without need for placement of a retractor with rib distraction. This leads to significantly less postoperative pain and earlier return to normal function. Imaged thoracoscopic surgery is more complex and tedious to perform than a traditional thoracotomy, and because, under certain circumstances, the chest may have to be opened to complete the procedure, only trained thoracic surgeons should perform this procedure. Although this technique is in its infancy, imaged thoracoscopic surgery seems to
have great promise.

Presently, numerous procedures are being performed in this manner, including lung biopsy, bullous ablation, treatment of recurrent pneumothorax, excision of benign, malignant, and metastatic parenchymal tumors, pericardial, esophageal, and bronchogenic cyst excision, pericardial window, cervical sympathectomy, truncal vagotomy, neurogenic tumor excision, and pleural sclerosis for malignant effusions. One can only speculate that with improved instrumentation and techniques, lobectomy and pneumonectomy might be performed with this procedure.

**CONCLUSION**

Imaged thoracoscopic surgery permits excellent visualization of the entire lung and the ability to take biopsy specimens from specific areas or lesions, through minimal incisions, with diminished postoperative pain. In selected patients, this technique appears to be ideal for open lung biopsy.

**REFERENCES**