

LY303366, which disrupt cell wall synthesis by inhibiting the enzyme  $\beta$ -(1,3)-glucan synthase, also appear promising. Immune modulators, which may ultimately allow the manipulation of the immune response in patients with disseminated disease, include interferon gamma and interleukin-12. Finally, progress is being made in the molecular characterization of the coccidioidal antigens that are recognized during the humoral and cellular immune responses to infection. In addition to providing reagents that will allow easier diagnosis of infection, these studies should provide information crucial for the development of an effective vaccine against infection.

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## Role of Thoracoscopy in Thoracic Surgical Practice

THORACOSCOPY or the more commonly used term, video-assisted thoracic surgery (VATS), refers to the use of minimally invasive operative techniques employing television guidance to accomplish thoracic surgical procedures previously requiring thoracotomy. The primary aim of this approach is to avoid the perioperative morbidity associated with open thoracotomy. Most diagnostic pleural procedures and simple therapeutic VATS procedures, such as wedge resection of the lung, use two to three small (2.5-cm [1-in]) incisions to achieve access to the thoracic cavity through the rib interspaces. These sites of access allow the introduction of the thoracoscope camera, hand instruments, and endoscopic stapling tools. More complex procedures such as pulmonary lobectomy, esophageal procedures, and mediastinal procedures such as thymectomy usually need additional sites of intercostal access.

The following VATS approaches are accepted in present-day thoracic surgical practice.

Many pleural effusions remain idiopathic, despite attempts at diagnosis with less invasive techniques such as thoracentesis or pleural biopsy. Other malignant or benign pleural effusions may resist tube thoracostomy management alone. Video-assisted thoracoscopic techniques are successful in diagnosing 90% of cases of idiopathic effusion (most of which are malignant). Loculated pleural effusions, hemothoraces, and thoracic empyemata, for which tube thoracostomy treatment has failed, are also

readily controlled with VATS, with the added benefit of avoiding thoracotomy in more than 80% of patients.

The VATS approach is readily suited as an adjunct to cervical mediastinoscopy in the evaluation of mediastinal adenopathy. In patients with this disorder, VATS is an alternative to the anterior minithoracotomy procedure for evaluating adenopathy out of reach of cervical mediastinoscopy. This approach can also be a good alternative to thoracotomy for managing posterior mediastinal tumors and mediastinal cysts and for doing thoracic splachnicectomy and vagotomy.

Indeterminate noncalcified pulmonary nodules and undiagnosed diffuse pulmonary infiltrates are common thoracic problems often requiring surgical biopsy. Until the development of VATS, an open thoracotomy with its attendant morbidity was required. Closed-lung biopsy done with VATS techniques is a preferred approach to many of these processes. Although most pulmonary infiltrates are amenable to VATS, candidate pulmonary nodules for the VATS approach should be small (<3 cm in diameter), located in the outer third of the lung parenchyma, and without endobronchial extension. Among patients with low surgical risk, the early use of the VATS excisional biopsy approach avoids the time delay in management, technical complications, expense, and the unacceptable false-negative diagnostic rate associated with percutaneous and transbronchial biopsy procedures. Diagnostic accuracy is excellent, postoperative mortality negligible, and hospital stays usually about three days. When the lesion is diagnosed as being benign or metastatic malignant disease, thoracotomy can usually be avoided. If intraoperative frozen section analysis identifies a primary lung cancer, conversion to a muscle-sparing minithoracotomy or the use of the VATS technique to accomplish anatomic lobectomy and mediastinal nodal dissection is indicated.

Pulmonary lobectomy and mediastinal nodal staging remain the gold standard of management for stage 1 lung cancer, but VATS wedge resection of peripheral small lung cancers can be an alternative to open surgical resection for patients with impaired cardiopulmonary reserve. Patient survival has been equivalent to that in patients with similar stage disease having lobectomy; the local recurrence rate is higher, however. As a compromise procedure, it appears to be reasonable. Nevertheless, we use this approach only with poor-risk patients who could not withstand the rigors of thoracotomy and lobar resection.

Lung volume reduction surgery has been shown to restore a more normal elasticity of emphysematous lungs and to improve the efficiency of the muscles of respiration. This operation has been described using either an open sternotomy approach or VATS techniques. Equivalent functional improvement has been noted with either approach, but the use of VATS avoids the morbidity associated with dividing the sternum.

Video-assisted thoracic surgical procedures are a growing technical component in the operative armamentarium of most thoracic surgeons today. Some centers are using VATS techniques in nearly 60% of their thoracic surgical interventions. It is a good approach to a variety of

thoracic surgical interventions previously requiring large, painful thoracotomies for definitive management.

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