

Thoracic | Oncology

Minimally Invasive Approaches to Surgery for Lung and Esophageal Cancer

Mark K. Ferguson, MD

Professor, Section of Cardiac and Thoracic Surgery
Department of Surgery
University of Chicago
(773) 702-3551
mferguso@surgery.bsd.uchicago.edu

Video-assisted thoracic surgery (VATS) was introduced in the late 1980s to facilitate lung biopsy, pleural procedures, and a variety of other small operations that traditionally were done through an open thoracotomy. Since then, the scope of VATS has expanded to include more major procedures such as resection of mediastinal tumors, thoracic spine surgery, and operations for benign esophageal disease.

During the past 5 years, a few pioneers have used VATS techniques to perform lobectomy and esophagectomy for cancer. These efforts have been controversial because of concerns over whether use of these techniques provides an adequate cancer operation and because initial reports indicated there was no advantage to using the minimally invasive techniques with regard to length of hospital stay or the incidence of postoperative complications. Recent reports suggest that the instrumentation and surgical techniques have improved to such an extent that such operations now can be performed with the expectation of improved patient outcomes and without compromising accepted standards of surgical cancer care.

LUNG CANCER

It is estimated that about 165,000 new cases of lung cancer will be diagnosed in 2000. Of these patients, fewer than 40 percent will be eligible

for surgery, among whom 10,000 to 20,000 patients will have early stage cancer possibly amenable to VATS resection. The feasibility and efficacy of VATS resection are being studied in a multi-institutional setting under the auspices of the Cancer and Leukemia Study Group B (CALGB) through a protocol that outlines the appropriate conduct of such operations.

Surgery is performed under a general anesthetic with the patient in a lateral decubitus position, employing single lung ventilation to permit collapse of the lung being operated on. Access to the chest is gained through three ports measuring up to 10 mm and a single accessory incision measuring up to 8 cm long, which permits use of some standard surgical instruments and allows removal of the resected lobe at the conclusion of the operation. An anatomic dissection is performed, ligating all vessels and the bronchus individually, and a standard dissection is performed of hilar and mediastinal lymph nodes to provide staging information.

Early published results suggest that VATS operations can be performed safely in patients with lung cancer, complications are infrequent, and duration of hospitalization is decreased compared with what is required for standard open lung resections.¹ In addition, intermediate-term survival appears to be equivalent to historical results for more traditional operations.²

Our medical center is one of few to begin screening patients for lung cancer using rapid, low-dose spiral computed tomographic scans. The new VATS techniques will enhance our ability to care for people with suspected very

early stage lung cancers, providing minimally invasive means to both diagnose and treat these individuals.

ESOPHAGEAL CANCER

The incidence of cancer of the esophagus and gastroesophageal junction is difficult to estimate accurately owing to differences among investigators as to how to categorize some of these tumors, but is between 14,000 and 18,000 new cases annually. In the United States, adenocarcinomas of the esophagogastric junction are increasing in frequency more rapidly than any other solid tumor. Most patients with

mobilization of the stomach and distal esophagus, while the proximal esophagus is dissected bluntly through a cervical incision. This is similar to the transhiatal technique for open esophagectomy, and the same controversies attend its use, including whether the extent of lymph node and soft tissue resection are adequate. In some cases a hand-assist technique is employed, in which the operating surgeon passes his or her hand into the abdomen through a special laparoscopy port, providing the ability to palpate tissues and retract organs by hand to facilitate dissection. The other technique involves the



FIGURE. Minimally invasive approaches to lung resection for cancer include the use of three standard 10 mm ports and a single small utility incision.

these cancers are candidates for either curative or palliative surgery. The role of chemotherapy and radiotherapy, either as a neoadjuvant treatment or in the postoperative setting, remains unproven.

Persistent arguments regarding surgical therapy include the appropriate approach to resection (open thoracotomy versus transhiatal approach), the correct amount of soft tissue resection, and the optimal extent of lymphadenectomy. No prospective trials have been performed that adequately address these issues. Now, new minimally invasive approaches to esophageal resection are adding to these ongoing controversies.

Two minimally invasive approaches to esophagectomy have been described. One technique includes a laparoscopic approach for

use of thoracoscopy for dissection of the esophagus under direct vision, followed by laparoscopic mobilization of the stomach for reconstruction. This permits any degree of soft tissue and lymph node dissection the surgeon desires, and is amenable to the performance of future randomized studies of the appropriate extent of surgery for esophageal cancer.

Advantages of minimally invasive esophageal surgery include decreased pain, faster return to full activity, and a resultant greater patient enthusiasm for surgery. Initial reports indicate that these procedures can be performed safely in carefully selected patients.³ Early results suggest a decrease in hospital stay and the incidence of postoperative complications compared with standard open techniques.⁴



REFERENCES

1. Demmy TL, Curtis JJ. Minimally invasive lobectomy directed toward frail and high-risk patients: A case-control study. *Ann Thorac Surg.* 1999;68:194-2000.

2. McKenna RJ Jr., Wolf RK, Brenner M, Fischel RJ, Wurnig P. Is lobectomy by video-assisted thoracic surgery an adequate cancer operation? *Ann Thorac Surg.* 1998;66:1903-1908.

3. Law S, Fok M, Chu KM, Wong J. Thorascopic esophagectomy for esophageal cancer. *Surgery.* 1997;122:8-14.

4. Watson DJ, Jameison GG, Devitt PG. Endoscopic cervico-thoraco-abdominal esophagectomy. *J Am Coll Surg.* 2000;190:372-378.

Pediatric

HEMATOLOGY/ONCOLOGY

Augmented Berlin Frankfort Munster Therapy for High-Risk Acute Lymphoblastic Leukemia

James B. Nachman, MD
 Professor of Clinical Pediatrics
 Department of Pediatrics
 Section of Hematology/Oncology
 University of Chicago
 (773) 702-6808
 jnachman@peds.bsdc.uchicago.edu

In the late 1950s, childhood acute lymphoblastic leukemia (ALL) invariably was a fatal illness. Children with this disease died as a result of either bleeding or infection because the bone marrow was completely replaced with malignant lymphoblasts. As we enter the new millennium, the cure rate for childhood ALL, even for those patients with high-risk ALL and a slow response to initial chemotherapy, is now approximately 80 percent. The ability to cure patients with ALL is one of the major success stories of modern medicine. The treatment principles derived from the study of ALL have been generalized to other forms of leukemia and other types of cancer as well.

Children with ALL who are at least 1 year of age are divided into two risk groups based on age and white blood cell count. Standard-risk patients are between the ages of 1 and 9 years and have a white blood cell count of less than 50,000 at the time of diagnosis. All patients at

least 10 years of age and those younger patients with a white cell count of at least 50,000 are considered high risk. Patients are further stratified according to their initial response to chemotherapy.

By the late 1980s, it became clear that although the outcome for most of these children improved with the use of intensive chemotherapy after the induction of remission, approximately 30 percent of these high-risk patients eventually would experience relapse. Numerous studies have demonstrated that a rapid response to initial chemotherapy is an important prognostic factor in childhood ALL.¹⁻⁶ German investigators⁶ observed that patients with fewer than 1000 blasts/mm³ in the peripheral blood after a 7-day course of prednisone had significantly better event-free survival than patients with at least 1000 blasts/mm³. Similarly, the Children's Cancer Group, a national research cooperative in which the University of Chicago Children's Hospital is a participant, reported that children with high-risk ALL who showed 25 percent blasts or less in the bone marrow on day 7 had a better outcome from initial chemotherapy than those with more than 25 percent blasts.⁴

In an attempt to improve the outcome for children with high-risk ALL and a slow response to initial therapy, the Children's Cancer Group developed a strategy of augmented, intensive

NUMEROUS STUDIES HAVE DEMONSTRATED THAT A RAPID RESPONSE TO INITIAL CHEMOTHERAPY IS AN IMPORTANT PROGNOSTIC FACTOR IN CHILDHOOD ACUTE LYMPHOBLASTIC LEUKEMIA.