Gastrointestinal and thoracic surgeons at Penn Medicine are now performing minimally invasive esophageal (MIE) surgery for patients with esophageal cancer.

The sixth leading cause of cancer deaths in men in the United States, [1] esophageal cancer was historically a disease of the mid and upper esophagus and a consequence of tobacco and alcohol use. Today, by contrast, most esophageal cancers are found at the gastroesophageal junction (GEJ) due to chronic acid reflux leading to the development of Barrett’s esophagus and eventual esophageal adenocarcinoma (EAC). The typical EAC patient is an obese male between 60 and 75 years of age with a chief complaint of progressive dysphagia.

The standard therapy for EAC is chemotherapy and radiation followed by surgery. The principal surgeries for esophageal resection, Ivor Lewis and McKeown, are named for their creators, and distinguished by incision location, associated risks, and operative techniques. As performed at Penn Surgery, both surgeries feature extirpation of the tumor with a wide margin and appropriate lymph node dissection, as well as mobilization and reconfiguration of the stomach to serve as a replacement for the removed, cancerous segment of esophagus (Figure 1).

The Penn Surgery approach to EAC further involves standard radiotherapy and chemotherapy combined with minimally invasive surgeries that combine laparoscopic and thoracoscopic techniques. The minimally invasive approach has been proven to have equivalent oncologic outcomes with decreased complications and faster recoveries when compared to open surgery.

**CASE STUDY**

Mr. C, a 67-year-old, was referred to Penn GI Surgery by his doctor when an outpatient barium swallow for substernal discomfort and dysphagia found a suspicious lesion in his lower esophagus. At presentation, Mr. C had a BMI of 38, a 30-year history of gastroesophageal reflux disease, and a 15lb weight loss. His medical history was otherwise unremarkable.

After a consultation with surgeon Francis Rosato, MD, Mr. C had an upper endoscopy confirming a mass at the GEJ. A biopsy performed during the endoscopy confirmed adenocarcinoma. Next, an endoscopic ultrasound of the tumor and PET/CT were carried out for staging purposes. Due to Mr. C’s tumor stage, he was recommended to undergo a six week course of combined radiation and chemotherapy prior to surgery. Four weeks after completion of his neoadjuvant therapy, a follow up PET scan demonstrated a significant reduction in tumor size. At this point, Mr. C signed consent forms for surgery, which was scheduled to take place in the following 4-6 weeks. During this time, he received nutritional, cardiovascular and pulmonary evaluations and was encouraged to exercise.

A minimally invasive Ivor-Lewis procedure was planned. At surgery, Mr. C was placed in the supine position under general anesthesia and intubated with a dual-lumen endotracheal tube. After placement of optical ports, the stomach, with its blood vessels, nerves and lymph nodes, were dissected and prepared for mobilization into the right chest cavity.

Mr. C was then shifted onto his left side to provide access to the distal esophagus and optical ports placed between the ribs. The right lung was deflated allowing a wide margin of dissection around the tumor, lymph node sampling, and tumor removal. Next, the mobilized stomach was delivered from the abdomen into the right chest and fashioned into a conduit to coincide with the diameter of the proximal esophagus using a linear stapler. The new gastric conduit was then sewn to the remaining esophagus to restore intestinal continuity. A feeding jejunostomy and pleural drains were placed and the right lung re-inflated prior to closure.

Following surgery, Mr. C was transferred to the ICU and entered the enhanced recovery after surgery (ERAS) pathway. ERAS is a program focused upon the use of perioperative non-opioid pain medications, improvement in postoperative pulmonary status and GI function, reduction in infection, early ambulation to avoid venous thrombosis, and other recovery protocols. After 7 days in the hospital, he was discharged to home, where he recovered without incident.

At Penn Medicine, EAC patients receive oncologic surveillance for five years via history and physical examination, blood chemistry, imaging studies, and endoscopy.

**References**

FACULTY TEAM
At Penn Medicine, surgeons from the Divisions of Gastrointestinal Surgery and Thoracic Surgery collaborate for esophageal surgeries involving cancer (including open and minimally invasive Ivor Lewis and McKeown procedures) as well as for GERD and achalasia. Penn GI surgeons also perform surgeries for neuroendocrine tumors, gastrointestinal cancers and abdominal wall conditions, among other procedures.

Performing Minimally Invasive Esophagectomy at Penn Medicine

John C. Kucharczuk, MD
Chief, Division of Thoracic Surgery
Associate Professor of Surgery

Francis E. Rosato, MD
Assistant Professor of Clinical Surgery

Taine T.V. Pechet, MD
Chief of Surgery, Penn Presbyterian Medical Center
Associate Professor of Clinical Surgery

Noel N. Williams, MD
Director, Penn Metabolic & Bariatric Surgery Program
Rhoads-Harrington Professor in Surgery

ACCESS

Penn Surgery
Perelman Center for Advanced Medicine
West Pavilion, 4th Floor
3400 Civic Center Boulevard
Philadelphia, PA 19104

Penn Medicine University City
3737 Market Street, 4th Floor
Philadelphia, PA 19104

Penn Medicine Cherry Hill
1865 Route 70 East
Cherry Hill, NJ 08003

Visit Penn Medicine on Twitter at:
@PennSurgery