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As founding chairman of the UPMC Department of Cardiothoracic Surgery, I am proud to present this issue of *Cardiothoracic Surgery Update*.

Our mission is to strive for excellence in patient care, to train the next generation of cardiothoracic surgical leaders, and to advance our field through innovation and research.

In this issue, we celebrate the accomplishments of our growing department and provide updates on upcoming events, clinical trials, and research initiatives. We welcome Christopher Sciortino, MD, PhD, surgical director, UPMC Advanced Heart Failure Center and are excited to share his plans for the UPMC Heart Transplant Program. In addition, we share the expertise of Jose Pedro da Silva, MD, surgical director, Center for Valve Therapy, Heart Institute at Children's Hospital of Pittsburgh of UPMC and his work in treating Ebstein's anomaly in the pediatric patient. We are also pleased to highlight the ongoing collaboration between the Division of Lung Transplant/Lung Failure and the Division of Thoracic and Foregut Surgery to provide robotic-assisted surgery techniques to patients with gastroesophageal reflux. Lastly, we discuss the challenges associated with reoperative esophageal surgery and the work our experts are doing to meet and exceed these challenges.

I am extremely proud of our department and our continued plans for clinical and academic growth. I look forward to keeping you up to date on future progress and developments.

For more information about our program, please visit UPMCPhysicianResources.com/ThoracicSurgery.



James D. Luketich, MD, FACS

A handwritten signature in black ink that reads "James D. Luketich". The signature is written in a cursive, flowing style.

Henry T. Bahnson Professor and Chairman,
UPMC Department of Cardiothoracic Surgery
Chief, Division of Thoracic and Foregut Surgery
Director, UPMC Esophageal and Lung Surgery Institute
Director, Thoracic Surgical Oncology

The UPMC Heart Transplant Program: Past, Present, and Future



Christopher Sciortino, MD, PhD
Surgical Director, UPMC Advanced Heart Failure Center
Assistant Professor, Cardiothoracic Surgery

Christopher Sciortino, MD, PhD is an assistant professor in the Division of Cardiac Surgery and surgical director of the UPMC Advanced Heart Failure Center. Dr. Sciortino arrived in Pittsburgh less than a year ago, with a plan to build on the remarkable and unmatched tradition of excellence of the UPMC Heart Transplant program. Over the program's 37-year history, our surgeons have performed more than 1,400 adult heart transplants, and our Heart Transplant and Heart Failure program accepts some of the most complex cases in the country.

The goals of the heart-failure service and the transplant service at UPMC are to provide excellent care for patients with heart failure — getting each patient the right support at the right time. We evaluate every person referred to our program to determine if he or she is eligible and would benefit from a heart transplant or heart-assist device. When a donor heart becomes available, we retrieve the organ, perform the transplant, and manage any surgical decisions.

Identifying the right patients at the right time

Dr. Sciortino stresses the need to identify patients with heart failure who may require transplant early in their disease progression. He wants to approach this challenge from three different angles. First, physicians and surgeons must acknowledge that patients are researching their disease independently. These patients will benefit greatly if their doctors can direct them to high-quality, accurate information to help them understand heart disease. Second, physicians should not consider referral to the UPMC Advanced Heart Failure Center to be evaluated by a surgeon to be an option of last resort. Helping physicians from other specialties understand the natural history of heart failure and the resources available at UPMC is an important mission of our specialty center. Third, we should develop the ability to identify patients within the UPMC system with heart failure, monitor their disease progression, and alert their doctors that referral for an evaluation by a heart transplant surgeon may be indicated. The goal of this project, which Dr. Sciortino initiated, is to use the electronic medical record as a tool to see patterns as the patient's heart disease progresses. If successful, it will identify patients when they are starting to decline, and then get them to our surgeons for evaluation and care.

When is the right time to see the division's specialists? The best time is when traditional medical therapies start to fail and the clinical trajectory of a patient with heart failure declines. The patient may not need intervention immediately, but there are many hurdles to transplant. The surgeons in the division are very adept at improving a patient's clinical status prior to listing for transplant. This translates into improved outcomes and better quality of life. Even if 10 years pass before an eventual transplant, it will be a

different 10 years than the patient would have experienced otherwise. The patient may also survive for longer without a transplant because the heart failure specialists at UPMC intervened.

The same is true for placement of mechanical circulatory support. If a patient gets a ventricular assist device (VAD) as a planned procedure when they are relatively healthier, there is typically a shorter hospital stay and better long-term survival than if the VAD is placed as emergency support in a very sick patient. Our VAD program in the UPMC Department of Cardiothoracic Surgery is internationally recognized due to our extensive clinical and research experience. We have implanted nearly 1,000 left ventricular assist devices (LVADs) and participate in almost every major trial of new VADs. With both heart transplantation and VAD support, we are striving to catch patients earlier in their disease progression and direct them to surgical treatments when appropriate.

Increasing the donor pool

Technology and surgical expertise cannot overcome the biggest hurdle to heart transplantation, which is the limited availability of donor organs. For the last 20 years in the United States, there have been approximately 4,000 patients on the waiting list for approximately 2,500 hearts each year. It is incredibly difficult for a patient with a common blood type to get a donor heart.

A dramatic increase in the number of donated organs suitable for transplant and the number of registered organ donors is essential to meet current clinical needs. Dr. Sciortino is exploring ways for UPMC to be a leader in organ donor registration in western Pennsylvania. He also believes it is important to promote an informed and enthusiastic discussion of organ donation.

Dr. Sciortino hopes to revisit the criteria that eliminate donor organs from consideration. As advances have been made in the treatment of infectious diseases, such as hepatitis C, some have become curable or manageable, and the risk of death while waiting for a heart transplant is far greater than the risk of death from the infectious disease or its treatment. Dr. Sciortino is initiating clinical trials to investigate evidence-based, safe, and feasible ways to expand the pool of acceptable donated organs from young, high-quality donors.

If we can reach our goal at UPMC of being able to provide every patient who requires and qualifies for a heart transplant with a transplanted organ from an appropriate donor within a reasonable amount of time, Dr. Sciortino is certain that "the outcomes will be extraordinary and the patients will be extraordinarily happy, and the same applies for VADs and other advanced heart failure therapies."

Robotic Antireflux Surgery in Lung Transplant Recipients: A Unique Approach to a Challenging Operation



Inderpal Sarkaria, MD, FACS
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Jonathan D'Cunha, MD, PhD, FACS
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Bronchiolitis obliterans syndrome (BOS), a form of chronic lung graft rejection, is encountered in at least 50 % of lung transplant recipients within five years of transplant. The surgeons in the Division of Lung Transplant/Lung Failure and the Division of Thoracic and Foregut Surgery in the UPMC Department of Cardiothoracic Surgery are collaborating and using highly specialized, robot-assisted surgery to address a major contributor to BOS—gastroesophageal reflux disease (GERD).

GERD, which may result from the disease that necessitated transplant or may result from the transplant surgery itself, increases the likelihood of BOS, chronic rejection, and graft failure. The current consensus is that GERD should be treated aggressively in lung transplant recipients. Although medical management of GERD is administered, it is generally insufficient, and rarely eliminates reflux completely. A laparoscopic Nissen fundoplication is usually performed after transplant, when the patient is able to tolerate the surgery. Robot-assisted laparoscopic surgery is an increasingly exciting option and may have some unique advantages for lung transplant patients.

The UPMC Department of Cardiothoracic Surgery is on the cutting edge of advanced applications of robotic technologies. Inderpal Sarkaria, MD, director, Thoracic Robotic Surgery, and other surgeons in the division have studied the safety and efficacy of robotic thoracic surgical procedures extensively. UPMC is known nationally and internationally for our training programs in robotic surgery, and Dr. Sarkaria has mentored surgeons from around the world in robot-assisted thoracic procedures.

Robotics give expert surgeons the opportunity to work with an extremely precise tool. Robotic surgery, which is actually telemanipulation of an advanced instrument that the surgeon controls completely, has several potential advantages over laparoscopy or video-assisted thoracoscopic surgery. The surgical robot allows better visualization and gives better control of more dexterous tools. The well-characterized benefits of minimally invasive thoracic surgery, such as faster recovery times and fewer postoperative complications, seem to carry over to minimally invasive robotic surgeries. Nonetheless, the surgeon's experience, expertise, and judgment are critical in selecting appropriate patients for robot-assisted procedures, conducting the procedures safely, and determining when to abandon a robotic approach.

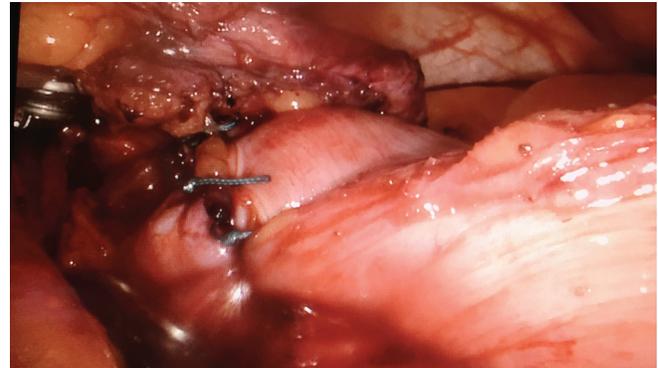


Figure 1. Intraoperative photograph of a completed Nissen fundoplication performed via robotic thoracic surgery in a lung transplant recipient.

When performing antireflux surgery in lung transplant recipients, robotic surgery can give better visualization and control of a difficult operative field. Antireflux procedures in transplant recipients are complex for a number of reasons. The immunosuppressants and steroids that prevent graft rejection alter tissue characteristics and wound healing. The tissues in the mediastinum can be unusually fragile secondary to chronic steroid use, and the previous lung transplant operation makes performing a de novo fundoplication similar to performing a redo surgery, particularly behind the heart near the vessel anastomoses. Scar tissue from the transplant requires meticulous dissection to prevent injury to the major heart vessels.

Dr. Sarkaria and Jonathan D'Cunha, MD, PhD, chief of the Division of Lung Transplant/Lung Failure, have recently begun offering robot-assisted fundoplication to lung transplant recipients at UPMC with good outcomes postoperatively (Figure 1). To ensure a thorough preoperative evaluation, all the standard tests ordered before an antireflux surgery are performed with additional anatomic evaluation (typically a CT scan of the chest, abdomen, and pelvis); additional laboratory assessments to look for graft rejection and infection; and a careful review of the patient's medications to minimize interference with wound healing. The expertise of the transplant surgeon is crucial at all steps.

When they performed robotic antireflux surgery in the lung transplant recipients, Dr. Sarkaria and Dr. D'Cunha found that the remarkable visualization afforded by the robotic interface was a

Continued on page 5

The Cone Procedure for Repair of Ebstein's Anomaly



Jose Pedro da Silva, MD

Surgical Director, Center for Valve Therapy,
Heart Institute at Children's Hospital of Pittsburgh of UPMC
Visiting Professor, Cardiothoracic Surgery

The Division of Pediatric Cardiac Surgery within the UPMC Department of Cardiothoracic Surgery provides cardiothoracic surgical intervention for infants, children, and adults with congenital cardiac and vascular diseases; congenital abnormalities of the tracheobronchial tree; and abnormalities of the chest wall. Under the direction of Victor Morell, MD, the division has been a national leader in the surgical treatment of congenital heart disease (CHD) for more than a decade with excellent surgical outcomes and surgical mortality rates far below national averages.

Jose Pedro da Silva, MD, joined the department last year and is continuing this tradition of excellence. Dr. da Silva is a world-renowned expert on the repair of Ebstein's anomaly, which accounts for 1 to 2 % of all CHD.

Ebstein's anomaly is a congenital malformation of the tricuspid valve (TV) and right ventricle (RV) that develops after six to 12 weeks of gestation due to a failure to delaminate from the right ventricle. The muscle of the RV is abnormal, leading to a thin ventricular wall and dilation of the RV that can worsen over time. The TV is malformed and displaced such that it is inside of the RV. The septal and posterior leaflets of the TV are most commonly hypoplastic and adherent to the RV. The anterior leaflet of the TV is often redundant with a sail-like shape. The displacement and malformation causes tricuspid regurgitation (Figure 1). An atrial septal defect (ASD) accompanies Ebstein's anomaly in most patients. Ebstein's anomaly has several anatomic variations, and patients range from asymptomatic throughout their lifetime to experiencing severe heart dysfunction as neonates who require immediate surgery. Typical symptoms include dyspnea, cyanosis, arrhythmia, and a dilated heart. Ebstein's anomaly is corrected in approximately 40 % of patients during their first year of life.

Historically, there have been several operations utilized to correct Ebstein's anomaly, in part because none of them resulted in a perfect, lifelong repair. In the early 1990s, Dr. da Silva started developing the cone procedure for repair of Ebstein's anomaly, which is now regarded as the most anatomically accurate repair and has become the standard of care. To date, Dr. da Silva has performed more than 200 cone procedures. With continued application and study of the technique, the long-term results are very good.

The cone repair has four major steps. First, the surgeon frees the tethered TV leaflets. Next, the surgeon uses all the available tissue from the mobilized leaflets to reconstruct the TV by forming them into a cone (Figure 2A). The conical reconstruction effectively

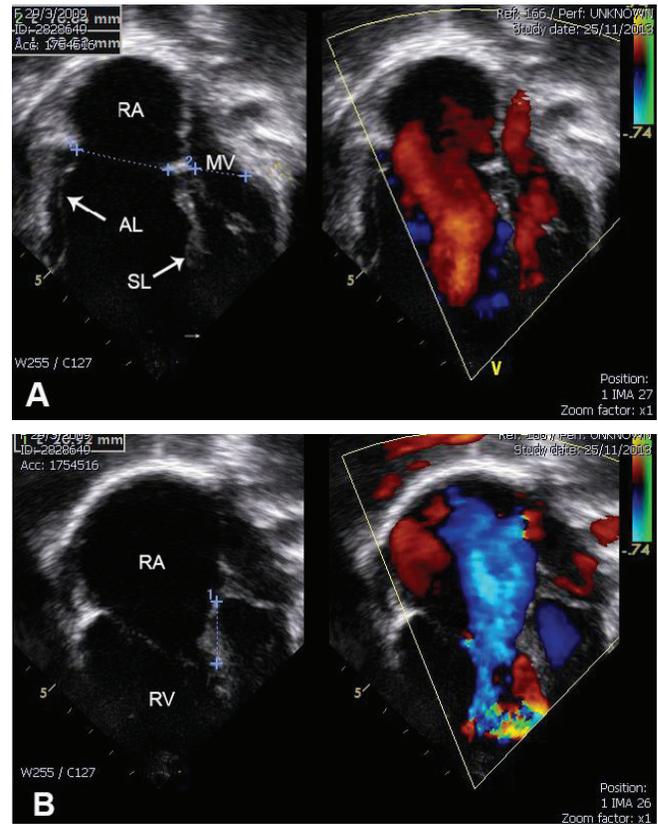


Figure 1. Echocardiogram of an Ebstein's anomaly patient showing: severe displacement of the septal leaflet of tricuspid valve, dilation of the right atrium, and right ventricle. The color flow Doppler reveals good blood inflow in diastole (A) and severe tricuspid regurgitation in systole (B). AL = anterior leaflet. SL = septal leaflet, RA = right atrium, RV = right ventricle, and MV = mitral valve.

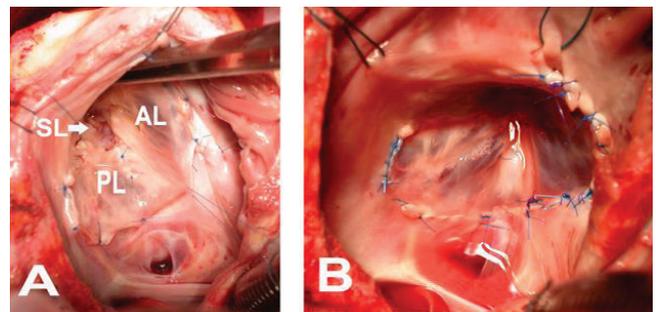


Figure 2. Cone construction done by rotation of the posterior leaflet, which was combined with the septal leaflet (A), and attached to the true tricuspid annulus (B). AL = anterior leaflet, PL = posterior leaflet, and SL = septal leaflet.

mimics the functional anatomy of the TV. Third, the surgeon reduces the size of the atrial-ventricular annulus, and finally, the surgeon attaches the reconstructed cone valve to its anatomically correct location at the atrial-ventricular junction (Figure 2B). With experience, it is possible to complete these steps in almost all patients. Mortality and morbidity after the procedure are low. The valve grows with the patient, and reintervention may not be required. In 5 to 10 % of patients, fibrosis necessitates reintervention, and lifelong monitoring of patients with CHD is recommended.

A key aspect to a successful cone procedure is the complete mobilization of the tethered TV leaflets. Surgeons inexperienced with the procedure may be conservative during this critical step and end up with tension in the repair, which then leads to problems. When a patient requires closure of an ASD, the closure should be valved to allow blood flow from the right side of the heart to the left in the event of RV failure. Some patients with extreme RV dilation require an additional intervention, typically a Glenn procedure, to help unload the ventricle.

Some care providers have hesitated to refer patients for surgical repair of Ebstein's anomaly because of the possibility that a TV replacement will be required, which sets the patient up for a lifetime of complications and a high likelihood of a redo valve replacement. There is increasing evidence that the cone repair creates a durable repair and a TV capable of appropriate growth. Dr. da Silva has found that optimal outcomes are obtained when the cone procedure is performed as an elective surgery in children under the age of 12, usually between the ages of three and five (Figure 3). This should inspire earlier referral for corrective surgery.

With more than 50 years of experience, the Division of Pediatric Cardiac Surgery has a well-established mission to provide surgical

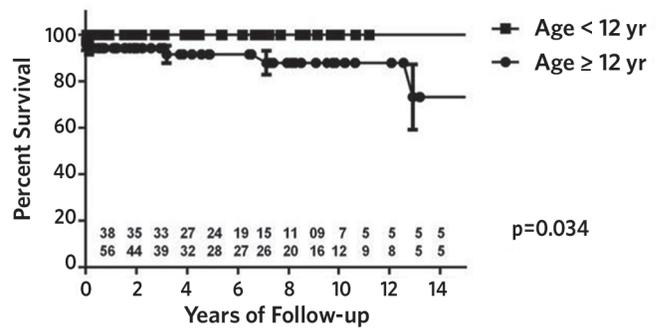


Figure 3. Kaplan-Meier survival curve of Dr. da Silva's first 94 cone procedures comparing repair of Ebstein's anomaly in patients younger than 12 years of age with repair in patients older than 12 years.

care to patients with CHD. We provide this care through dedicated service lines for newborns, children, adolescents, and adults. The children who we treat for CHD at Children's Hospital of Pittsburgh of UPMC benefit from a comprehensive heart center with expert surgeons, cardiologists, advanced practice providers, and support staff. Their perioperative care is enhanced by our dedicated cardiac anesthesiology team and our cardiac ICU. The adults who we treat benefit from comprehensive medical care with a smooth transition from childhood through adolescence and into adulthood. We are well versed in the prevention and treatment of late-onset complications in adults with CHD who had life-saving heart surgery as newborns and children, and now require a life-long, coordinated approach to their care. The Division of Pediatric Cardiac Surgery is well-equipped to continue our long tradition of excellent care of patients with CHD.

Robotic Antireflux Surgery in Lung Transplant Recipients: A Unique Approach to a Challenging Operation *continued from page 3*

clear improvement over the visualization provided by standard laparoscopy. Additionally, the enhanced manipulative ability of the robotic tools allowed them to dissect higher and more aggressively in the mediastinum and free more of the esophagus from the surrounding tissue, reducing the likelihood of an esophageal-lengthening procedure that might delay recovery in some patients. Both doctors believe that their two-minded approach, with a lung transplant specialist and a specialist in robotic thoracic surgery, resulted in better patient care. Because the lung transplant surgeons at UPMC can follow the patient longitudinally through both procedures, the anatomy and physiology of the lung transplant recipient is better understood during the antireflux surgery.

The surgeons also work closely with a dedicated anesthesiology team, because general anesthesia of lung transplant recipients

is not necessarily straightforward. At UPMC, an expert-driven, continuum-of-care model is applied. Pulmonary and infectious disease specialists are consulted before, during, and after the antireflux surgery. Because the patient is typically cared for in the cardiothoracic ICU, the intensivists, nurses, and advanced practice providers are also experts at caring for transplant recipients.

Robotic thoracic surgery is the most sophisticated and advanced minimally invasive technology currently available. In the hands of the experienced surgeons in the UPMC Department of Cardiothoracic Surgery, appropriate and expert use of advanced technologies, such as robotics, promises to improve our standards, which we hope will lead to safer surgeries and better outcomes for our patients.

Reoperative Esophageal Surgery after a Fundoplication Failure



Omar Awais, DO
Chief, Thoracic Surgery, UPMC Mercy
Assistant Professor, Cardiothoracic Surgery

Reoperation is not uncommon in patients who have undergone surgery to correct medically refractory gastroesophageal reflux disease (GERD). Even when antireflux surgery is performed by an experienced surgeon, GERD symptoms return in 15 % of patients, and some will require reoperative surgery. The failure rate for antireflux surgery may be as high as 50 % when the first operation to address GERD is performed in a less experienced center. Because paraesophageal hernia repair often includes an antireflux procedure, the considerations for reoperative surgery to repair a recurrent hiatal hernia are similar to those for redo antireflux surgery. When reoperative surgery is necessary, a referral to a high-volume center of excellence, such as the Division of Thoracic and Foregut Surgery in the UPMC Department of Cardiothoracic Surgery, is highly recommended.

Redo esophageal surgery is complex. At UPMC, we recognize this challenge and prepare appropriately. A complete workup before entering the operating room is essential. First, we determine the indications for the previous surgery. It is essential to identify the symptoms that prompted the initial operation. We thoroughly review the operative records and preoperative and postoperative testing from previous antireflux surgeries. Subsequently, we perform our own complete preoperative workup to assess the patient's current physiology.

We approach each patient with the paradigm that we are starting over from the beginning. It is critical to understand what symptoms



Ryan Levy, MD
Chief, Thoracic Surgery, UPMC Passavant
Assistant Professor, Cardiothoracic Surgery

the patient hopes the redo surgery will resolve. At a minimum, we assess the patient's anatomy with a barium esophagram and an endoscopy by the surgeon who will be performing the redo procedure. CT scans are sometimes useful for additional anatomic assessments. We evaluate gastrointestinal tract function with manometry and gastric emptying studies. In some patients, pH studies are also indicated. Additionally, we assess if gall bladder removal is necessary, especially if Roux-en-Y near esophageojejunostomy (RNYNEJ) is a likely surgical option.

Once we recognize the problem or problems underlying the failure of the prior surgery, we consider repair. The best surgical outcomes are likely when the patient's clinical symptoms correlate with the results of objective testing. Common reasons for failure include wrap migration, wrap misplacement, and the presence of a short esophagus (Figure 1). There are usually three reoperative options: repeating the fundoplication and/or hernia repair, RNYNEJ, and esophagectomy (Figure 2). The primary goal should always be restoring the normal anatomy, but the ability to successfully redo a fundoplication varies from patient to patient. Additionally, the likelihood of successfully alleviating the patient's symptoms decreases with each redo fundoplication.

The initial step of any reoperation is restoring the normal anatomy. We carefully take down the previous repair, paying meticulous attention to vagal nerve integrity. Thorough inspection of the stomach is needed to ensure tissue viability and the absence of perforations. A frequent mistake in primary antireflux surgery is to wrap the stomach around an unrecognized short esophagus. If an adequate length of intra-abdominal esophagus (2-3 cm) cannot be attained with complete mediastinal dissection, the surgeon needs to be prepared to perform a Collis gastroplasty before attempting redo fundoplication. Both the surgeon and the patient need to be aware of the options if the normal anatomy cannot be restored. RNYNEJ is an esophageal-preserving procedure that may be a good alternative in obese patients because it addresses both weight-related and reflux-related morbidities. It can also be considered for patients with reflux and the absence of intact vagal nerves. If the esophagus is severely dilated, an esophagectomy is usually necessary.

It is sometimes hard to predict which procedures will ultimately be necessary during reoperative esophageal surgery. The surgeon needs a diverse skill set with the ability to perform multiple reconstructive procedures so that the patient's options are not limited. In the UPMC Division of Thoracic and Foregut Surgery, we have experience with all types of esophageal surgery that is not matched elsewhere. The UPMC Department of Cardiothoracic Surgery is also unique in our volume and experience with minimally invasive approaches.

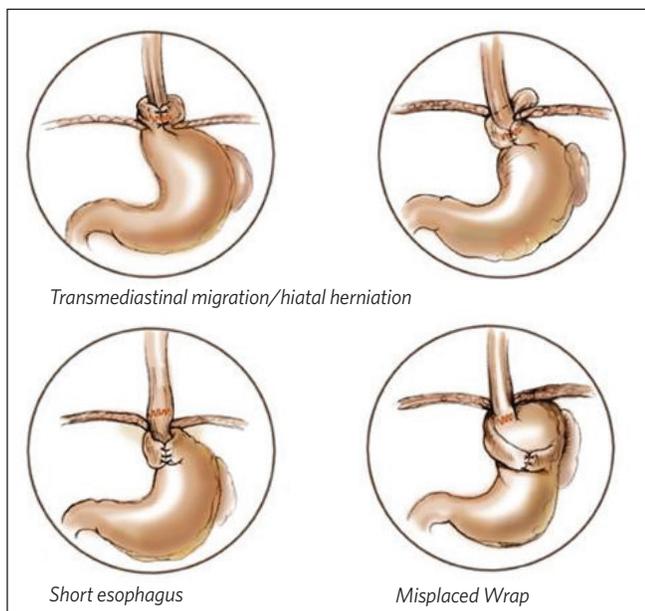


Figure 1. Common reasons for failure of antireflux surgery.

The surgeons at UPMC are world-recognized leaders in esophageal surgery in part because we have published some of the largest experiences to date of highly successful patient outcomes after reoperative antireflux surgery and minimally invasive esophagectomy. In 2011, we published a 275-patient series of redo antireflux surgery (typically a Nissen fundoplication) after a failed fundoplication. There was no perioperative mortality; 11.3 % of patients required reoperation for failure of the redo procedure, and 86 % reported excellent-to-satisfactory quality of life, with respect to their GERD. In 2014, we provided evidence-based support for the use of RNYNEJ in obese patients with a failed antireflux operation in a series of 105 obese patients who underwent RNYNEJ after one or more failed antireflux operations. Again, perioperative mortality was avoided, and most patients experienced weight loss and improvement of their symptoms with excellent quality of life. Last year, we presented the outcomes of esophagectomy in 39 patients with failed antireflux surgery at the 52nd Annual Meeting of the Society of Thoracic Surgeons. Many of these patients had two or more antireflux procedures. In most patients, symptoms of dysphagia were improved and GERD-related quality of life was excellent. In a landmark 2012

report, James D. Luketich, MD, chairman of the Department of Cardiothoracic Surgery, reviewed the outcomes of more than 1,000 patients who underwent minimally invasive esophagectomy at UPMC. Thirty-day mortality was an exceptional 1.68 %, with a median ICU stay of two days, a median hospital stay of only eight days, and a rapid return to preoperative quality of life.

Complex reoperations are not well-suited for low-volume centers. It is difficult for any surgeon to succeed at decision-making during redo esophageal surgery in a low-volume setting. In the UPMC Division of Thoracic and Foregut Surgery, we have developed algorithms for decision-making in the OR that are informed by our extensive experience, and we train our surgeons in reoperative esophageal surgery. We often consult our colleagues and use a collaborative approach, which is another big advantage of the high-volume center of excellence at UPMC.

Reoperative esophageal and antireflux surgery can be quite complex and challenging. Having reoperative esophageal surgery performed in a high-volume center of excellence should be a priority as this gives the highest likelihood of a successful outcome.

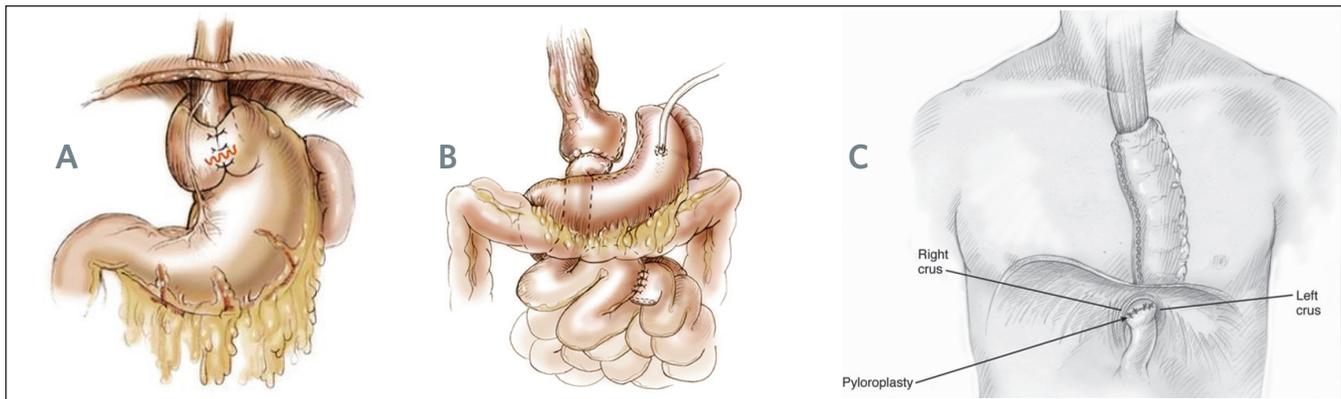


Figure 2. Options for reoperative surgery following a failed antireflux procedure. A. Redo fundoplication; B. Roux-en-Y near esophagojejunostomy (RNYNEJ); C. Esophagectomy.

Department News

Donor Heart and Lung Procurement Simulation Lab

The UPMC Division of Lung Transplant/Lung Failure hosted a donor heart/lung procurement simulation lab on Friday, April 3 at the Center for the Future of Surgery at the University of California San Diego School of Medicine.

The porcine heart/lung procurement lab was designed to teach both the theory and technical aspects of donor selection, procurement, and ex vivo lung perfusion.

The course was well attended with 20 participants and was an excellent opportunity for attending physicians, residents, and fellows with an interest in transplantation to explore the field and improve their skill sets and knowledge of the heart/lung procurement process.

The lab was directed by:

Jonathan D’Cunha, MD, PhD, FACS

Chief, Division of Lung Transplant/Lung Failure
UPMC Department of Cardiothoracic Surgery

Hannah Copeland, MD

McGuire VA Medical Center

Lara Schaheen, MD

UPMC Department of Cardiothoracic Surgery

Attendees included those from the United States, Canada, Austria, Belgium, Italy, Chile, India, and Australia.

ANNOUNCEMENTS AND UPCOMING EVENTS

Congratulations

A special congratulations to James D. Luketich, MD, FACS for his appointment as a Councilor to the American Association for Thoracic Surgery.

2nd Annual UPMC Lung Transplant Symposium

Wednesday, Oct. 4 to Friday, Oct. 6

Invited Faculty: Dr. Matthew Hartwig, Duke University; Dr. Alessandro Bertani, ISMETT-UPMC Italy.

Minimally Invasive Approaches to the Management of Esophageal Cancer

Wednesday, Nov. 29 to Friday, Dec. 1.

For more information, contact Angela Kinnunen,
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A \$14 billion world-renowned health care provider and insurer, Pittsburgh-based UPMC is inventing new models of patient-centered, cost-effective, accountable care. UPMC provides nearly \$900 million a year in benefits to its communities, including more care to the region's most vulnerable citizens than any other health care institution. The largest nongovernmental employer in Pennsylvania, UPMC integrates 65,000 employees, more than 25 hospitals, 600 doctors' offices and outpatient sites, and a 3.2 million-member Insurance Services Division, the largest medical and behavioral health services insurer in western Pennsylvania. Affiliated with the University of Pittsburgh Schools of the Health Sciences, UPMC is on the prestigious *U.S. News & World Report* annual Honor Roll of America's Best Hospitals. UPMC Enterprises functions as the innovation and commercialization arm of UPMC, while UPMC International provides hands-on health care and management services with partners in 12 countries on four continents. For more information, go to UPMC.com