NYU Langone Health

OUR COVID-19 EFFORTS

Read about NYU Langone Health's response to the challenges of the COVID-19 pandemic.
See insert.

Cardiology & Heart Surgery

2020 HIGHLIGHTS

Cover image: Heart
RENDERING: SKETCHFAB

NYU Langone's cardiovascular programs are among the highest-ranked in the country, and we are always striving to reach new heights of excellence in clinical care, education, and research.

In 2020, we overcame unprecedented challenges by being both nimble and resourceful. We developed new protocols that allow safe same-day discharge of patients receiving cardiac ablations and electrophysiology implants, enabling us to continue providing care during the coronavirus pandemic as well as increasing patient satisfaction. Despite the crisis, we pioneered an array of novel technologies for treating heart valve disease, including the next-generation mitral valve clip, a transcatheter chordal implantation device, and the first transcatheter treatment for severe tricuspid valve disease.

Our reputation for preeminence helped make us a national training site for transcatheter aortic valve replacement (TAVR) and the busiest and most experienced practice in the Northeast for MitraClip procedures. Our outcomes placed us ahead of most U.S. programs, with procedure times, complication rates, and length of stay far superior to national norms.

We continued our recognized leadership in heart transplantation, complex aortic procedures, and robot-assisted surgery for cardiac tumors. As always, our mission was to enhance care not only for our patients, but for patients everywhere. We are proud of these and other achievements and delighted to share the highlights of the past year's work.

BEST HOSPITALS U.S.News & WORLD REPORT NATIONAL CARDIOLOGY & HEART SURGERY 2020-21

#11

IN *U.S. NEWS & WORLD REPORT*

98.44%

ONE-YEAR HEART TRANSPLANT SURVIVAL RATE

385+

SCIENTIFIC PUBLICATIONS

175+

ACTIVE CLINICAL TRIALS

$40 Million+

IN RESEARCH FUNDING

Deane E. Smith, MD, and Nader Moazami, MD

Pioneering Heart–Lung Transplant Supports New Donor Source for End-Stage Disease

With other treatment options exhausted for a patient with end-stage idiopathic pulmonary arterial hypertension and right ventricular failure, a multidisciplinary team recommended a heart–lung transplant using donation after circulatory death (DCD) organs to expedite her lifesaving surgery. Following careful surgical planning supported by the Transplant Institute's innovative DCD viability research, the patient underwent successful transplantation with a positive outcome that shows promise for other patients awaiting donor organs.

COMPOUNDING CLINICAL PICTURE PRECLUDES TYPICAL WAIT FOR TRANSPLANT

The 53-year-old woman presented for combined heart–lung transplantation—a complicated surgical procedure that may provide the only opportunity for survival with a return to normal quality of life for a subset of patients with end-stage cardiac and pulmonary disease. Unfortunately, due to the patient's status on the United Network for Organ Sharing (UNOS) list, she was unlikely to obtain donor organs from that network.

"We are one of the few institutions in the country to perform combined heart–lung transplants," explains Nader Moazami, MD, chief of the division of heart and lung transplant and mechanical circulatory support, and surgical director of heart transplantation at the Transplant Institute. "Unfortunately, the procedure is rarely performed as a result of the scarcity of organs from donation after brain death (DBD), which results in untenable delays for patients waiting for a suitable donor."

To address the scarcity of available organs, the Transplant Institute continuously explores new strategies to expand the donor pool, working closely with procurement agencies and aggressively searching for new sources, providing patients with shorter waits and reductions in the waitlist mortality associated with prolonged hospital stays and related complications. The DCD approach utilizes organs obtained from a donor after life support is withdrawn and the heart has stopped; the patient has not been declared brain dead before the withdrawal of support, in contrast to the standard DBD approach, in which brain death must first be declared. At the time of this patient's presentation, the method had recently resurfaced as the subject of an interventional pilot study by transplant surgeons at the institute.

NOVEL APPROACH EXPANDS ORGAN POOL AND OFFERS NEW HOPE FOR SURVIVAL

DCD heart donation involves a technique called normothermic regional perfusion (NRP), which resuscitates the heart in the donor once life support has been withdrawn according to the patient's or family's wishes. When it is confirmed that the heart has stopped and circulatory death is declared, cardiopulmonary bypass is used to resuscitate the heart and reestablish blood flow to the entire

body except the brain. "This unique method corrects the metabolic abnormalities that occur with death, and also allows comprehensive evaluation of cardiac function to determine if the heart is suitable for transplant," explains Dr. Moazami.

In January 2020, transplant surgeons at NYU Langone Health launched their study, Heart Transplantation Using Normothermic Regional Perfusion Donation after Circulatory Death, to examine the method's efficacy. "The use of normothermic regional perfusion in situ with an assessment of myocardial function has shown comparable outcomes between DCD and DBD hearts as a result of shortened ischemic time," notes Dr. Moazami. "To further reduce ischemic time, we place the donor and recipient in adjacent operating rooms."

With 250,000 Americans diagnosed with end-stage heart failure in the United States, up to 15 percent of them urgently in need of transplant, surgeons at the Transplant Institute realized that the expansion of the donor pool with DCD donor hearts could significantly reduce the growing backlog of patients with end-stage heart disease awaiting transplantation—offering hope to patients without other treatment options. DCD heart transplant using regional normothermic perfusion provides an opportunity to expand the pool of available donor hearts for transplant by up to 20 percent.

As the patient's cardiorespiratory failure continued to progress rapidly in June 2020, the transplant team realized that she was unlikely to receive donor organs in time from the typical pool. DCD organs, however, are counted outside of that UNOS network. "For this patient, a DCD donor heart could be assigned just in time, since we are the only center in the United States using this approach,"says Dr. Moazami. After identification of a suitable donor from the NRP–DCD study, surgeons planned the details of the procedure.

CAREFUL PLANNING AND SURGICAL PRECISION PUT PATIENT ON PATH TO RECOVERY

The complexity of the case necessitated collaboration among surgeons, intensivists, and cardiologists. In addition to Dr. Moazami, the team included Deane E. Smith, MD, assistant professor of cardiothoracic surgery and associate director of heart transplant and mechanical circulatory support; Zachary Kon, MD, formerly an assistant professor in the Department of Cardiothoracic Surgery; Stephanie H. Chang, MD, assistant professor in the Department of Cardiothoracic Surgery and surgical director of lung transplantation; Julius A. Carillo, MD, clinical assistant professor in the Department of Cardiothoracic Surgery; Luis F. Angel, MD, professor in the Departments of Medicine and Cardiothoracic Surgery and medical director of lung transplantation; Alex Reyentovich, MD, associate professor in the Department of Medicine, medical director of the heart transplant and left ventricular assist device programs and clinical director of the heart failure program; and Claudia G. Gidea, MD, associate professor in the Department of Medicine and associate director of the ventricular assist device and heart transplant program. "Without this amazing team of specialists lending their knowledge, experience, and dedication across every step of this process, we would not be able to perform this pioneering procedure," says Dr. Gidea.

The patient agreed to proceed with transplantation after a discussion of the potential risks. After the establishment of donor circulatory arrest and a five-minute standoff time, the donor median sternotomy was performed, and the cerebral blood vessels were ligated before cannulation of the aorta and right atrium and initiation of standard cardiopulmonary bypass. The functional quality of the allograft was confirmed by intraoperative transesophageal echocardiogram and right heart catheterization after 30 minutes. Combined heart and lung transplantation was performed without any major complications. The patient was discharged to Rusk Rehabilitation and returned home six weeks after admission.

CLOSE COLLABORATION AND SHARED EXPERTISE LED TO OPTIMAL OUTCOME

At the time of follow-up three months post-transplant, the patient complained of a dry cough but was otherwise doing well. Transthoracic echocardiogram revealed normal ventricular size and wall motion with left ventricular ejection fraction of 65 percent. Right heart catheterization revealed excellent cardiac output and normal pulmonary artery and right atrial pressures.

For this patient, the Transplant Institute's position at the forefront of innovative approaches to meet the demand for available organs—combined with focused multidisciplinary transplant expertise—delivered a successful intervention when time was running out. "Seamless integration of specialized care and an advanced, rarely utilized approach enabled our team to address the patient's uniquely urgent needs with a pioneering transplant," notes Dr. Chang.

"In this case, a successful outcome depended fully on our ability to innovate for the sake of our patients," Dr. Moazami adds. "Without this program, the patient would not have been transplanted. Now, we can offer the possibility of transplant to patients who otherwise are unlikely to receive organs through the UNOS network."

The NYU Langone Transplant Institute team includes surgeons, heart failure cardiologists, nephrologists, pulmonologists, endocrinologists, hepatologists, infectious disease experts, radiologists, and rehabilitation specialists, in addition to dedicated pharmacists, social workers, nutritionists, and nurses and nurse practitioners with specialized training in transplantation. Leadership in clinical research and a search for new treatment strategies coupled with surgical expertise and cutting-edge technology has made NYU Langone Transplant Institute one of the nation's top transplant institutes. ■

EXPERTISE YIELDS TOP RANK IN THE NATION

SINCE 2019, NYU LANGONE'S HEART TRANSPLANT PROGRAM HAS ACHIEVED THE

shortest

WAIT TIMES IN THE NORTHEAST

WITH BEST OUTCOMES FOR HEART TRANSPLANTATION

AND HAS THE

highest

ONE-YEAR SURVIVAL RATE

FOR HEART–LUNG TRANSPLANTATION

ACCORDING TO THE SCIENTIFIC REGISTRY OF TRANSPLANT RECIPIENTS

Larry A. Chinitz, MD

Heart Rhythm Center Reduces Time to Ambulation & Safely Continues Care During COVID-19

When caseloads of COVID-19 began climbing in March 2020, many of New York City's cardiac electrophysiology (EP) practices were forced to shut down in order to protect their patients from contagion and conserve resources for the pandemic's victims. NYU Langone's Heart Rhythm Center was able to continue operating safely throughout the crisis, thanks to new protocols enabling same-day discharge for the majority of catheter-based procedures.

> *Our cardiologists are always looking for ways to use state-of-the-art technology, and their own ingenuity, to enhance care and the patient experience."*
>
> **—Glenn I. Fishman, MD**

NEW VASCULAR CLOSURE TECHNOLOGY SPURS A BROAD CHANGE OF APPROACH

One of the busiest arrhythmia practices in the nation, the center is led by Larry A. Chinitz, MD, the Alvin Benjamin and Kenneth Coyle Sr. Family Professor of Medicine and Cardiac Electrophysiology, clinical director of the Leon H. Charney Division of Cardiology, and director of cardiac EP. Shortly before the pandemic arrived, he and his team were investigating an advanced vascular closure technology designed to decrease time to ambulation after catheter ablations.

With conventional manual compression, patients required four to six hours of bed rest before ambulation; they were then transferred to a recovery unit, where they remained overnight before discharge. The new device, whose safety and efficacy had been established in a multicenter clinical trial, enabled patients to ambulate in only two hours—and, if their condition allowed, to go home soon afterward.

With the COVID-19 crisis looming, the team recognized that earlier discharges might offer the solution to an urgent problem: how to continue providing necessary treatments without interruption. "We have a lot of patients who are dependent on our work," says Dr. Chinitz, who has long been known as a pioneer of novel devices and techniques for treating complex arrhythmias. "Cardiac disease is not something that you can just close the door on."

The Heart Rhythm Center quickly integrated the vascular closure device with an array of operational efficiencies, enabling the majority of ablation patients to be discharged the same day directly from the cardiac EP service itself, rather than from a separate floor. Nurse practitioners were assigned to call patients the following morning to check on their recovery and address any questions or concerns.

"Besides shortening length of stay, the new protocols protected our patients and staff from exposure to potentially infectious individuals in other units," Dr. Chinitz explains. "That allowed us to keep operating safely, while freeing up resources in those units for coronavirus care."

Once the system was in place for ablation patients, the EP team began developing similar protocols for patients receiving cardiac devices such as pacemakers and implantable cardioverter defibrillators. The timing of preoperative echocardiograms, chest X-rays, and device interrogation was optimized to accelerate workflows; postoperative patients were encouraged to sit upright within one hour and to walk within two.

By June, more than 60 percent of complex ablation patients, and approximately 75 percent of EP lab patients overall, were being discharged on the same day.

PANDEMIC-INSPIRED PROTOCOLS BRING LASTING ENHANCEMENTS IN CARE

As the months passed, the new techniques and protocols proved to have an added benefit: patient satisfaction scores rose significantly. “Patients who’d been through previous procedures told us they were happy to get up and moving sooner, instead of lying on their backs for six hours,” Dr. Chinitz says. “They were thrilled to get out of the hospital more quickly.”

The results of these changes are being analyzed as part of a three-year study of outcomes and patient response at the Heart Rhythm Center; initial data will be published in a journal paper currently under review. Based on the early findings, Dr. Chinitz expects that same-day discharge will remain the center’s standard of care for catheter-based procedures going forward. “We’ve learned a lot from this adaptation that has changed our practice,” he says, “and that will persist even after the pandemic dies down.”

The changes also reflect the broader mission of NYU Langone’s Leon H. Charney Division of Cardiology. As director Glenn I. Fishman, MD, the William Goldring Professor of Medicine at NYU Grossman School of Medicine and vice chair for research in the Department of Medicine, explains, “Our cardiologists are always looking for ways to use state-of-the-art technology, and their own ingenuity, to enhance care and the patient experience.”

COVID-19 Clinical Trials from the "Leon H. Charney" Division of Cardiology

Binita Shah, MD

Colchicine Caronavirus SARS-CoV2 Trial (COLCORONA)

Co-led by NYU Langone primary investigator Binita Shah, MD

Phase 3, randomized, double-blind, placebo-controlled multicenter study to evaluate the efficacy and safety of colchicine in adult patients diagnosed with COVID-19 infection who have at least one high-risk criterion.

Judith S. Hochman, MD

Accelerating COVID-19 Therapeutic Interventions and Vaccines-4 Trial (ACTIV-4)

Chaired by primary investigator Judith S. Hochman, MD

Randomized open-label trial to compare effectiveness of two dosing regimens currently used for prevention of clotting events in COVID-19 positive inpatients. Both doses and routes of anticoagulation regimens are currently used in COVID-19 positive inpatients.

Emergent High-Risk Pseudo-aneurysm Repair and Infected Aortic Graft Replacement

Experts from NYU Langone’s Center for Complex Aortic Disease Treat an Expanding Pseudoaneurysm and Infected Aortic Graft with Three Separate Procedures

A high-risk referral was received for a patient requiring emergent repair of a softball-sized, palpable, expanding pseudoaneurysm of the ascending aorta located at the clavicle, as well as treatment for an infected aortic graft. A successful patient outcome was facilitated by the integration of cardiac and vascular surgical teams, coupled with multidisciplinary nursing and rehabilitation expertise.

EXPANDING PSEUDOANEURYSM AND RELATED SYMPTOMS REQUIRE PROMPT ACTION

A 62-year-old man with a type A aortic dissection underwent placement of an aortic graft at another hospital in 2015. He experienced a prolonged recovery, complicated by sternal graft infection that required incision and drainage of the sternum, wire removal, and reconstruction flap at the same hospital. In 2017, he developed fungemia due to graft infection and was placed on chronic suppression therapy after treatment. In August 2019, after initiation of Eliquis® for deep vein thrombosis, the patient developed a bulge at his clavicle the size of a softball. The palpable mass was identified as an expanding pseudo-aneurysm of the ascending aorta.

The patient was referred to Aubrey C. Galloway, MD, the Henry H. Arnhold Chair and Professor of Cardiothoracic Surgery and cardiac surgery director of the Center for Complex Aortic Disease, and Thomas Maldonado, MD, the Schwartz Buckley Professor of Surgery and director of vascular surgery at the Center for Complex Aortic Disease. Ultimately the patient underwent a high-risk emergency repair of the ruptured pseudoaneurysm with removal of the infected graft, replacement of the ascending aorta and debranching bypass to the innominate artery followed by delayed left carotid subclavian bypass and endovascular stent graft repair of a chronic 5.9-cm aneurysm in the distal aortic arch and proximal descending aorta.

In mid-September 2019, before a scheduled consultation with Dr. Galloway, the patient presented

to an emergency department (ED) in New Jersey complaining of severe chest pain. A CT scan revealed an expanding 6.7-cm pseudoaneurysm anterior to the mid and upper ascending thoracic aorta. The patient was discharged from the ED in stable condition and encouraged to follow up at NYU Langone. At the initial appointment with Dr. Galloway the patient reported that he had been having severe chest pain over the previous week, now continuous and keeping him up at night. A large tender pulsating mass was visible in his lower neck above his clavicle. Dr. Galloway recommended immediate hospitalization for repair of the pseudoaneurysm with removal of the infected graft. The patient had planned to defer surgery for a week but was ultimately admitted for tight blood pressure control followed by emergent surgery on October 8.

Aubrey C. Galloway, MD, and Thomas Maldonado, MD

OPEN REPAIR OF RUPTURED PSEUDOANEURYSM PRECEDES ENDOVASCULAR REPAIR OF DISTAL ANEURYSM

The patient was admitted to NYU Langone and stabilized in the intensive care unit (ICU). Imaging studies obtained after the patient's admission revealed a 6.9-cm pseudoaneurysm of the ascending aorta and proximal aortic arch, with a bovine arch and a 5.6-cm chronic aneurysm distally in the upper descending thoracic aorta. The aortic valve was normal and the aortic root was not aneurysmal. The surgical team anticipated rupture of the aneurysm upon opening the chest and therefore planned to initiate cardiopulmonary bypass with profound systemic body cooling (deep hypothermia) prior to opening the breastbone. Circulatory arrest was planned upon chest entry, followed by removal of the ruptured pseudoaneurysm and infected graft.

After induction of general anesthesia and confirmatory transesophageal echocardiogram, the patient's head was packed in ice and cardiopulmonary bypass was initiated, core cooling the patient's blood to 18 degrees centegrade. The aneurysm ruptured freely upon opening of the chest, and blood flow was stopped with circulatory arrest. After removal of free blood and clot, the rupture site was identified at the lower graft anastomosis. The pseudoaneurysm and infected graft were excised down to the aortic root. A short graft was placed to bovine innominate artery and connected to the heart lung machine to restore blood to the head and brain prior to proceeding with arch replacement. The innominate artery was then detached from the arch and sutured to side graft for subsequent debranching. The remainder of the ascending aorta and arch were excised out to zone 2 of the arch (adjacent to the left subclavian artery), and replaced with a graft from this area down to the aortic root. The bovine innominate artery side graft was then connected to the ascending aortic graft to complete the "debranching" process.

The patient was rewarmed, cardiopulmonary bypass was discontinued without difficulty, and hemostasis was confirmed. The patient was soon transported to the cardiac surgical critical care unit with stable hemodynamics. Following the seven-hour procedure he experienced a small perioperative stroke, but recovered his neurologic function nicely. After physical therapy and cardiac rehabilitation, he was able to walk a number of blocks without difficulty, with only a small degree of residual toe numbness.

DELAYED CAROTID SUBCLAVIAN BYPASS AND ENDOVASCULAR REPAIR OF A DISTAL ARCH ANEURYSM

The patient was seen in clinic in May 2020, and an open left carotid subclavian bypass was planned to safely cover the origin of the artery, in preparation for a later endovascular stent graft repair of the upper descending thoracic aneurysm.

The patient's final procedure was scheduled for July 22. After induction of general anesthesia, Dr. Maldonado exposed the common carotid artery anterior to the sternocleidomastoid. The subclavian artery was dissected through a supraclavicular incision and encircled with vessel loops before surgeons tunneled a 6-mm Propaten® graft below the sternocleidomastoid and administered heparin. The common carotid was then clamped proximally and distally, and an arteriotomy was performed. After the graft was beveled, the anastomosis was created and the clamps were removed and placed on the graft. An arteriotomy was then performed with graft placement at the subclavian artery in the same fashion.

Next, the bilateral common femoral arteries were accessed and sheaths placed, with placement of a ProGlide® device for later percutaneous closure of the right common femoral artery. A pigtail catheter was advanced over guidewire via the left side and positioned in the ascending aorta, after which an aortogram was performed to evaluate the aneurysm and confirm arterial patency.

A catheter was advanced into the ascending aorta over guidewire, which was then exchanged for a stiff Lunderquist® wire. A Gore® Tag® conformable stent graft was advanced and deployed at the level of the deep branch bypass from the ascending aorta. The delivery system was removed, and a Tri-Lobe balloon was used to mold all areas of attachment and overlap. A completion aortogram demonstrated an excellent result, with complete filling of the bypass and no evidence of endoleak. Wires, catheters, and sheaths were removed, manual compression was placed on the left, and 20 mg of intravenous (IV) protamine was administered to return activated clotting time to normal. Percutaneous closure of the right femoral artery was then followed by manual compression and application of sterile dressings. The patient was extubated and returned to the recovery room without complications.

The patient was doing well at follow-up with Dr. Maldonado in August, less than 12 months after his initial consultation at NYU but almost 5 years after the initial repair of the type A dissection. "NYU Langone is a pioneer in the field of endovascular aneurysm repair," Dr. Maldonado says. "We were one of the initial centers in the United States to test early endograft techniques in the 1990s, and we continue to test new endovascular devices for complex aneurysm repair."

"Our approach is patient-centric," Dr. Galloway adds. "Each case is reviewed from planning to execution by an experienced multidisciplinary team to determine the best approach to complex aortic disease tailored to each individual's anatomy, pathology, and underlying risks. At the same time, institutional best practices, including infection control and tailored rehabilitation, minimize the risk of complications and ensure optimized return to health for each patient."

The Center for Complex Aortic Disease Offers Cutting-Edge Techniques and an Individualized, Multidisciplinary Subspecialty Approach

NYU Langone's Center for Complex Aortic Disease is one of few comprehensive programs in the New York metropolitan area that focus on the body's largest artery—and one of just a handful nationwide that specialize in the most complex interventions.

Recognized as a leader in complex open procedures, endovascular branch graft repair, and hybrid surgical approaches to complex aneurysms of the aorta, the Center also performs valve sparing procedures for replacement of the aortic root in patients with Marfan syndrome and other genetic connective tissue disorders.

Expanding the Options for Transcatheter Mitral Valve Repair and Replacement

In 2021 the Centers for Medicare and Medicaid Services (CMS) approved Medicare coverage of the MitraClip™ transcatheter valve repair device for patients with functional mitral valve regurgitation (MR)—a potentially transformative change for structural heart practices across the nation. NYU Langone's Heart Valve Center helped pioneer this technique and remains in the forefront of research and clinical practice for other mitral valve repair and replacement technologies.

Mathew R. Williams, MD

A PROMISING APPROACH TO FUNCTIONAL MITRAL REGURGITATION

Manufactured by Abbott Vascular, the MitraClip™—which clips together the mitral valve's two leaflets to reduce regurgitation—was approved by the U.S. Food and Drug Administration (FDA) in 2013 for treating degenerative MR in patients judged too high-risk for open heart surgery. Functional MR, however, is more common, has a poor prognosis, and is the leading indication for MitraClip™ outside the United States.

The Heart Valve Center participated in the multicenter COAPT (Cardiovascular Outcomes Assessment of the MitraClip™ Percutaneous Therapy for Heart Failure for Patients with Functional Mitral Regurgitation) study, which investigated the device's safety and efficacy for treating functional MR. Researchers randomly assigned 614 patients to receive either a MitraClip™ or standard care. Over a two-year period, 151 patients who received only medical treatment were hospitalized for heart failure and 61 died, compared with just 92 hospitalizations and 28 deaths among those who received the MitraClip™. Beyond the encouraging mortality and morbidity benefits, patients who underwent a mitral valve clip procedure also had a better quality of life than those who received medical therapy alone.

In August 2019, these results led the FDA to approve the device for functional MR in high-risk patients. In July 2020, CMS released proposed changes to the national coverage determination for catheter-based mitral valve repair, to expand coverage to include treatment of this condition by the use of transcatheter edge-to-edge repair (TEER). Because the MitraClip™ was previously the only TEER device approved by the FDA, its expanded use became covered when the new rules were approved.

"Our team is well positioned to bring this life-saving technology, and our proven model of care, to a new population of patients," says Heart Valve Center director Mathew R. Williams, MD, associate professor of cardiothoracic surgery and medicine, chief of the Division of Adult Cardiac Surgery, and director of interventional cardiology at NYU Langone.

> *"These results reflect the skills and experience of a specialized team of surgeons, cardiologists, radiologists, anesthesiologists, and nurses who have performed these highly complex procedures together thousands of times."*
>
> **—Mathew R. Williams, MD**

OUTSTANDING OUTCOMES IN MITRACLIP™ PROCEDURES

The Heart Valve Center is the highest-volume practice in the tri-state area for MitraClip™ procedures, as well as the most experienced, and its outcomes place it far ahead of most U.S. practices. Over the past year, median procedure time at the center was 65.5 minutes, versus 113 minutes for patients participating in a national registry. The Center's rate for any complications was 3.2 percent, versus 10.6 percent nationally; for major bleeding, 0.0 percent, versus 1.9 percent nationally; and for device complications, 0.0 percent, versus 1.4 percent nationally. The mean length of stay in the intensive care unit (ICU) for Heart Valve Center patients was 0.0 hours, versus 23.6 for patients nationally. And the mean length of stay in the hospital was 1 day, versus 2.8 days nationally.

"These results reflect the skills and experience of a specialized team of surgeons, cardiologists, radiologists, anesthesiologists, and nurses who have performed these highly complex procedures together thousands of times," says Dr. Williams. "We've developed protocols that enable patients to recover and go home much more quickly than the national norm, without spending time in the intensive care unit. Because patients selected for transcatheter valve procedures are inherently sicker than those eligible for open heart surgery, they benefit greatly from this lower-impact approach."

Eliminating ICU time has provided additional benefits during the COVID-19 pandemic, Dr. Williams notes, by lessening the potential for exposure and freeing up critical-care resources for other patients.

PIONEERING NEW FRONTIERS IN VALVE REPLACEMENT AND REPAIR

In recent years, the Heart Valve Center has been a pioneer of many other advanced devices, including first implantations of the Caisson TMVR (transcatheter mitral valve replacement), Medtronic's CoreValve Evolut™ PRO TAVR (transcatheter aortic valve replacement) System, and the Meridian Transcatheter Aortic Valve.

Dr. Williams and his team continue to investigate novel technologies for treating heart valve disease, such as the next-generation mitral valve clip and a transcatheter chordal implantation device. The center is also a study site for the APOLLO trial of Medtronic's Intrepid mitral valve replacement device, which is implanted through a transapical approach on a beating heart. In addition, the center is currently enrolling patients in a pivotal trial of Abbott's Tri-Clip™ device—the first transcatheter treatment for severe tricuspid valve disease.

ACHIEVING EXCELLENCE IN A BROAD RANGE OF CLINICAL PROCEDURES

A national training site for TAVR best practices, the Heart Valve Center offers a full array of other minimally invasive, open, and robotic procedures. Dr. Williams, who was the first surgeon in the United States to be dual-trained in interventional cardiology and cardiac surgery, brings an uncommon versatility to his clinical approach. "I tend to be less biased toward one modality or the other than might otherwise be the case," he says. "My training enables me to understand the nuances of both the surgical and transcatheter approaches and to pick what's best for the patient."

Robotic Surgery Offers a More Advanced Approach to Cardiac Tumors

While reducing trauma for patients, robotic-assisted cardiac tumor removal provides greater precision and versatility than other minimally invasive methods.

A LOWER-IMPACT ALTERNATIVE TO OPEN HEART SURGERY

Benign cardiac tumors such as myxomas and papillary fibroelastomas often go unnoticed until they are detected incidentally, through diagnostic imaging for other conditions. Due to the risk of embolization, hemodynamic complications, inflammatory reactions, or mechanical damage to cardiac valves, surgical removal is indicated even when these rare neoplasms are small and asymptomatic. Traditionally, resection has been performed via a median sternotomy, which provides generous exposure but subjects patients to the rigors of an open heart procedure.

"These patients are often told they must have their chests cracked open to remove a 5-mm lesion that is causing them no symptoms," observes Didier F. Loulmet, MD, associate professor in the

Didier F. Loulmet, MD

Department of Cardiothoracic Surgery and director of robotic cardiac surgery and chief of cardiac surgery at NYU Langone's Tisch Hospital. "That's a high price to pay for such a tiny thing."

Dr. Loulmet and his team offer a far less invasive alternative: robot-assisted surgery. This approach comprises three components—a control console, a three-dimensional (3D) visioning platform that provides 10× magnification, and an instrument cart with a camera arm and three robotic operating arms.

Robotic cardiac surgery is associated with less bleeding, less pain, reduced need for narcotic analgesics, and shorter recovery times than open procedures. Extubation typically occurs in the operating room rather than the intensive care unit (ICU), and hospital length-of-stay is reduced from one week to two or three days. Most patients are able to resume normal activities within weeks rather than months.

IMPROVED DEXTERITY AND VISUALIZATION

Unlike other minimally invasive approaches, such as the mini-thoracotomy and mini-sternotomy, robotic surgery can be employed even in the most challenging cases.

"The advantages of this technique lie in enhanced dexterity and visualization," Dr. Loulmet explains. "If a tumor is situated deep in the left ventricle, for example, or you need to repair a hole that your excision has created in the interatrial septum, those situations would be very difficult to navigate with conventional minimally invasive techniques. With robotics, there is no limit to access."

Magnified, 3D visualization also facilitates complete excision of even the smallest tumors. "It's like operating with a pathology microscope," Dr. Loulmet says. In addition, improved dexterity minimizes the need for conversions to open surgery.

THE VALUE OF EXPERIENCE

NYU Langone's Robotic Surgery Center is internationally known for its pioneering cardiac program. Dr. Loulmet was part of the 1998 team that performed the world's first robotic mitral valve repair and coronary artery bypass grafting operations in France. Since joining NYU Langone in 2009, he has led more than 1,000 robotic cardiac procedures, in addition to performing thousands of surgeries using other techniques.

The center is one of just a handful nationwide that offer robot-assisted surgery for cardiac tumors, and the only practice in the New York metropolitan area with extensive experience in this modality. All such procedures are performed using the latest-generation da Vinci® Xi, widely regarded as the most advanced robotic surgical system available.

"Our work is part of a long tradition of innovative approaches to cardiac surgery at NYU Langone," Dr. Loulmet notes. "Robotic surgery has become our standard approach to cardiac tumor removal, with excellent results. I believe it will someday become the standard everywhere." ■

> *"Our work is part of a long tradition of innovative approaches to cardiac surgery at NYU Langone."*
>
> **—Didier F. Loulmet, MD**

Continuing Medical Education

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Learn more about these courses by visiting **med.nyu.edu/cme**

COVID-19–related Publications from Cardiology & Heart Surgery

NYU Langone researchers have led many efforts to better understand the impact of COVID-19 across nearly every medical specialty, with 617 publications in 2020. The Department of Cardiology & Heart Surgery contributed to this research with publications that included:

Aggarwal G, Henry BM, Aggarwal S, Bangalore S. Cardiovascular safety of potential drugs for the treatment of coronavirus disease 2019. *American Journal of Cardiology*. August 1, 2020; 128: 147–50.

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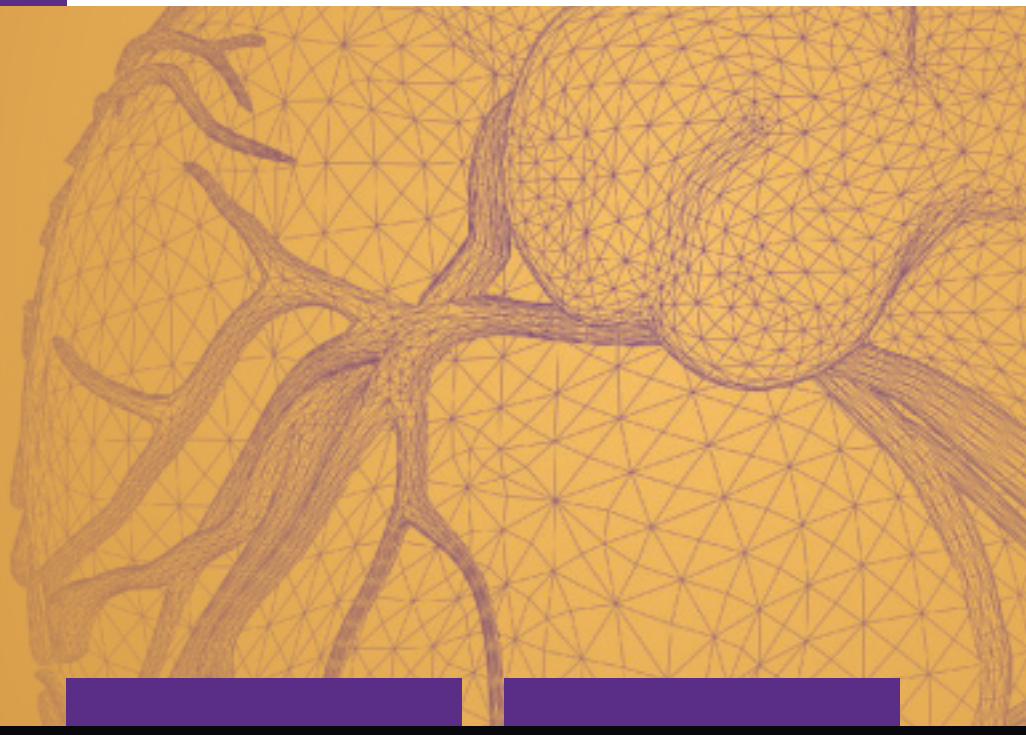

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Enhanced Protocols Enable Care for Heart Rhythm Conditions to Safely Continue During the COVID-19 Crisis
See page 3.

Complex Case: High-risk Expanding Pseudoaneurysm with Infected Aortic Graft Requires Three Separate Procedures
See page 4.