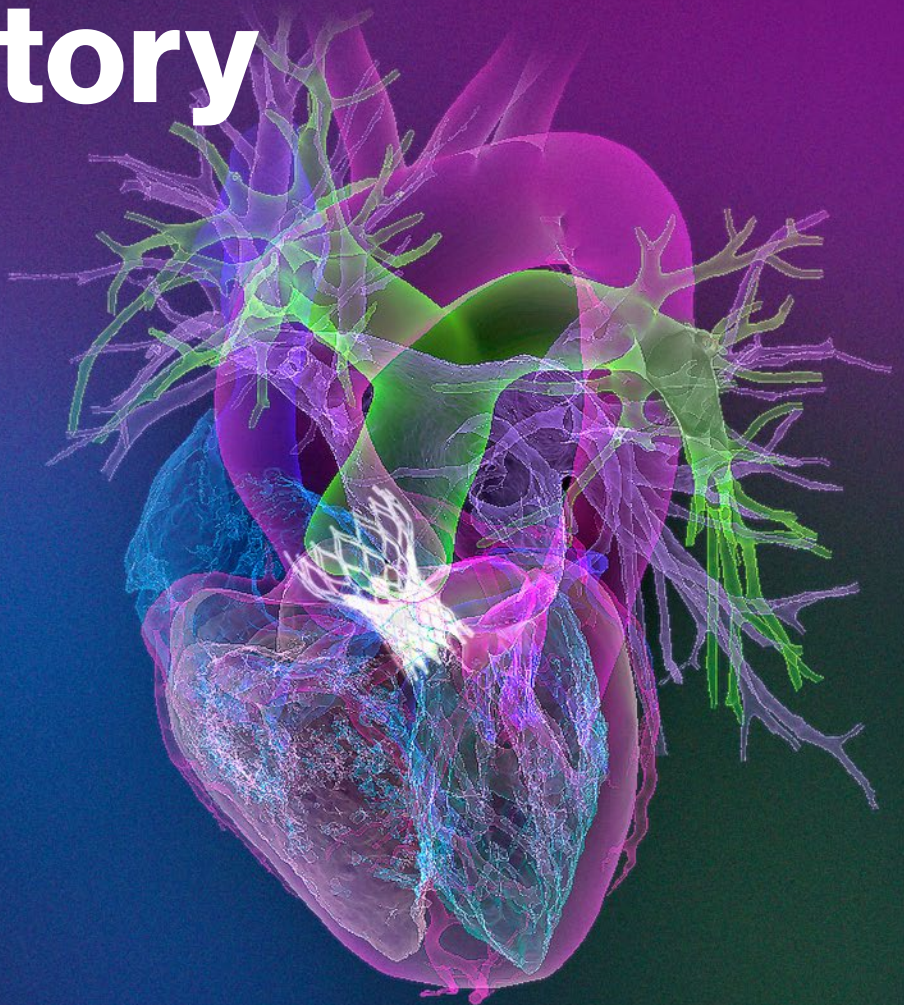


DR. SAMIN K. SHARMA FAMILY FOUNDATION

Cardiac Catheterization Laboratory

**2019 Clinical Outcomes
& Innovations Report**



Dr. Samin K. Sharma

“The Visionary”



Samin K. Sharma, MD, FACC, MSCAI

Senior Vice President, Operations
& Quality, Mount Sinai Heart

Director, Interventional Cardiology,
Mount Sinai Health System

President, Mount Sinai Heart Network

We are proud to present this 11th edition of our *Clinical Outcomes & Innovations Report*. We've been compiling the report of our procedural outcomes and volume, transparently sharing our results as compared to other centers in our region and across the country. The landscape of interventional cardiology has changed greatly—today, many centers offer percutaneous coronary intervention (PCI) as a life-saving intervention for coronary artery disease and transcatheter valve interventions (TAVR/TMVR) for valvular heart disease.

At The Mount Sinai Hospital, our Cardiac Catheterization Laboratory remains a leader for several reasons, including:

- The talent of our team of interventionalists and supporting staff;
- The strict adherence to proven protocols and standards of care;
- The innovation and embrace of new technologies, techniques, and approaches, including participation in clinical trials that can benefit our patients;
- A Heart-Team approach, which involves consulting with our colleagues in clinical cardiology and cardiac surgery to ensure the best course of care for each patient;
- Compassion and genuine concern for our patients' health, long after their procedure.

Over the years, our data has shown excellent interventional procedural outcomes despite high complexity. As a result, many patients who have been considered too high-risk to receive care elsewhere are referred here. As we accept ever more complex cases, our PCI complications continue to decline.

Patients remain at the center of everything we do, and in this publication, you will read the words of our grateful patients, many of whom had particularly challenging clinical scenarios. As we look to 2020 and beyond, we will continue to pioneer new paths, setting the pace for another remarkable decade of innovation and excellence. We will continue to improve clinical outcomes by critically analyzing our outcomes and feedback from our grateful patients.

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For more information, visit www.mountsinai.org/interventional-cardiology-cath-lab

Dr. Valentin Fuster

“The Inspiration”



Valentin Fuster, MD, PhD, MACC

Physician-in-Chief,
The Mount Sinai Hospital
Director, Mount Sinai Heart
Director, Zena and Michael A. Wiener
Cardiovascular Institute and
Marie-Josée and Henry R. Kravis
Center for Cardiovascular Health
Richard Gorlin, MD, Heart Research
Foundation Professor of Cardiology

Mount Sinai Heart continues a proud tradition of leadership in cardiac care. Our physicians, researchers and staff are not only leaders in New York City, their reputation as pioneers extends worldwide. The team at The Samin K. Sharma Family Foundation Cardiac Catheterization Laboratory exemplifies this excellence.

The team at the Catheterization Laboratory works in a true interdisciplinary fashion, applying the results of clinical research to determine the best course of treatment for each patient's unique circumstances. Everything that happens in the Catheterization Laboratory begins with a focus on safety, which directly results in our exceptionally low complication rate. Their work goes beyond treating acute cardiac events. They're also simultaneously investigating the causes of heart disease on a molecular level, and exploring novel approaches to treating structural heart conditions.

Together, the team works to employ the most advanced techniques and technologies while focusing on what is best for patients. We encourage our patients to ask questions and take an active role in their care, believing positive outcomes happen when cardiologists and patients work together.

Safety is at the forefront of everything that happens in the Catheterization Laboratory, as is reflected in the exceptionally low complication rate. These excellent outcomes stem from the team's combined efforts to employ the most advanced techniques and technologies. The team's goal is always to put their patients' well-being first.

This effort to work both for and with patients stands out in those patients' minds and is at the heart of the stories they share with us, as you'll read in the following pages. It has been my honor to witness the growth of our Cardiac Catheterization Laboratory as one of the busiest and most successful centers in the country. I'm proud to present this edition of the *Clinical Outcomes & Innovations Report 2019*.

Dr. Annapoorna S. Kini

“The Educator”



Annapoorna S. Kini, MD, MRCP, FACC

Director, Cardiac Catheterization Laboratory
 Director, Structural Heart Disease Program
 Director, Interventional Cardiology
 Fellowship Program

Since the release of BifurcAID in September 2017, Mount Sinai Heart has remained dedicated to increasing access to free, quality education for interventional cardiologists around the world. We pride ourselves on our educational ventures, such as our robust interventional fellowship program, more than 10 years of streaming live cases, and multiple yearly symposiums. Our mobile applications, BifurcAID, OCTAID, TranseptAID, TAVRcathAID, and CalcificAID, now total more than 27,500 unique downloads around the world including thousands internationally, growing by around a thousand every month. We are inspired by feedback from countries around the world, including India, France, Argentina, Germany, and even Saudi Arabia, as well as stories of interventionalists brushing up on their bifurcation techniques before a procedure.

With the experience gained developing our educational applications and years of STEMI pathway optimization, our team ran a mock patient transfer on February 27 from our sister hospital, Mount Sinai Queens, to our Cardiac Catheterization Laboratory using STEMIcathAID. This STEMI transfer platform offers efficient and instantaneous communication between health care providers during patient transfer. The app records key metrics using first medical contact timers and GPS for reporting to registries, such as the American Heart Association’s Mission: Lifeline.

Our goal is to cover nearly every aspect of interventional cardiology, providing a free crash-course to any current or aspiring cardiologist. Currently in development are a new batch of educational tools:

- BifurcAID 3D: A fully animated version of BifurcAID, offering intuitive and novel views of our updated bifurcation lesion treatment algorithm.
- ComplicAID: A website detailing dozens of complications and how they were treated.
- GuidewireAID: Education on coronary guidewire characteristics, clinical implications of design choices, and a glossary of many of the market’s available wires.

For updates on our mobile application efforts, we have created a website, www.cardiologyapps.com, where descriptions—and in some cases, like the new OCTAID—fully featured versions can be explored. Health care is changing rapidly, now more than ever to digital formats. EMR, telemedicine, and more are becoming the standard, not the exception. We will continue to innovate, striving to bring about the digital transformation of the Cardiac Catheterization Laboratory.

The Cardiac Catheterization Laboratory



Talent wins games,
but teamwork and
intelligence wins
championships.”

- MICHAEL J. JORDAN
LEGENDARY BASKETBALL PLAYER

AN OVERVIEW OF SERVICES AND OUTCOMES

The Cardiac Catheterization Laboratory at The Mount Sinai Hospital is among the highest-volume centers, yet also among the safest interventional catheterization laboratories in the United States. Each staff member has a strong work ethic and takes pride in his or her role in the principal goal of delivering efficient and safe care to patients in need. As a result, the Cardiac Catheterization Laboratory consistently reports a high level of patient satisfaction in various parameters, but we will continue to strive to improve other patient satisfaction measures. Sixty-two percent of patients are discharged on the same day after a successful interventional procedure.

62 Percent

OF OUR ELECTIVE INTERVENTIONAL
PATIENTS ARE DISCHARGED ON
THE SAME DAY OF THE PROCEDURE



From left: George Dangas, MD; Pedro Moreno, MD; Joseph Sweeny, MD; Samin Sharma, MD; Nitin Barman, MD; Annapoorna Kini, MD; Vishal Kapur, MD; Prakash Krishnan, MD; Serdar Farhan, MD; Usman Baber, MD; Jeffrey Bander, MD; and Gregory Serrao, MD.

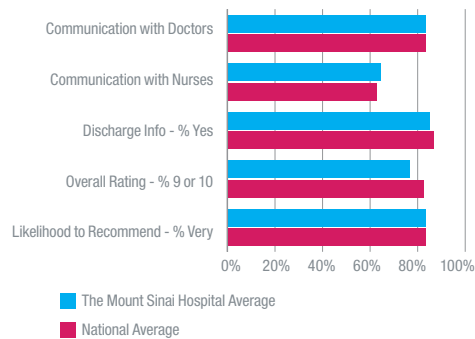
The system of established standardized protocols, rigorous attention to detail, and a strong sense of teamwork have helped us to achieve the best interventional outcomes in the country.

We continue to improve our outcomes every year, maintaining low procedural complications of less than one percent in 2019. This remarkably low complication rate has been achieved despite high complexity and comorbid medical conditions of patients treated in our Cardiac Catheterization Laboratory.

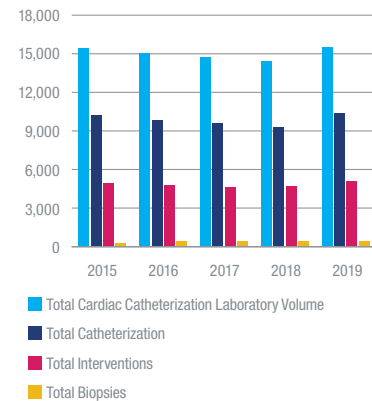
23% of 3,701

23% OF 3,701 CASES HAD A PLAQUE MODIFICATION STRATEGY BEFORE STENT IMPLANTATION DUE TO LESION COMPLEXITY

PATIENT SATISFACTION: 2019 HCAHPS SURVEY



CARDIAC CATH LAB VOLUME AT MSH PROCEDURES OVER THE LAST FIVE YEARS



42 Percent

OF PCI'S WERE DONE VIA **RADIAL ACCESS**

COMPARISON OF THE MOUNT SINAI HOSPITAL INTERVENTIONAL OUTCOMES WITH NEW YORK STATE DATA—2016

Our Cardiac Catheterization Laboratory continues to serve the full range of cases, from simple to the most complex cases with high clinical comorbidities and complex angiographic characteristics. The majority of PCI complications at The Mount Sinai Hospital have been one-third to one-half of other New York State hospitals.

Reports of risk-adjusted PCI mortality have consistently placed The Mount Sinai Hospital Cardiac Catheterization Laboratory among the lowest for in-hospital and 30-day risk-adjusted mortality. The hospital received the double star, denoting a statistically significant lower RAMR than the statewide average consistently over the last 21 years of New York State Department of Health PCI reporting.

This lower 30-day risk-adjusted mortality can be attributed in large part to the experience and high procedural volume of our five senior full-time interventionalists, who together perform more than 3,600 interventions per year. Our interventionalists frequently get double star notations (**) for PCI safety among 600 interventionalists practicing in the state.

NYS-DOH REPORT OF PCI 2014-2016 DATA ON THE TOP 10 VOLUME CENTERS IN NY STATE 30-DAY RAMR

PCI Statistics 2014–2016	# Cases	All Cases	Non-Emergency Cases	Emergency Cases
1. The Mount Sinai Hospital	10,888	0.90**	0.58**	2.84
2. Saint Francis Hospital	8,035	1.13	0.72	3.29
3. Columbia Presbyterian Hospital	6,978	1.02	0.70	2.40
4. North Shore University Hospital	6,780	1.03	0.77	2.16
5. Saint Joseph's Hospital	5,777	1.22	0.91	2.76
6. Lenox Hill Hospital	5,042	1.25	0.81	3.18
7. Beth Israel Hospital	4,993	0.98	0.54	3.20
8. NYU Hospitals Center	4,985	1.35	0.96	3.25
9. Rochester General Hospital	4,668	1.36	0.86	3.69
8. Buffalo General Medical Center	4,571	1.60*	1.04	4.01*
NYS Total	146,568	1.18	0.77	3.10

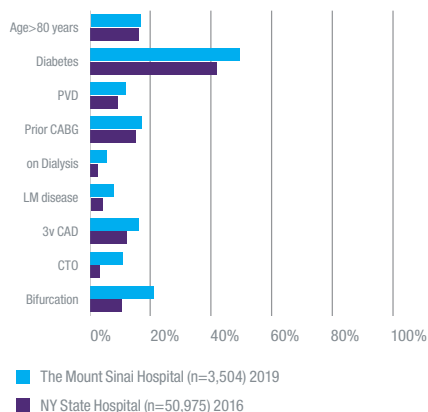
www.nyhealth.gov *Risk Adjusted Mortality Rate (RAMR) significantly higher than statewide rate
**Risk Adjusted Mortality Rate (RAMR) significantly lower than statewide rate

NYS-DOH 30-DAY RAMR FOR PCI ** AT MSH FOR LAST 5 REPORTS

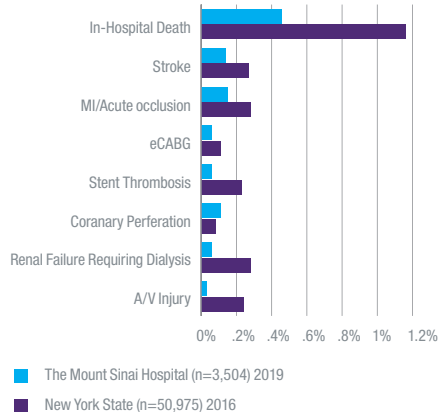
Years/ # cases	All cases RAMR %	Non-Emergency cases RAMR %	**Interventionalist
2014–2016/ 3,249	0.72**	0.50	Dr. Sharma
2,555	0.64**	0.34**	Dr. Kini
725	0.21**	0.00**	Dr. Moreno
2013–2015/ 3,356	0.66**	0.41**	Dr. Sharma
2,693	0.65	0.27**	Dr. Kini
2012–2014/ 3,566	0.62**	0.36**	Dr. Sharma
2,714	0.55**	0.19**	Dr. Kini
2011–2013/ 3,925	0.56**	0.38**	Dr. Sharma
2,883	0.60	0.31**	Dr. Kini
439	0.29**	0.16	Dr. Dangas
2010–2012/ 4,052	0.51**	0.35**	Dr. Sharma
2,874	0.29**	0.21**	Dr. Kini

www.nyhealth.gov **Risk Adjusted Mortality Rate (RAMR) significantly lower than statewide rate

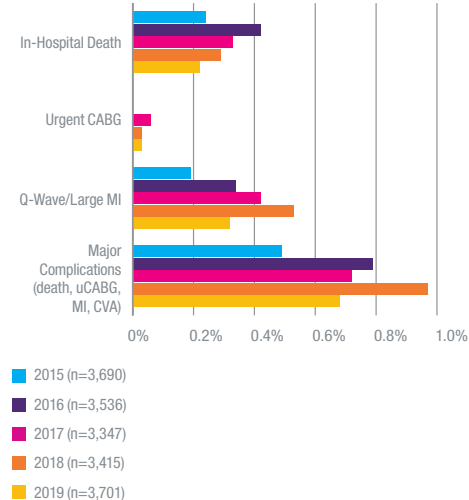
IMPORTANT BASELINE CLINICAL AND LESION CHARACTERISTICS OF PCI:
NY STATE HOSPITAL DATA 2016–2019



NYS-REPORTED MAJOR PCI COMPLICATIONS



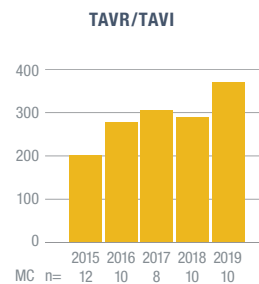
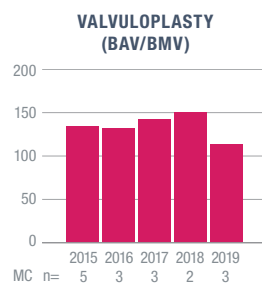
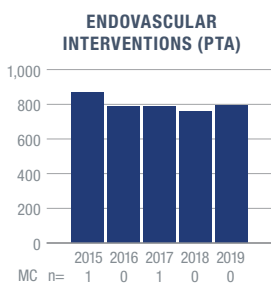
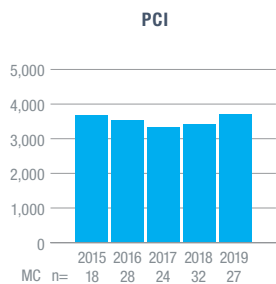
TEMPORAL TRENDS IN COMPLICATIONS OF PCI AT THE MOUNT SINAI HOSPITAL



21 Consecutive Years

THE MOUNT SINAI CARDIAC CATHETERIZATION LABORATORY TOPS IN LOWER PCI MORTALITY IN NY STATE.

INTERVENTIONAL VOLUME AND MAJOR COMPLICATIONS (MC)



Alcohol Septal Ablation = 17
MitraClip = 73
TMVR = 4
TriClip = 3
TTVR = 3
ASD Closure—Adult = 14

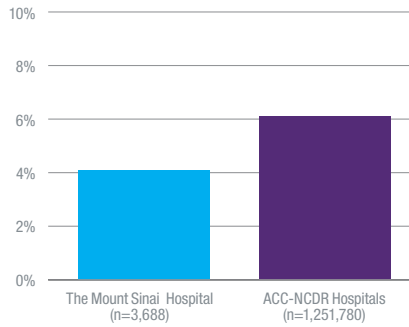
MC = Major Complications

COMPARISON OF THE
MOUNT SINAI HOSPITAL
INTERVENTIONAL
OUTCOMES WITH OTHER
U.S. HOSPITALS—2019
ACC-NCDR REPORT

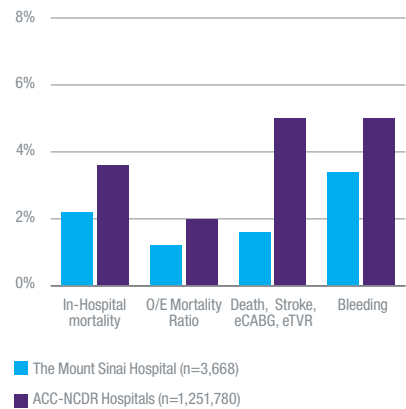
The American College of Cardiology-National Cardiovascular Data Registry (ACC-NCDR) reports the characteristics and in-hospital outcomes after PCI of more than 1,400 hospitals in the United States, providing data of 1,251,780 patients annually.

The graphs show superior outcomes despite higher complexities for PCI patients at The Mount Sinai Hospital in comparison to other U.S. hospitals in the ACC-NCDR report for 2019.

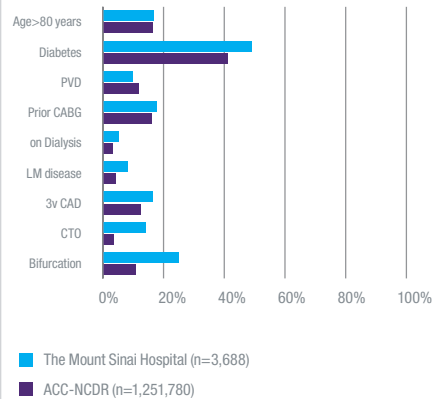
STEMI PCI IN-HOSPITAL MORTALITY:
MSH VS. ACC-NCDR HOSPITALS 2018



PCI COMPLICATIONS:
MSH VS. ACC-NCDR HOSPITALS 2019



IMPORTANT BASELINE CLINICAL AND LESION CHARACTERISTICS OF PCI:
ACC-NCDR DATA FOR 2019

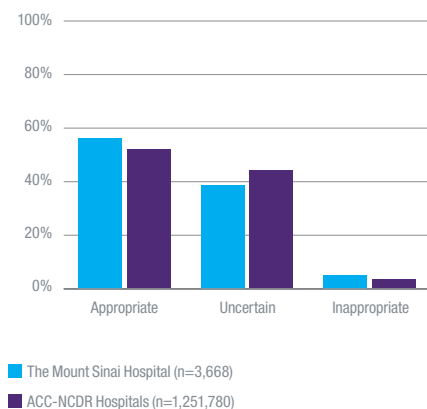


15,000+ Cases Per Year

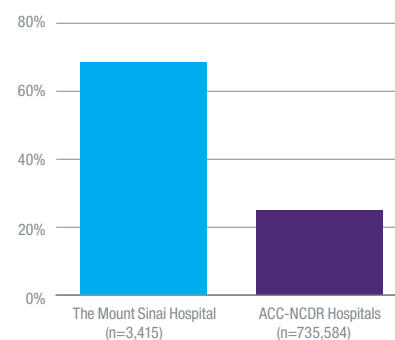
LED BY FIVE SENIOR FULL-TIME INTERVENTIONALISTS,
WHO TOGETHER PERFORM MORE THAN 9,500 CASES PER YEAR.

At Mount Sinai Heart, we have established evidence-based protocols for proper evaluation of CAD patients before scheduling catheterization and possible intervention. We follow a rigorous application of the appropriate use criteria (AUC) of the American College of Cardiology and fractional flow reserve (FFR/iFR) guiding the decision making for appropriately indicated PCI.

**APPROPRIATENESS OF PCI PROCEDURE:
AUC EVALUATION OF PCI PROCEDURES
MSH VS. ACC-NCDR HOSPITALS IN 2019 Q3**



**FFR/iFR EVALUATION OF INTERMEDIATE
STENOSIS LESION (40–80%) UNDERGOING PCI:
MSH VS. ACC-NCDR HOSPITALS 2018**



Annapoorna S. Kini, MD, with the current interventional fellow class.

Complex High-Risk Percutaneous Coronary Interventions (PCI)

SAMIN K. SHARMA, MD, AND ANNAPOORNA S. KINI, MD

Earlier randomized clinical trials have suggested the benefit of coronary artery bypass graft (CABG) surgery in higher angiographic-complexity cases over percutaneous coronary intervention (PCI). Based on data evidence, there is an increasing tendency at The Mount Sinai Hospital to recommend surgery for patients with more complex coronary artery disease (CAD). Ultimately, the decision to have either surgery or PCI lies with the patient and his or her family, after consultation with the Heart Team, which includes a cardiologist, cardiothoracic surgeon, and a cardiac interventionalist. Many patients (≈ 58 percent) with complex CAD choose

revascularization with PCI, due to lower short-term complications and relative ease of recovery compared with surgery. The EXCEL Trial, which compared the XIENCE drug-eluting stent (DES) with CABG in treating unprotected left main disease with a SYNTAX Score below 32, has shown equal results after a five-year follow-up for both modes of revascularization, but a higher mortality in the PCI group. Additional studies involving newer stents, combined with advanced imaging modalities before and during procedures, may tip the balance in favor of recommending PCI as first-line therapy for more patients with moderate to severe CAD.

Based on the current data and practice guidelines, the following patient groups will be appropriate for CABG:

- Three-vessel CAD and SYNTAX Score >32
- Diabetics with three-vessel CAD or complex two-vessel CAD with prox-mid LAD lesion
- Left ± additional vessel CAD with SYNTAX Score >32

In addition to expertise in interventional treatment of complex CAD, our Cardiac Catheterization Laboratory serves as a tertiary center for complex coronary intervention (bifurcation, calcified, left main, CTO, and/or vein graft lesions) and patients with low ejection fraction (LVEF <35 percent).

IABP SYSTEM



IMPELLA SYSTEM



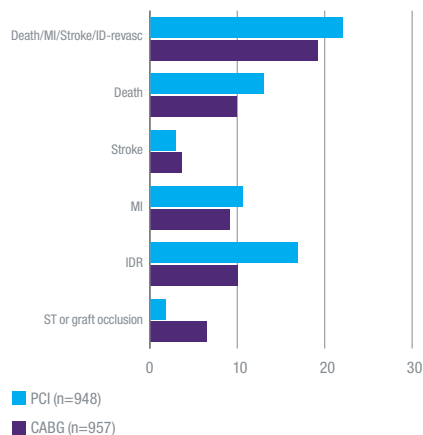
ECMO CARDIOHELP SYSTEM



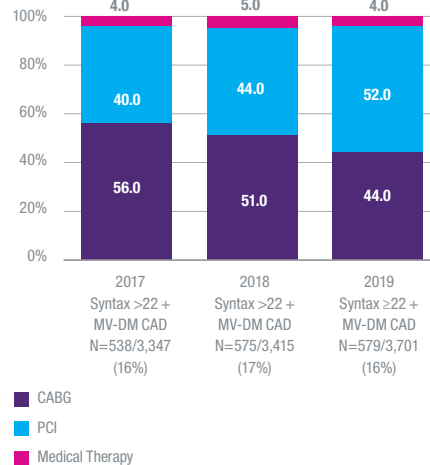


To view archived live cases of complex PCI, please scan the QR codes above.

EXCEL TRIAL: PRIMARY AND SECONDARY CLINICAL ENDPOINTS AT 5 YEARS



COMPLEX CAD (HIGH SYNTAX SCORE AND MV DIABETES) AT THE MOUNT SINAI HOSPITAL



N=Complex CAD Patients/Total PCI Patients

Malka Percal, 68



Diagnosis: Left main disease and aortic stenosis

Treatment: PCI, atherectomy and placement of drug-eluting stent (DES)

“Six years ago, I went to my cardiologist with some concerns. I really wasn’t feeling well. I was referred to the Mount Sinai Cardiac Catheterization Laboratory where Dr. Sharma did an angiogram, but no procedure at the time. I went home and didn’t have any issues for awhile.

“Five years later, my symptoms started to get worse. Most recently, I started feeling pressure in chest. I’d be walking and suddenly the only way I could continue moving forward was to cut my pace in half or in quarter. I had a lot of swelling in my legs.

“I had a new cardiologist, and she confirmed that my aortic stenosis was becoming a problem. The valve was getting tighter. And then I got very rapidly much worse. I ended up back in the Cath Lab, and this time, it was determined that

“Now I have my health under control. I always feel so well cared for at Mount Sinai.”

I would have a stent put in my left main artery. I was so relieved to be back in Dr. Sharma’s care.

“They got me in really soon — Dr. Sharma did my procedure on Easter weekend. It all went so smoothly. When I woke up, I felt immediately 100 times better.

“It was such a relief to have the same doctor, and he’s so personable and nice. I’m really grateful to Dr. Sharma. Soon we’re going to discuss treating my aortic stenosis with a TAVR procedure.

“When I first went in, I was kind of a mess health-wise. Not only did they treat my condition, but they had a lot of good advice for

lifestyle changes. Now I have my health under control. I always feel so well cared for at Mount Sinai. It’s wonderful to have that level of care available.”

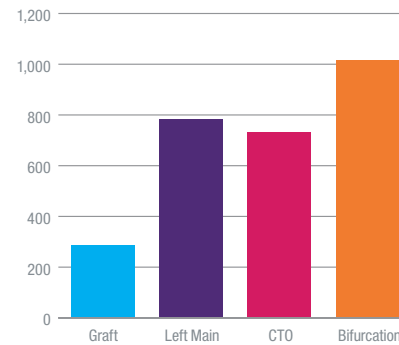
We use a variety of adjunct interventional techniques in these complex coronary cases, such as atherectomy (23 percent of calcified lesions) and thrombectomy/distal protection devices (3 percent of thrombotic and vein graft lesions). In a small number of complex lesion patients (\approx 5 percent) of PCI with reduced ejection fraction (LVEF <35 percent), we use LV assist devices, such as IABP, Impella®, or ECMO CARDIOHELP™ to safely and dependably perform these high-risk PCI's (protected PCI).

INTRAVASCULAR BRACHYTHERAPY (IVBT) FOR MULTI-LAYER RECURRENT DES IN-STENT RESTENOSIS

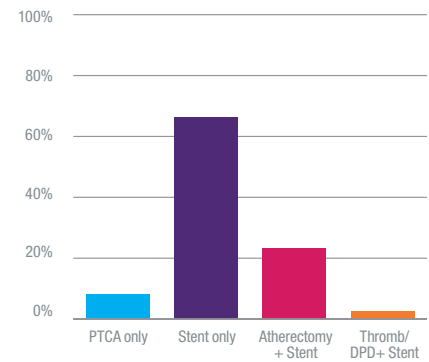
Patients with recurrent in-stent restenosis (ISR) of DES with more than two layers of stents are appropriate cases for IVBT using the Beta-Cath™ System to reduce subsequent restenosis by inhibiting intimal hyperplasia (scar tissue).

Our IVBT data over the last five years has shown excellent acute outcomes with less than one percent major complications (MC). There is no need for implantation of another stent, and long-term restenosis is 25 percent (compared to 55 percent in comparable recurrent DES ISR without IVBT); this is a reduction of 70 percent compared to routine treatment.

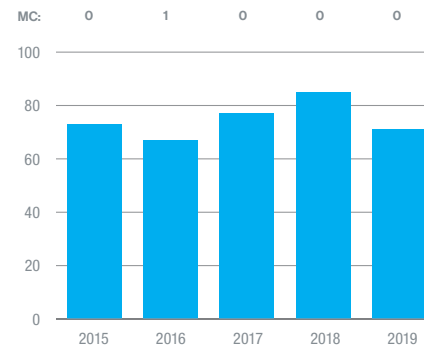
COMPLEX CORONARY INTERVENTIONS IN 2019
(N=3,701 PCI's)



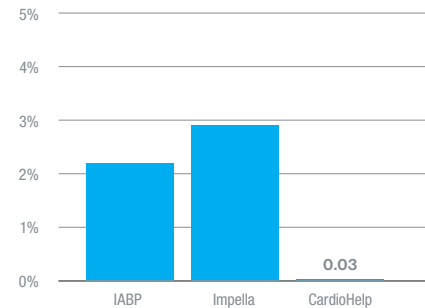
TYPE OF CORONARY INTERVENTIONS IN 2019
(N=3,701 PCI's)



IVBT VOLUME AT THE MOUNT SINAI HOSPITAL



HIGH RISK PCI WITH LV SUPPORT IN 2019 AT MOUNT SINAI HOSPITAL: (N=3,701 PCI's)



ROTAPRO ROTATIONAL ATHERECTOMY SYSTEM



DIAMONDBACK 360 ORBITAL ATHERECTOMY SYSTEM



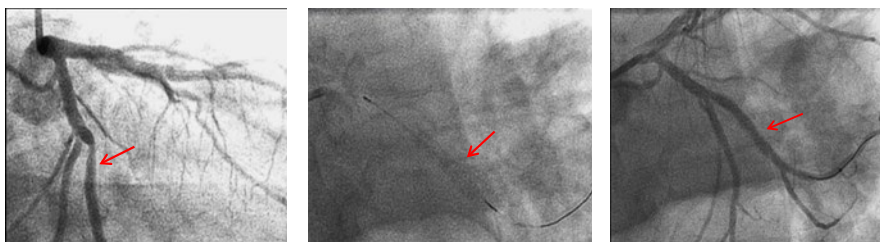
EXCIMER LASER ATHERECTOMY SYSTEM



NOVOSTE™ BETA-CATH™ 3.5F SYSTEM



INTRAVASCULAR BRACHYTHERAPY TREATMENT



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1. Five-Year Outcomes After PCI or CABG for Left Main Coronary Disease (EXCEL Trial), *N Engl J Med* 2019;381:1820
2. Current Status of Rotational Atherectomy, *J Am Coll Cardiol Intrv* 2014;7:345
3. Intravascular Brachytherapy for the Management of Repeated Multimetal-Layered Drug-Eluting Coronary Stent Restenosis, *Circ Cardiovasc Intrv* 2018;11:e00683

Mike Carracio, 77



Diagnosis: Two-vessel CAD and in-stent restenosis

Treatment: Percutaneous transluminal coronary angioplasty and atherectomy of LAD

"I've had a long history of cardiac care, going back almost 40 years. I have very, very high cholesterol, and I've suffered from chest pains since I was 42. I had my first heart attack at 44, and had open-heart surgery. My cholesterol is in the 300s—I have to take an injection twice a month just to manage my cholesterol levels.

"I first became acquainted with Dr. Sharma when I needed a stent. I asked my cardiologist at my local hospital in here in New Jersey, 'What do you do when you have cases you can't handle?' He said, 'We send them to Dr. Sharma.' Since then, he's placed four stents on different occasions. Every time I've had problems, I've called Dr. Sharma. Not only does he do a great job, but his people take care of everything.

"Dr. Sharma is incredible. He always takes time for his patients, with a real personal touch."

"Most recently, I had an angiogram at my local hospital but was still getting chest pain when I walked. I wrote to Dr. Sharma, and told him I was still getting chest pain. He invited me to The Mount Sinai Hospital so he could take a look. Sure enough, he found a blockage in an artery from a previous stent two or three years ago, where scar tissue had formed around the stent. He was able to put a hole in it and open it with a balloon.

"Dr. Sharma is incredible. He always takes time for his patients, with a real personal touch. At the

hospital they call him 'Superman.' The staff is also wonderful. They're always phenomenal, and right on top of things. As busy as he is, Dr. Sharma himself comes and checks on you after the procedure.

"You just feel like you're in good hands at Mount Sinai. I wouldn't go anywhere else."

STEMIcathAID: STEMI Patient Transfer Optimized

ANNAPOORNA S. KINI, MD, AND PARASARAM MELARCODE-KRISHNAMOORTHY, MD

Patients with STEMI (ST-Segment Elevation Myocardial Infarction), a dangerous type of heart attack, have outcomes tied very closely to how quickly revascularization occurs. Optimizing the STEMI treatment pathway can have tangible benefits, especially for hospitals that refer to a primary PCI center, since door-in-out and transfer times add to the total system delay.

Guided by the American Heart Association’s Mission: Lifeline STEMI recommendations,

The Mount Sinai Cardiac Catheterization Laboratory has developed STEMIcathAID to improve communication between health care providers, expedite recognition, reduce false STEMI activations, and add automated time-stamped performance metrics for reporting and further optimization. Additionally, screening for cardiogenic shock provides ample time for the shock team to prepare, and a detailed web portal contains easy access to records of current and previous cases.

The EKGs of suspected STEMI’s are sent instantly with an urgent alarm to the specialists at the PCI-capable facility for review. The rest of the STEMI response team is activated only upon confirming the STEMI to be valid, saving the institution money and avoiding the undue stress of false alarms. Meanwhile, the transfer center dispatches an ambulance to pick up the patient. Upon accepting the STEMI alert, the whole care team of physicians, nurses, technicians, and the transfer center begin



communicating through group chats and video calls to ascertain the status of the patient, medications, and additional vitals. The ambulance is trackable, with GPS showing the ETA to pick-up and arrival at the PCI facility; these times are logged.

During discharge, recommendations for lifestyle modifications, cardiac rehabilitation, and smoking cessation are required fields as they have been shown to have significant impact on patients' long-term well-being. STEMIcathAID

will allow us to better respond to STEMI emergencies and achieve better outcomes for our patients.

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Andrea Bryan, 54



Diagnosis: 2-vessel coronary artery disease, chronic total occlusion

Treatment: Percutaneous transluminal coronary angioplasty, atherectomy, and placement of two drug-eluting stents.

"I had no idea there was anything wrong with me. I exercise, keep my weight down and do what I'm supposed to do. But in 2017, I had just gotten off a six-hour flight to California when I started having difficulty breathing and feeling a tightness in my chest. My husband insisted that I go to the hospital, where it was determined that I was having a heart attack. I had a stent placed and I stayed in the ICU for two days.

"The surgeon who worked on me in California had studied under Dr. Sharma and recommended him to me. I felt good going into my first appointment with him because I had read reviews online and liked what I read. I've been seeing him

"If anyone was ever in my situation, I would recommend Dr. Kini immediately."

every four to six months and he's performed two surgeries on me. I now have five stents in total.

"My recovery from each procedure was pretty good. Each time I've had something done, they've always gone through my wrist. I had no extra bleeding, no issues with anesthesia. And I follow doctor's orders to take it easy and not stress.

"People think I'm crazy to drive all the way into the city for care, but I love Dr. Sharma's team. They're

very nice and they care about their patients. And Dr. Sharma is a sweetheart. I like how patient he is. Whenever I go to see him, he sits down with me, answers all my questions and puts me at ease.

"I would definitely recommend Dr. Sharma, Dr. Kini and the team at Mount Sinai Heart."

Bifurcation Interventions and BifurAID 3D

ANNAPOORNA S. KINI, MD, YULIYA VENGRENYUK, PHD, AND ANDRIY VENGRENYUK, MS

Bifurcation lesions account for 15–20 percent of percutaneous coronary interventions and are technically challenging, with multiple lesion and treatment permutations. Depending on the location, medina classification, and side-branch compromise, multiple permutations and combinations are possible. The experience gained from high PCI volume, complex referrals, and published studies assisted in the development of a free mobile app, BifurAID, to simplify education on the complex subject of coronary artery bifurcation intervention.

More than two years and 14,500 downloads later, BifurAID continues to guide users through the treatment of complex bifurcation lesions, using clear illustrations and an easy-to-use design. Based on user

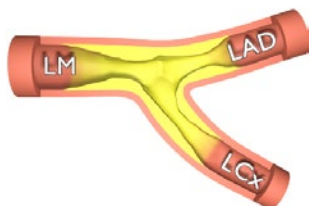
feedback, we developed a fully animated version of the application, BifurAID 3D, to provide medical professionals with an intuitive new visual teaching tool for bifurcation lesion treatment. Detailed animated models of left and non-left main bifurcation lesions were created for all medina classifications. All devices, including balloons, guidewires, and stents were modeled and animated to respond realistically with the procedure. The models were rendered into 3-D animations to match user selections anywhere in the bifurcation algorithm. Despite the complexity, the user experiences a fluid animation that is tailored to their lesion selection and how the plaque responds to treatment. New perspectives, such as from within the side branch, offer an insight into what is commonly viewed in two hazy dimensions or obscured by contrast media.

Exploring within each branch of the algorithm teaches users how differences in plaque location or complications will result in various recommended treatments. These detailed animations will help interventional cardiologists and fellows by expanding their access to free, quality education created by the experienced interventionalists at The Mount Sinai Hospital Cardiac Catheterization Laboratory.

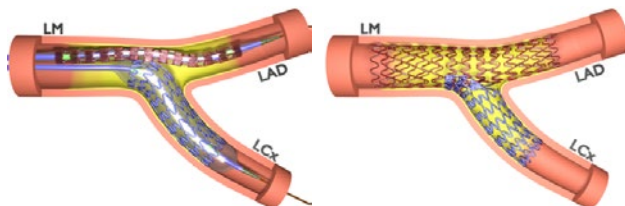
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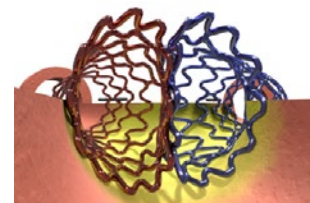
LEFT MAIN BIFURCATION LESION



MINI-CRUSH TWO-STENT TECHNIQUE MID-PROCEDURE AND FINAL RESULT



VIEW FROM WITHIN A DOUBLE-STENTED LEFT MAIN ARTERY



Corey Gellis,
46



Diagnosis: CTO; 2-vessel CAD and in-stent restenosis

Treatment: Placement of DES in LAD

“Dr. Sharma, Dr. Kini and the entire staff made me feel so comfortable and confident.”

“My history with cardiac care started about four years ago, at age 44. I’m normally very active, but I started feeling some troubling symptoms. My legs were cramping and I was experiencing jaw pain. I couldn’t make it around the block with my wife and dog without being winded.

“When I went for a checkup, initially, nothing came up heart-related. Eventually, my doctor sent me for a diagnostic catheterization at a local hospital. Though they were not expecting to find anything at that point, they found a vessel that was 100 percent blocked, what they called a CTO. After the interventionalists at the local hospital here in New Jersey spent three

hours trying to get through the blockage, they determined this was an advanced case and contacted Dr. Sharma at Mount Sinai. My doctor told me to have faith, that Dr. Sharma would be able to break the blockage.

“Within a few days, Dr. Sharma called me, he sounded very confident. He said, ‘We’ll take care of it.’ And he was right. They got me in pretty soon, and almost immediately after the procedure, all my symptoms were perfect. My high blood pressure was better, and I was feeling great, and was back to running in no time.

“A few years later, I started feeling bad again. I called Mount Sinai and

they got me in right away. Dr. Sharma placed three stents in my right coronary artery. But not long after, my body was rejecting the stents. I went to see Dr. Sharma and we sat and talked—he was confident that despite the issues I’d had, we could use a different stent and avoid what would otherwise be an open-heart procedure. The intervention was a success.

“I feel pretty great right now. I’m working to lose a few pounds—since the most recent procedure I box and do Crossfit three times a week. Dr. Sharma, Dr. Kini and the entire staff made me feel so comfortable and confident.”

Expanding Indications of Transcatheter Aortic Valve Replacement (TAVR)

SAMIN K. SHARMA, MD, AND ANNAPOORNA S. KINI, MD

Multiple trials of transcatheter aortic valve replacement (TAVR) in patients with varying surgical risk (based on STS Score) have shown TAVR as the viable therapeutic option for patients who have severe symptomatic calcific aortic stenosis (AS) in all surgical risks.

The NOTION trial, comparing surgical vs. transcatheter aortic valve replacement in low STS risk, showed equivalent results after both strategies. It also showed better durability of transcatheter aortic valve replacement compared to surgical valve replacement at six years.

The use of the SENTINEL™ Cerebral Protection System (which is an embolic filter designed to trap calcified and thrombotic deposits that become dislodged during the TAVR procedure) has showed that SENTINEL device is associated with lower risk of brain infarction and stroke rates compared to the control group.

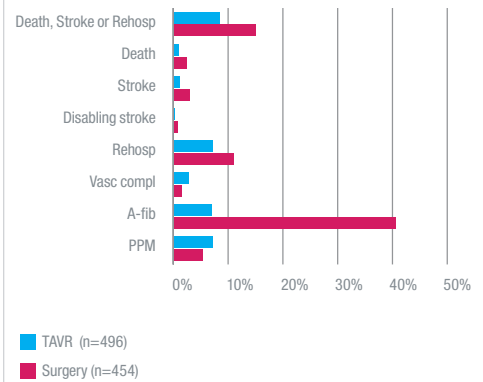
At our center, the SENTINEL device is routinely used during TAVR (60 percent of eligible cases).

Recently, two trials comparing TAVR vs. SAVR in low STS risk AS patients have shown equal or better results after TAVR vs. SAVR at one year. Hence TAVR is now indicated in the majority of patients with symptomatic severe aortic stenosis.

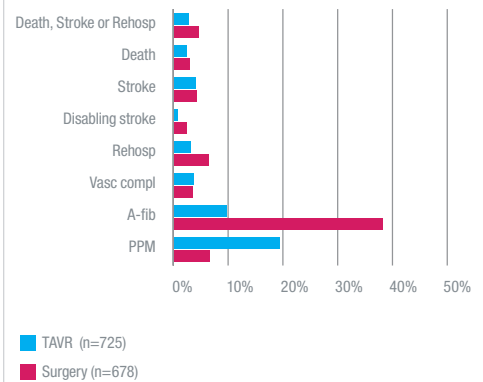
We routinely employ three-dimensional echocardiography (3-D echo) and 4-D computed tomography (CT) for planning the TAVR procedure. Image quality and details are highly relevant to the success of TAVR, which relies on the appropriate evaluation and measurement of the aortic annulus to prevent complications, such as paravalvular leak, prosthesis migration, coronary artery occlusion, or annulus rupture.

The Mount Sinai Hospital was the first center in the United States to deploy the CoreValve®, in December 2010. Since then, our TAVR volume and outcomes have improved significantly compared with other centers in the TVT registry.

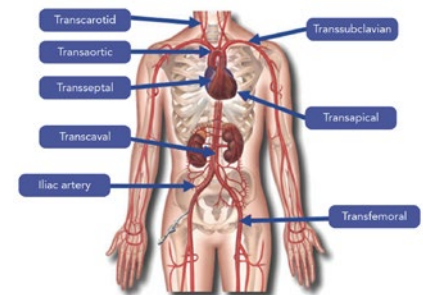
PARTNER 3: CLINICAL OUTCOMES AT 1 YEAR



EVOLUT LOW-RISK TRIAL: CLINICAL OUTCOMES AT 1 YEAR

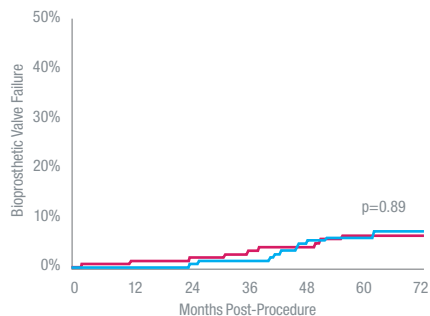
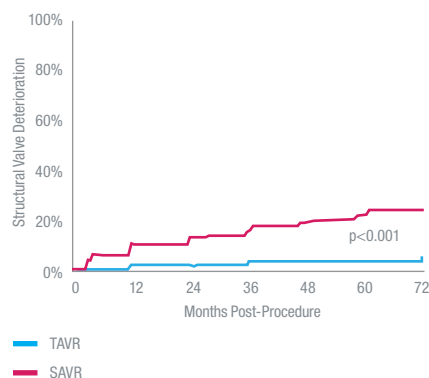


OVERVIEW OF THE APPROACHES FOR TAVR

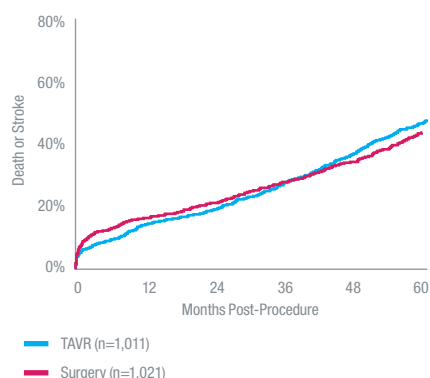


**HEAD-TO-HEAD DURABILITY OF TAVI VS. SAVR:
6-YEAR OUTCOMES OF THE NOTION TRIAL**

NOTION: 280 patients at low surgical risk randomized to TAVI or SAVR



**PARTNER 2A 5-YR: PRIMARY ENDPOINT
(DEATH AND STROKE)**



SENTINEL Trial

THE SENTINEL TRIAL, TO ASSESS THE RISK OF STROKE IN PATIENTS WHO HAVE TAVR WITH THE SENTINEL CEREBRAL PROTECTION SYSTEM, SHOWED THAT USE OF THE SENTINEL DEVICE IS ASSOCIATED WITH **LOWER RISK OF BRAIN INFARCTION (42 PERCENT) WITH A TREND TOWARD STROKE RATES COMPARED TO A CONTROL GROUP.**

TAVR STS RISK ASSESSMENT

AS RISK STRATIFICATION REDEFINED

Traditional



Recent /Contemporary: TAVR for ALL



Need to be equipped with open heart surgery and CPB in emergency

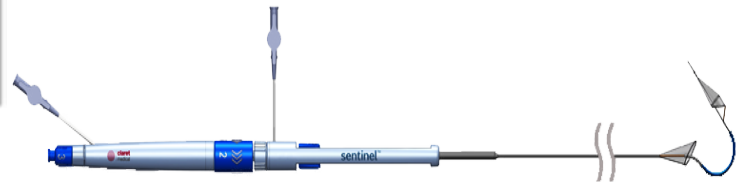
There are some AS patients for whom implanting TAVR may have higher incidence of complications. Those patients should be referred to open surgical aortic valve replacement (SAVR).

SAVR will be indicated in following scenario of severe AS:

- Low to intermediate STS risk and extensive/complex CAD
- Bicuspid AV with low STS risk (under trial)
- Concomitant aortic root/aorta dilatation (>4.6cm)
- Heavy LVOT calcification (high chance of annular rupture)
- Low-intermediate STS risk aortic bioprosthetic dysfunction
- Adverse anatomy (low coronary height, too small or large annulus)
- Concomitant significant MV disease with low surgical risk



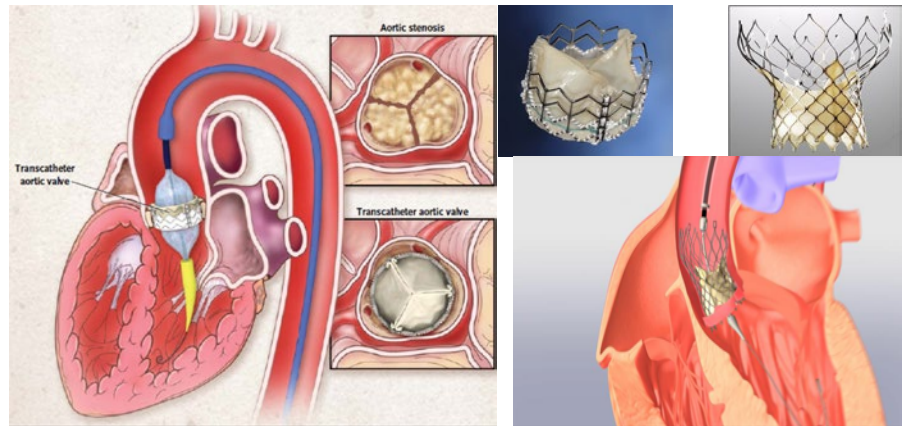
To view archived live cases of complex TAVR, please scan the QR codes above.



SENTINEL® CEREBRAL PROTECTION SYSTEM

- Two independent filters capture and remove embolic material
- Polyurethane filter, pore size = 140 µm
- Standard right trans-radial sheath access (6F)
- One size accommodates most vessel sizes; fits ~90% of anatomies
- Deflectable compound-curve catheter facilitates cannulation of LCC
- Minimal profile in aortic arch (little interaction with other devices)

TRANSCATHETER AORTIC VALVES



EDWARDS-SAPIEN

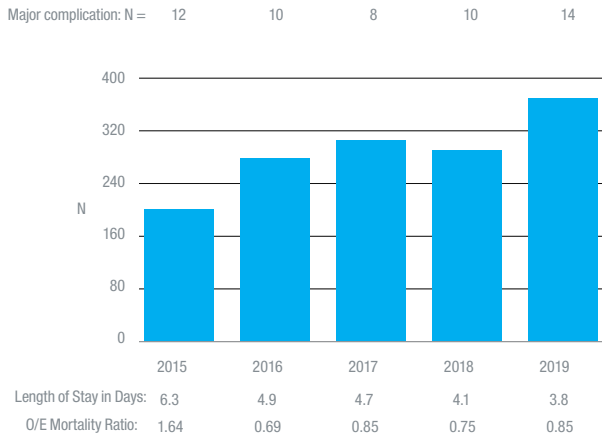
COREVALVE

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STRUCTURAL TRANSCATHETER HEART INTERVENTIONS

TAVR PROCEDURES AT MSH: 2015 TO 2019

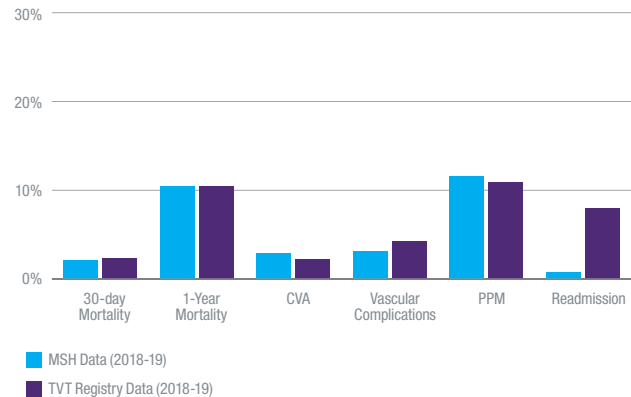


TAVR OUTCOMES AT THE MOUNT SINAI HOSPITAL 2019

- 52% Evolut-R CoreValve, 48% SAPIEN-3

- 90% conscious sedation; 10% general anesthesia

- 93% Perc femoral; 6.2% cutdown femoral; 0.5% subclavian; 0.3% transaortic



Martin Siskel, 74



Diagnosis: Low-flow, low-gradient aortic stenosis

Treatment: Placement of EvolutPRO+ TAVR device

"I had problems with my aortic valve for some time. My medical team knew it, I was being monitored. I would have an echo every six months, and for a while, things were stable. I went for a stress test, and afterward, my cardiologist told me things had changed. He said 'You need to call Dr. Sharma and talk about a valve intervention.' I knew Dr. Sharma because he had placed stents some time ago for me.

"I went to Mount Sinai in the first week in January for a diagnostic catheterization to choose the best path to the heart and determine the right size for the replacement valve. We scheduled my TAVR procedure for four weeks later. Dr. Sharma said if everything went right, I would go in on a Monday and go home on Tuesday.

"On a scale of one-to-ten, everyone at Mount Sinai was a 12... I don't know how you find people like that, but they were the best."

"I'm happy to report everything was textbook. I came in very early on Monday morning, and I went home at 11 o'clock on Tuesday morning. They went in, they put in new valve and they monitored me for 24 hours. There were no issues—the valve was right where it should be and working great.

"Everything was terrific. One day after valve replacement, the only restriction I had was to avoid lifting anything heavy for two weeks. I haven't had a pain since—no more chest pains, no more shortness of breath. I went to see the doctor

a month later, and they said I'm in great shape.

"On a scale of one-to-ten, everyone at Mount Sinai was a 12. They were caring and concerned—not only for me, but also for my family. I don't know how you find people like that, but they were the best. If I wanted to complain, I'd have to make something up.

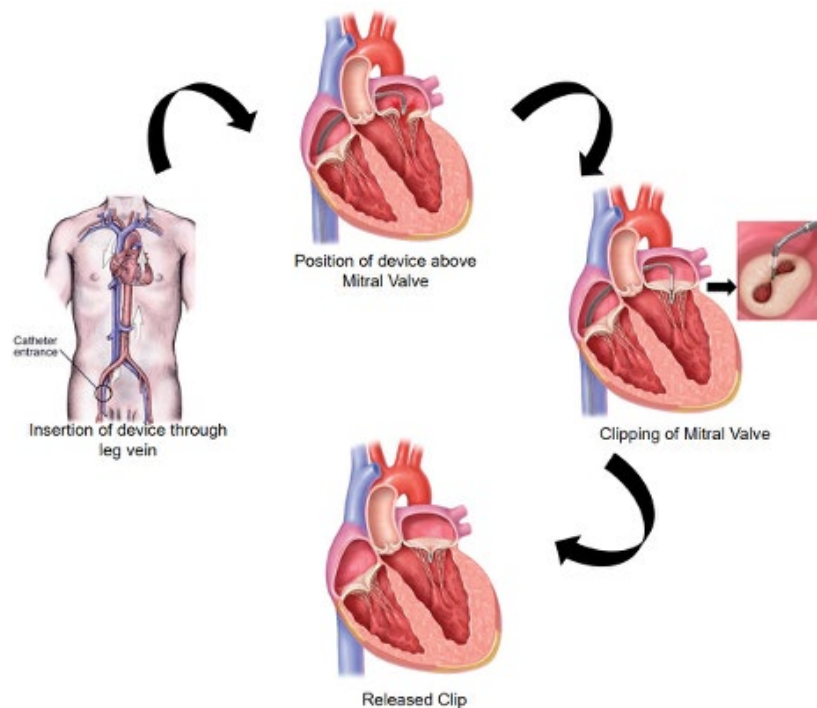
"People used to spend weeks in the hospital after valve surgery. I was out in a day. It was a phenomenal experience. I've never had to look back. I'm living better through modern medicine."

Expanding the Horizon of MitraClip to Prolong Survival in Patients with Heart Failure

ANNAPOORNA S. KINI, MD, AND NAGENDRA BOOPATHY SENGUTTUVAN, MD

Valvular heart disease remains an important public health problem, imposing a huge economic burden on health care systems in the United States. Moderate or severe valvular disease is common, impacting 12 percent of the general population, with the prevalence increasing with advancing age. Among all valvular heart diseases, mitral regurgitation (MR) is the most common valvular abnormality, affecting 10 percent of individuals aged ≥ 75 years.

Mitral regurgitation can be classified into primary or organic MR, and secondary or functional MR. Structural abnormalities of mitral valve lead to organic or primary MR. Mitral regurgitation due to primary pathology in the left ventricle is called secondary or functional MR. When a mitral valve is determined to have a severe backflow of blood across the valve, the patient's cardiologist will refer them to a structural heart program, where they will have a consult with the structural heart team and several non-invasive studies

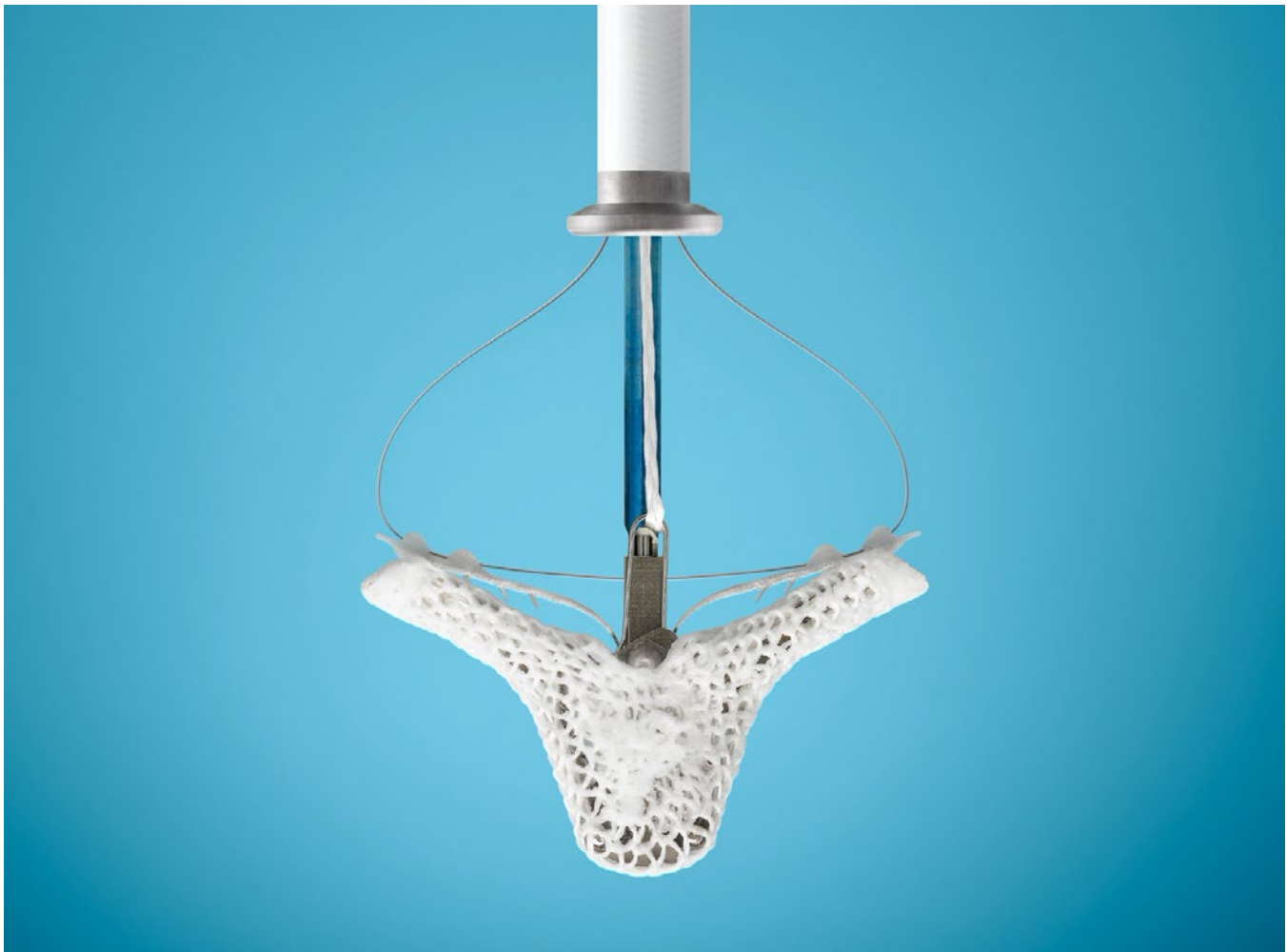




TO VIEW AN ARCHIVED LIVE MITRAL VALVE CASE PLEASE SCAN THE QR CODES ABOVE.

to determine procedure eligibility and plan for the procedure. Candidacy for the MitraClip procedure is determined by team and based on a number of factors and tests performed at Mount Sinai. The tests required are transthoracic echocardiogram, transesophageal echocardiogram, and consults with an interventional cardiologist and a cardiothoracic surgeon. Surgical repair would typically restore the mitral

valve function and minimizes the mitral regurgitation. MitraClip is currently indicated in patients with primary MR who are not candidates for mitral valve surgery, and symptomatic patients with secondary MR who are on optimal medical therapy. The MitraClip is reserved for those deemed too high risk for surgery, as it does not completely eliminate the mitral regurgitation but rather reduces it.

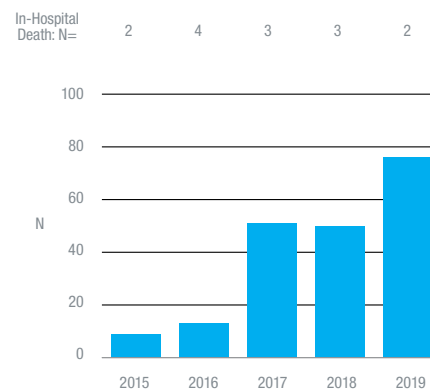


The MitraClip device is a small metal alloy clip covered with a polyester fabric that is implanted on the mitral valve. The MitraClip works by bringing the two leaflets of mitral valve together, which allows the valve to close more effectively and reduces the amount of blood that flows backwards. With the patient under local anesthesia, the device is implanted using a catheter inserted through the leg vein to the heart. The mitral clip procedure takes about 1.5 to 3 hours. Usually one to three clips are implanted in the mitral valve during the procedure, until a favorable result is obtained. MitraClip is an extremely safe procedure, but there is a very small risk of death, stroke, heart attack, bleeding, vascular injury, clip detachment and infection. Usually two

to three days of hospital stay is required. Patients should begin to feel relief of their symptoms within a few weeks after their procedure, but improvement may vary depending on their underlying medical conditions. MitraClip, in addition to the current medical therapy, will help improve the management of patients with heart failure. In the COAPT trial, MitraClip has been shown to improve the survival of patients with HFrEF and reduce their hospitalization due to heart failure.

The Mount Sinai Hospital experience from 01/2015 to 12/2019 is shown in table. Strict adherence to our highly effective and cautious protocol, appropriately complemented by post-procedure management, has helped us in optimizing our outcomes.

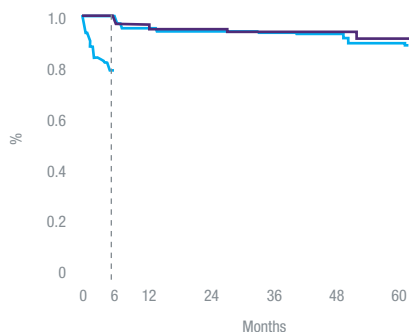
**MITRACLIP PROCEDURES AT MSH:
2015 TO 2019**



References

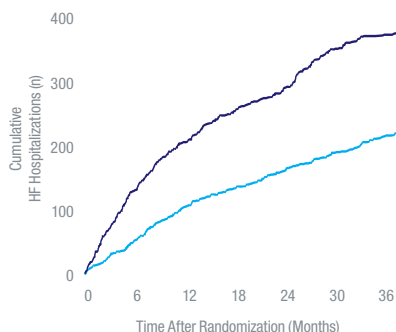
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**EVEREST II TRIAL:
5 YEAR OUTCOMES**



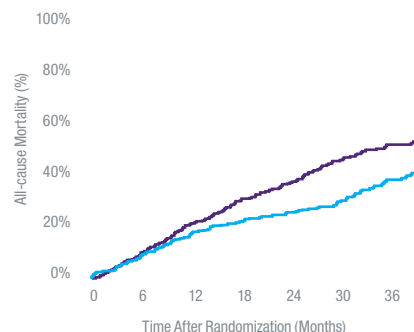
— RCT Device (n=136)
— RCT Surgery (n=75)

**COAPT TRIAL:
ALL HOSPITALIZATION AT 3 YEARS**



— MitraClip + GDMT
— GDMT alone

**COAPT TRIAL:
ALL-CAUSE MORTALITY AT 3 YEARS**



— MitraClip + GDMT
— GDMT alone

John Mattera,
85



Diagnosis: Mitral valve regurgitation

Treatment: Placement of MitraClip NTr x1 via femoral vein

“Dr. Kini is wonderful, so nice and very professional. We were honestly pleased with our whole stay.”

After a successful mitral valve procedure, John Mattera is grateful to be home with his wife, Joyce, who shares his story. Joyce explains.

“John had been constantly short of breath and we were seeing a local cardiologist. It continued over a period of a couple of years, and we were making numerous visits to our local hospital. John would get Lasix and then go home. We were spending so much time at the hospitals. John wasn’t a good candidate for open surgery because of his other health issues, but his cardiologist told us there was a new procedure, MitraClip. He suggested a wait-and-see

approach and said to wait a year.

“When it was time, he put us in touch with the team at Mount Sinai. John was in the ER the night that I called them to set up a consultation. One of the team members had him transferred to Mount Sinai.

“We spent a few days at Mount Sinai while John recovered. When he was feeling better, they did a diagnostic catheterization so Dr. Kini could find a path to the valve. We scheduled the procedure for five days later. The hospital even helped arrange transportation take us home and bring us back. We went in on Sunday after

Thanksgiving and Monday morning he had the procedure. Dr. Kini was very pleased with how it went.

“That Christmas, John played Santa at our church. Dr. Kini got a kick out of that. John is 85, and they were very helpful and accommodating to all his needs.

Mount Sinai is a good hospital—an amazing hospital, they try to give a personal touch. That’s a blessing. Dr. Kini is wonderful, so nice and very professional. We were honestly pleased with our whole stay.”

Innovations in Transcatheter Mitral Valve and Tricuspid Valve Interventions

GILBERT H. L. TANG, MD

Transcatheter mitral valve interventions have made steady progress over the past year. In mitral valve repair, the MitraClip® from Abbott Laboratories received FDA approval for the treatment of patients with symptomatic moderate-to-severe to severe secondary mitral regurgitation (MR) already on optimal medical therapy. The Edwards Lifesciences PASCAL™ edge-to-edge repair device obtained CE mark approval last year in Europe, and is currently undergoing a pivotal trial in the United States, comparing it with MitraClip in both primary and secondary mitral regurgitation. In terms of annuloplasty, direct annuloplasty devices, such as the Cardioband™ from Edwards Lifesciences and Boston Scientific's IRIS Transcatheter Annuloplasty Ring System, have not made significant progress. CARILLON® Mitral Contour System™, an indirect annuloplasty device, has begun its pivotal trial in the U.S. There is also rapid development in chordal replacement technologies, an emerging category of transfemoral devices.

In transcatheter mitral valve replacement (TMVR), there is a shift in focus to devices that can be delivered via a transseptal approach, which is less invasive than the transapical approach. However, the technologies run into anatomic feasibility limitations due to annular sizing or left ventricular outflow tract (LVOT) obstruction. The Tendyne™ device by Abbott, delivered transapically, has had the largest clinical experience thus far with an excellent safety and efficacy profile, while being versatile in treating patients with prior failed mitral annuloplasty repair or mitral annular calcification (MAC). The SUMMIT pivotal trial testing the Tendyne device is currently ongoing. The APOLLO pivotal trial is testing the Medtronic Intrepid™ device to treat both primary and secondary MR. Other transfemoral devices, such as EVOQUE and SAPIEN M3 (Edwards Lifesciences), with a more atrial design and lower risk of LVOT obstruction, are commencing pivotal trials shortly.

Transcatheter tricuspid valve interventions have progressed rapidly over the past year. The Abbott TriClip™ has completed the TRILUMINATE early feasibility study with promising results, and the pivotal trial, for which The Mount Sinai Hospital is one of the leading sites, is currently enrolling patients. Annuloplasty devices, such as Trialign™ from Mitralign and Edwards Cardioband, are facing hurdles due to imaging and implant difficulties. Three-dimensional intracardiac echo (ICE) may improve the ability to image the tricuspid valve during the procedure to improve therapy expansion. Transcatheter tricuspid valve replacement (TTVR) for native disease has seen growing clinical experience with the Medtronic Intrepid and Edwards EVOQUE devices, but clinical data remain preliminary.

FIGURE 1

CT reconstruction depicting a Medtronic Intrepid TMVR device

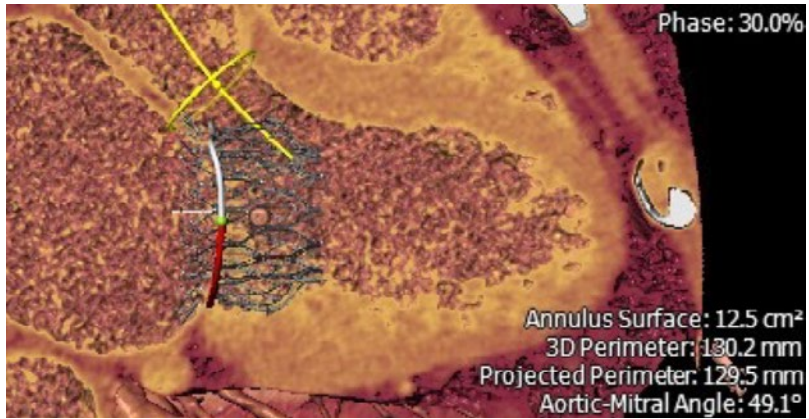
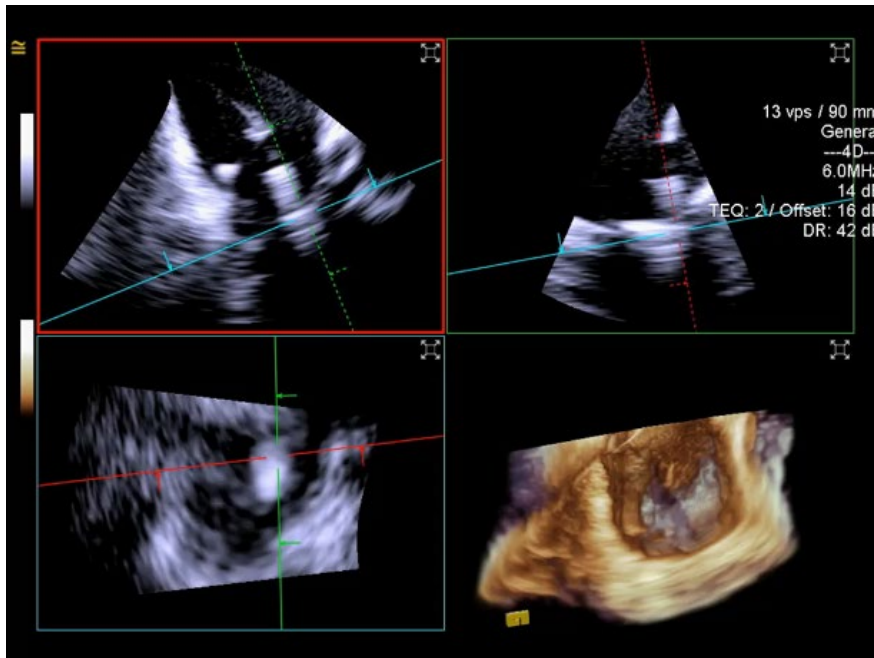


FIGURE 2

3D ICE showing a TriClip device grasping the anterior and septal leaflets.



Alcohol Septal Ablation for HOCM

ANNAPOORNA S. KINI, MD, AND NAGENDRA BOOPATHY SENGUTTUVAN, MD

Hypertrophic obstructive cardiomyopathy (HOCM) is the most common genetic cardiovascular disease, affecting approximately 700,000 people in the United States.

It presents differently among patients with the genetic disease, but manifests as an enlarged left ventricle without dilatation. The majority of these patients (70 percent) have asymmetric septal hypertrophy with obstruction. Though most patients with HOCM will have a normal life span, it is the most common cause of sudden death in young athletes.

Patients present with chest pain on exertion, shortness of breath, fatigue, and heart palpitations. Cardiologists can confirm a HOCM diagnosis with a transthoracic echocardiogram. The first line of treatment consists of medical management with medications including beta-blockers, calcium channel blockers, and disopyramide. For patients with persistent/

refractory symptoms, the recommended treatment is open heart surgery with surgical removal of septal muscle or alcohol ablation of septal muscle.

The Mount Sinai Cardiac Catheterization Laboratory is one of the few high-volume centers offering alcohol septal ablation (ASA). This minimally invasive procedure, done under local anesthesia, is associated with shorter recovery times, without the complications of open surgical septal myectomy. Risk factors favoring ASA include advanced age, significant medical comorbidities that increase the surgical risk, prior open heart surgeries, and prior stroke. In general, a focal septal bulge with appropriate-sized septal perforator supplying the target myocardium is suitable for ASA.

Long-term outcomes of ASA are similar to those for surgical myectomy. In this procedure, 98 percent alcohol is injected slowly (1–3cc/second) into the targeted

septal perforators supplying blood to the thickened myocardium through small catheters routed from the femoral artery.

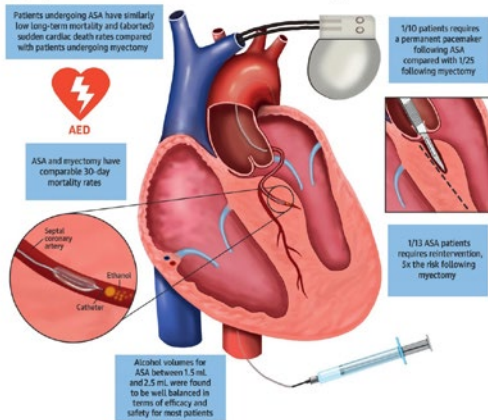
The treatment is effective immediately, causing controlled cell death at the targeted zone. After the procedure, patients are monitored in coronary care units for two to three days, assisted by a temporary pacemaker inserted through a vein in the neck.

The table below shows The Mount Sinai Hospital experience from 09/2001 to 12/2019. Strict adherence to highly effective standardized protocols, complemented by careful post-procedure management, has helped optimize outcomes.

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Management of HOCM: Key points of Alcohol Septal Ablation



To view an archived live case of alcohol septal ablation, please scan the QR code above.

ALCOHOL SEPTAL ABLATION IN HOCM MOUNT SINAI HOSPITAL EXPERIENCE (9/2001–12/2019)

	N = 254
Mean age (years)/Female gender (%)	55 ± 12/72
Baseline resting gradient mean (mm Hg)	42 ± 15
Baseline post-PVC gradient (mm Hg)	90 ± 22
Post ASA resting gradient (mm Hg)	10 ± 6
Post ASA post-PVC gradient (mm Hg)	28 ± 16
Alcohol dose (cc)	2.5 (1-5)
Peak CPK/peak MB (U/L)	1600 ± 520 / 162 ± 42
Need for permanent pacemaker (%)	10 (3.9%)
In-hospital death	1 pt (ref VT)
Average LOS (days)	3 ± 1
5-year need for re-ASA (%)	4.5% (No surgery)

Innovation in the Endovascular Treatment of PAD: Bioabsorbable Stent Platforms

PRAKASH KRISHNAN, MD

The prevalence of peripheral artery disease (PAD) in tibial vessels continues to increase. Although medical therapy of atherosclerosis is paramount and considered the foundation of treatment for PAD, approximately 1–3 percent of these patients

develop critical limb ischemia (CLI) requiring endovascular intervention (EVI).

CLI is defined as ischemic rest pain, tissue loss, or gangrene in the presence of PAD and hypoperfusion of the lower extremity. CLI is a severe condition with a high risk for major amputation and subsequently for mortality. EVI in the setting of CLI has become the primary treatment approach to reduce the risk of limb-related events such as amputation and death. EVI options include plaque modification with atherectomy devices or atherectomy balloons, plain balloon angioplasty, and stent implantation.

Recently, bioabsorbable scaffolds have been introduced for EVI of tibial arteries. The Absorb bioabsorbable scaffold has been investigated in two prospective studies: the ABSORB-BTK trial and DISAPPEAR

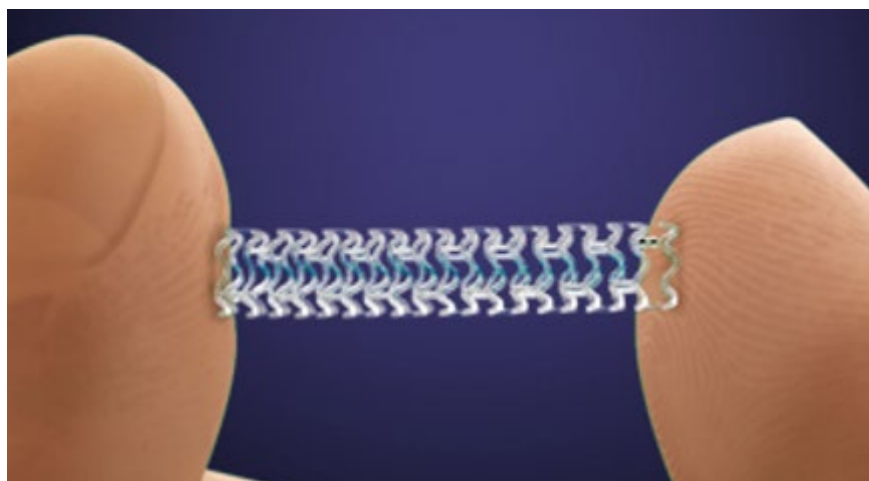
registry. Both studies found 100 percent technical success with the implantation of the bioabsorbable scaffold. At five years, the ABSORB-BTK study found 95 percent sustained clinical improvement, 90 percent complete wound healing for those with tissue loss, and a limb

salvage rate of 100 percent. Furthermore, freedom from clinically driven target lesion revascularization was 90.7 percent, and no scaffold thrombosis occurred. Similarly, in the DISAPPEAR registry at the 12-month follow up, complete wound healing occurred in 79.5 percent of patients,



freedom lesion revascularization was 93 percent, and amputation-free survival was 85 percent.

Despite these encouraging preliminary results, bioabsorbable scaffolds will be evaluated in an investigational device exemption trial (LIFE-BTK). Patients will be randomized to Esprit bioabsorbable scaffold versus plain balloon angioplasty. Bioabsorbable scaffolds might become an essential tool in our armamentarium to treat PAD with CLI. The Mount Sinai Hospital will be a major site in the ABSORB-BTK trial that commences in summer 2020.



Maria Diaz, 72



Maria's son Luis shares Maria's story. "My mom is diabetic and has had repeat ulceration of the left foot. She met Dr. Krishnan after a referral from her podiatrist. He recommended Dr. Krishnan because of her vascular health. She had a poor vascular flow and a deformity in her toe that was causing recurrent ulcerations.

"When we first met Dr. Krishnan, he was very positive and gave us hope. We finally felt that she would be able to have her issue resolved;

"He was great to work with and a very nice person who communicated the risk and benefits of the procedure clearly."

we knew she was in safe hands. Dr. Krishnan had a clear plan of action and scheduled her procedure immediately.

"We went in on December 17th and again on the 26th and the circulation was successfully restored to

her legs. He was great to work with and a very nice person who communicated the risk and benefits of the procedure clearly. She is now currently recovering in rehab."

Diagnosis: Critical limb ischemia with gangrene and rest pain of the left foot.

Treatment: Peripheral diagnostic catheterization, peripheral intervention

Role of ABI Testing for PAD Screening

VISHAL KAPUR, MD

The presence of peripheral arterial disease (PAD) is associated with higher cardiovascular morbidity and mortality, regardless of gender or clinical form of presentation (symptomatic or asymptomatic). It is frequently associated with comorbidities such as age greater than 70 years, diabetes mellitus, renal dysfunction, or smoking. PAD is actually considered an independent predictor of paramount importance for cardiovascular mortality, more important for survival than clinical history of coronary artery disease.

The ankle-brachial index (ABI) is an initial screening modality for diagnosis of patients with suspected PAD. It is a simple, efficient test, characterized by the use of blood pressure (BP) cuffs and Doppler ultrasound.

The ABI is calculated via lower extremity (DP or PT) systolic pressure/brachial artery pressure. The table at right shows the various cutoffs.

ABI has a prognostic role, helping to identify patients with very high cardiovascular risk, independent of the

presence or absence of symptoms. An abnormal ankle-brachial index (below 0.9) is a powerful independent marker of cardiovascular risk. Also, there is an inverse correlation between ABI value, non-fatal cardiac events (myocardial infarction, stroke, and heart failure exacerbation) and mortality (cardiovascular and global). The relation is nonlinear—patients with very low ABI (<0.3) have a significantly higher additional risk (4). Also, a decrease in ABI was found as an independent prognostic factor for these patients. In addition, an ABI greater than 1.4 is associated with a two times greater risk for cardiovascular death (defined as sudden death, death from acute coronary syndromes, or stroke), the risk being independent of other risk factors.

In patients with normal or borderline ABI at rest, but with risk factors for PAD, it is useful to measure ABI after exercise and to compare it with the nominal value.

In conclusion, the ankle-brachial index is a simple, reproducible, and cost-effective assessment that can be used to detect lower-extremity arterial stenosis in the

primary care setting. This makes it an efficient tool for objectively documenting the presence of lower extremity peripheral arterial disease.

ABI	Interptetation
>1.4	Abnormal
1–1.4	Normal
0.9–1	Borderline
0.4–0.9	Mild-to-moderate disease
<0.4	Severe disease

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Update on Renal Denervation for Hypertension Control

GEORGE DANGAS, MD

Hypertension is a major risk factor for heart and vascular disease. Even small decreases in arterial blood pressure over time provide major long-term benefits. A low-sodium diet is the most useful first step, followed by a range of medical treatments, typically a combination of drugs taken daily. Many patients follow this treatment pathway successfully.

Still, some patients may be unable or unwilling to proceed with medical treatment, or may have hypertension that is resistant to treatment with more than three drugs.

Renal denervation, a new form of hypertension treatment, has been under

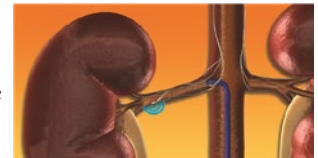
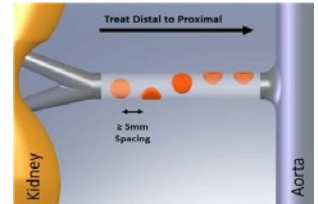
development for several years and may soon become approved for clinical use in patients. This approach would treat high blood pressure by altering its “thermostat” in the body: kidney circulation. Interventionalists could potentially use renal denervation to treat drug-resistant hypertension by guiding a catheter to the wall of the kidney arteries and delivering ablative energy to selectively damage overactive nerves. It may potentially be useful for those patients who have drug side effects or cannot tolerate taking drugs for a long time. A series of global clinical trials is expected to conclude soon. If these trials demonstrate significant blood pressure reduction with this novel catheter ablation method, this type of treatment may

be added to the armamentarium of cardiovascular disease specialists.

Earlier studies have established that delivery of this type of energy to the kidney arteries does not cause any permanent damage or long-term side effects. Mount Sinai Heart has been involved in this type of research and innovation for several years, and we expect to be leaders in its clinical utilization as soon as it is approved.

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Jose Vasquez, 76

Diagnosis: Coronary artery disease

Treatment: Diagnostic catheterization and placement of drug-eluting stents.

“I’ve been receiving treatment for heart problems for the past 20 years. I’ve been going to Mount Sinai for several years, for a number of medical issues. That’s how I met Dr. Dangas, who has been treating me for around eight to 10 years now.

“At first, I was seeing Dr. Dangas for regular check-up visits—then I had the emergency episode. Six months ago, I was having symptoms for what turned out to be a pre-heart attack. I had pain in my left arm and shoulder, headache,

chest pain and shortness of breath. I knew I had to go to the hospital right away.

“As soon as I got to the emergency room at Mount Sinai, the cardiac team performed an electrocardiogram and put me on a gurney. When Dr. Dangas came in, he made me feel at ease, even though he doesn’t speak much Spanish and I don’t speak much English. He’s always so kind, whether it is in his practice, the ER or the operating room.

“Two hours later, they took me upstairs to prep me for surgery. Dr. Dangas was the one who placed stents in me. Everything turned out fine, and after the procedure I felt pretty good!

“The team at Mount Sinai is great; I’ve always had good experiences there. They solve my medical problems so I can go on with my life. And Dr. Dangas is always so caring. He treats me like a son treats his father. It’s like God sent an angel to help me. I would recommend Mount Sinai Heart to anyone.”

Measurement of Radiation Exposure in the Cardiac Catheterization Laboratory

JOSEPH SWEENEY, MD

Ionizing radiation, such as X-ray fluoroscopy, is an essential tool in diagnosing, managing, and treating patients with structural and coronary artery disease in the cardiac catheterization laboratory. However, it is well-recognized that ionizing radiation has molecular-level effects on exposed human tissue, with injury potential to both patients and medical personnel. As a result, it is imperative to minimize radiation exposure in the cardiac catheterization laboratory.

While radiation skin damage is a rare complication of fluoroscopically guided interventional cardiac procedures, the National Council on Radiation Protection

and Measurements (NCRP) prepared a report in 2010 detailing radiation monitoring for patients and recommended monitoring specific metrics, including: Air Kerma (AK) at the interventional reference point, Dose Area Product (DAP), and Fluoroscopic Time (FT) to establish quality-monitoring programs. Following these guidelines, all patients who now undergo a fluoroscopically guided procedure at The Mount Sinai Cardiac Catheterization Laboratory have each of these fluoroscopic variables monitored, reported, and retrievable in the medical record. Furthermore, if a given fluoroscopic procedure exceeds a predefined substantial

radiation dose level (SRDL) (Table 1) as defined by the NCRP Report number 168, patients and caregivers are informed in writing, prior to discharge, about potential radiation skin injury and given instructions for clinical follow up.

The overall clinical benefit of fluoroscopically guided cardiac interventions far outweighs the potential radiation exposure risks to our patients, but by following this new quality-monitoring protocol to monitor patient dose and guide management strategies, The Mount Sinai Cardiac Catheterization Laboratory aims to reduce this associated risk even further.

References

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TABLE 1

Suggested values for first and subsequent notifications and the SRDL

Dose Metric	SRDL
Peak skin dose (Gy)	3
Air kerma (Gy)	5
Dose area product (Gy cm ²)	500
Fluoroscopy time (min)	60

Ellis Coleman, 64



Diagnosis: Two-vessel CAD and restenosis

Treatment: PTCA, atherectomy and placement of drug-eluting stent in right coronary artery

“My troubles with my heart didn’t start until I was 45. I first noticed something wasn’t right when I started feeling pain in my neck and throat.

“I was in great shape, and my doctor thought it might be acid reflux. After treatment with the purple pill didn’t change anything, one of my family members reminded me of our history with heart disease. I moved quickly to be seen by a cardiologist. Turns out I needed a stent, and that cleared up the problem.

“About 12 years later, I started feeling some pain again during my intense workouts. That escalated quickly, and my local hospital placed another stent in the intersection to my LAD. Eight months later, I had to have another stent placed.

“At that point, we started to realize this was a serious, chronic issue in the LAD that needed attention from the very best. I needed a place that handles special cases like mine. So I called Mount Sinai—a direct flight to New York City away—and was

“The information you get from him is personal and directly relevant to your unique case.”

connected to Dr. Sweeney. He wrote back immediately, and invited me to come visit him in New York.

“He explained that there was a reaction to the stent in my LAD and it had gotten blocked again. They did a procedure to drill out the blockage. He told me the artery was clear but it would likely close up again, and I was a candidate for an arterial bypass.

“Eight months later, the pain came on again, but worse than ever. I called Dr. Sweeney and got that direct flight. I could barely walk when I got there. Dr. Sweeney checked me into the hospital at that minute and observed me carefully until the surgeon got back in town. I got the arterial bypass at Mount Sinai, and I’ve been a different person since.

“Earlier this year (2020) on a ski trip, I began having that familiar pain again. I called Dr. Sweeney, and once again, received immediate return call, an appointment, a treadmill test, and yet another stent all in a period of 10 days.

“Dr. Sweeney is like a guy you’d want to hang out with. Anytime you’re there, he’s there. The information you get from him is personal and directly relevant to your unique case.

“I have recommended Mount Sinai to anyone I talk to. Not everyone is willing to fly to New York for the best cardiac care these days, but that doesn’t stop me from recommending it!”

Increasing Utilization of Radial Access to Reduce Vascular Complications

NITIN BARMAN, MD

Percutaneous coronary intervention (PCI) with stenting, in addition to medications, has remained the preferred treatment for symptomatic obstructive coronary artery disease (CAD) for decades. Originally performed through larger arteries, including the femoral artery in the groin and the brachial artery in the upper arm, pioneers in the field of interventional cardiology demonstrated through the early 2000s the feasibility of conducting the procedure through the radial artery, a smaller artery in the wrist.

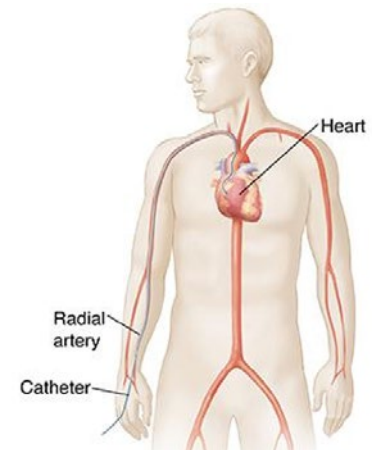
Utilizing the radial artery for coronary procedures results in less procedure-related bleeding and vascular complications. Additionally, radial access for PCI is strongly preferred by patients as it allows for earlier ambulation and discharge from the hospital, as well as return to normal function. Beyond these universally accepted benefits of transradial catheterization, many recent clinical trials have demonstrated that radial PCI patients may actually experience the additional benefit of reduced clinical events, including heart attacks and death. One such important trial was the MATRIX (Minimizing adverse hemorrhagic events by transradial access site and systemic implementation of Angiomax) study, which compared radial versus femoral access in patients with ACS (acute coronary

syndrome) including STEMI (ST elevation myocardial infarction) heart attacks. This pivotal trial demonstrated a significant reduction in major cardiovascular events and bleeding in the radial group.

Despite these significant findings, the majority of patients in the United States undergoing PCI continue to receive their procedure through the groin. While there has been a consistent increase in utilization of the radial artery for PCI, in general, patients who are the most likely to benefit from radial access (i.e., sicker patients) remain the least likely to receive radial PCI.

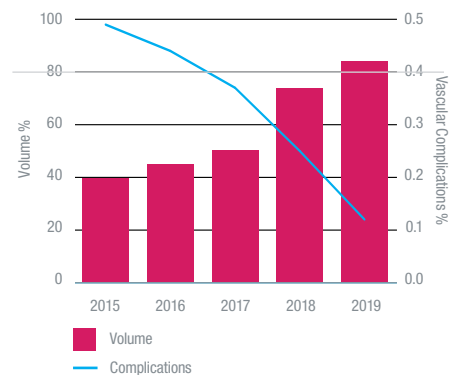
At The Mount Sinai Hospital, we have steadily incorporated the validated and valuable tool of transradial catheterization to benefit even our most complex cases. There has been an ongoing commitment to the transradial program in terms of growth and technical efficiency. As a result, we have become widely recognized as leaders in this field. In addition to the daily education of our fellows in this approach, we offer a training course in transradial access for complicated PCI for visiting physicians from across the country.

Over the past five years, the use of transradial catheterization at Mount Sinai has more than doubled, now nearly half of the patients treated in our Cardiac



Catheterization Laboratory receive this procedure (those that do not generally cannot due to technical and patient-specific reasons). Concomitant with this increase in transradial use, our patients have enjoyed a dramatic (over 75 percent) reduction in the rates of vascular complications associated with their procedures (see figure). We expect and intend for this trend to continue, as the safety of our patients is our number-one priority.

GROWTH OF RADIAL PROCEDURES AT MSH: IMPACT ON VASCULAR COMPLICATIONS



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Transcatheter Closure of Coronary Artery Fistula

BARRY LOVE, MD

Coronary artery fistulas are abnormal connections between the coronary arteries and a cardiac chamber or great vessel. While angiography may reveal tiny coronary fistulae in up to 0.9 percent of patients, larger fistulae are rare. Coronary fistulae are typically congenital and also may be acquired after events such as endomyocardial biopsy, cardiac surgery, or penetrating trauma. Larger fistulae lead to dilation of the proximal coronary artery, and may cause heart failure, coronary steal, atrial fibrillation, and endocarditis. Fistulae may also become aneurysmal and can rupture. The vast majority of coronary fistulae are asymptomatic, but may have an audible continuous murmur. The recommendation to close large and symptomatic-moderate coronary fistulae is based on 2008 ACC/AHA Guidelines.

Our approach at Mount Sinai Heart has been to try and address moderate to large coronary fistulae using a transcatheter approach during childhood before the feeding coronary artery becomes so large that it creates an unacceptable risk for thrombosis, and also before they can develop coronary thrombosis (Case 1).

In adults, we have tried to limit intervention for fistulae that are causing heart failure, or have a target where the proximal vessel does not appear so dilated where abruptly reducing the flow will lead to thrombosis (Case 2).

References

Warnes C, et al. ACC/AHA 2008 Guidelines for the Management of Adults with Congenital Heart Disease: Executive Summary. *Circulation* 2008; 118: 2395.

ACC/AHA GUIDELINES

CLASS 1:

1. If a continuous murmur is present, its origin should be defined either by echocardiography, MRI, CT angiography, or cardiac catheterization.
2. A large coronary arteriovenous fistula (CAVF), regardless of symptomatology, should be closed via either a transcatheter or surgical route after delineation of its course and its potential to fully obliterate the fistula.
3. A small to moderate CAVF in the presence of documented myocardial ischemia, arrhythmia, otherwise unexplained ventricular systolic or diastolic dysfunction or enlargement, or endarteritis should be closed.

CLASS 2:

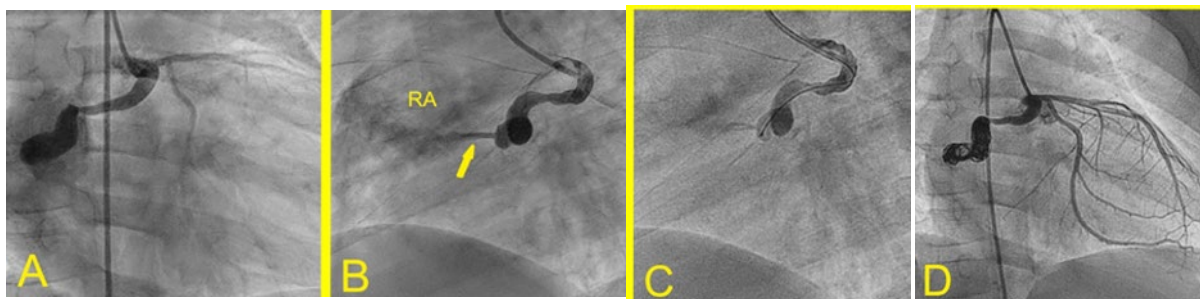
1. Clinical follow-up with echocardiography every three to five years can be useful for patients with small, asymptomatic CAVF to exclude development of symptoms or arrhythmias or progression of size or chamber enlargement that might alter management.

CLASS 3:

1. Patients with small, asymptomatic CAVF should not undergo closure of CAVF.

CASE 1:

Six-year-old girl with a coronary fistula diagnosed on echocardiogram due to a continuous murmur. Angiography of the left coronary artery (A) demonstrates a large coronary fistula from the proximal circumflex draining to the right atrium (RA). The fistula was engaged with a 5Fr VL 3 guide (B). A 0.021 microcatheter was advanced over a coronary wire to the connection with the right atrium (C). A total of 11 0.018 Interlock coils were nested in the fistula. Afterward, angiography shows complete occlusion (D).



CASE 2:

Coronary angiography revealed a fistula from the LAD to the pulmonary artery (A) with a huge aneurysm (*). The fistula was engaged with a microcatheter and eighteen 0.018 Interlock coils were delivered in the aneurysm causing no further flow in the fistula and the aneurysm was sealed (B).



Shortening Aspirin Duration After Percutaneous Coronary Intervention

ROXANA MEHRAN, MD

Dual antiplatelet therapy (DAPT), a combination of aspirin and P2Y12 receptor inhibitor, is the cornerstone of treatment after coronary stenting. Over the last decade, however, the latest advances in coronary stent design have enhanced the safety and efficacy of these devices, reducing their thrombogenic properties and, subsequently, the need for prolonged DAPT duration. Several studies have shown that bleeding complications associated with long-term DAPT have a detrimental impact on patients' prognoses in terms of both morbidity and mortality. Therefore, minimization of the bleeding risk associated with percutaneous coronary intervention (PCI) has become a clinical priority in contemporary practice.

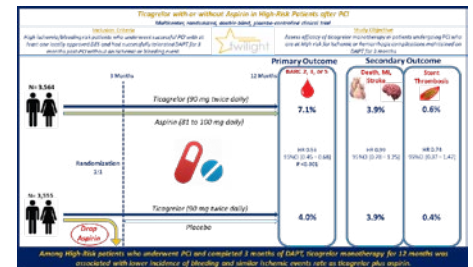
While several trials have shown that a short duration (one to three months) DAPT regimen followed by aspirin monotherapy may be safe in low-risk patients undergoing PCI, extrapolation to higher risk patients remains debatable. Aspirin has been the most commonly prescribed antiplatelet agent for secondary prevention of ischemic events; however, recent data have suggested

a potential benefit in using P2Y12 inhibitor monotherapy after a short DAPT course.

The Icahn School of Medicine at Mount Sinai, together with a robust executive committee under the leadership of Roxana Mehran, MD, designed and executed the TWILIGHT Study. This large, multinational, double-blind placebo-controlled, randomized trial tested the P2Y12 inhibitor monotherapy strategy (dropping ASA) in selected high-risk PCI patients. The study enrolled 9,006 patients discharged on ticagrelor plus aspirin after coronary stent implantation, of whom 7,119 were randomized at three months to receive either ticagrelor plus placebo or ticagrelor plus aspirin for an additional 12 months. The trial showed that patients on ticagrelor monotherapy (without aspirin) had almost half the risk of bleeding complications (hazard ratio (HR) 0.56, 95 percent confidence interval (CI) 0.45–0.69; $p < 0.001$ for superiority). Importantly, this strategy showed similar rates of ischemic events such as death, myocardial infarction, or stroke

compared to patients on both ticagrelor and aspirin.(3)

The TWILIGHT Study represents a new paradigm of treating complex patients with an effective strategy without causing harm and highlighted that it is safe to stop aspirin after three months post-PCI.



References

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Starting an Adult Congenital Heart Disease Program

ALI ZAIDI, MD

The Mount Sinai Health System has established a comprehensive Adult Congenital Heart Disease Center (ACHD Center) at Mount Sinai Heart to serve the medical and surgical needs of a growing population of adults born with heart disease.

Congenital heart disease is the leading birth defect in the United States, and every year nearly one out of 100 babies is born with some form of this condition. Scientific advancements over the last 40 years have enabled more than 90 percent of these patients to live well into adulthood. Nationwide, 1.4 million adults are living with congenital heart disease, but 90 percent of them aren't getting the care needed to avoid sudden and severe health issues. The Mount Sinai ACHD Center will leverage the resources available at Mount Sinai Heart and the Children's Heart Center, Mount Sinai Kravis Children's Hospital, to provide treatment to all ACHD patients in relation to the structural complexity of their underlying congenital heart disease, while taking into account the patient's functional status and the presence of cardiovascular and non-cardiovascular comorbidities.

Mount Sinai's Fontan Program includes a comprehensive multidisciplinary program in which ACHD specialists, hepatologists, nutritionists, cardiac imagers, and mental health and social workers will work together

in a single setting. The Mount Sinai ACHD Center will also provide dedicated reproductive health, fertility management, and high-risk pregnancy care for women with congenital heart disease; transition of care for adolescent patients with congenital heart disease; and neurocognitive care to address long-term cognitive difficulties of the adult patient with congenital heart disease. The center will work closely with The Mount Sinai Pulmonary Hypertension and The Mount Sinai Advanced Heart Failure Transplant teams in providing state-of-the-art care to ACHD patients with pulmonary hypertension, or those in need of cardiac transplantation.

SERVICES AND TESTING WE OFFER INCLUDE:

- Adult congenital cardiac surgery
- Multimodality congenital cardiac imaging
- Cardiopulmonary exercise testing
- Diagnostic and interventional cardiac catheterization
- Electrophysiology, pacing and complex arrhythmia management
- Advanced heart failure, mechanical circulatory support and cardiac transplantation
- Comprehensive evaluation and management for pulmonary hypertension
- Cardiovascular genetics

- Single ventricle fontan clinic
- Gastroenterology, hepatology, and liver transplantation
- Reproductive health fertility management and high-risk pregnancy
- Neurocognitive assessment and care
- Transition of care for adolescents with congenital heart disease
- Pulmonary and sleep medicine

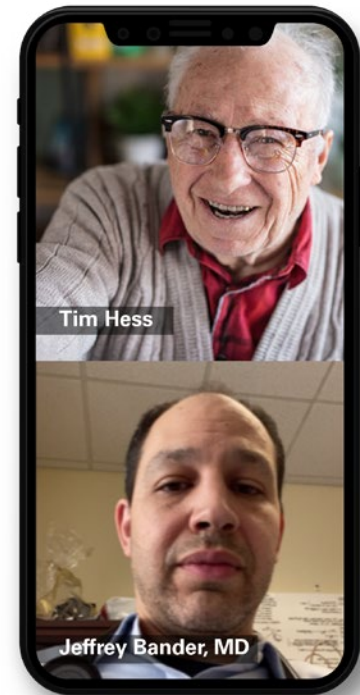
To refer a patient, please call 212-241-1382
For more information, visit
www.mountsinai.org/ACHD

Telehealth: A New Way to Deliver Patient Care

JEFFREY BANDER, MD

With the outbreak of COVID-19, Telehealth services have become essential in allowing patients to maintain their cardiovascular care without increased risk of exposure. An interactive audio and video telecommunication system, several aspects of a traditional visit are maintained including the taking of histories, non-auscultatory physical exams guided by the physician, review of medications and diagnostic studies, and of course generation of an appropriate assessment and plan based on the patient's clinical presentation. Vitals can be monitored for patients who have at home devices such as blood pressure cuffs, pulse oximeters, or digital scales. New features such as ECG tracking on new generation Apple devices or heart rate monitoring on Fitbit devices are able to assist physicians in performing more comprehensive evaluations. Patients with labs, ECGs, or studies done at other facilities including discharge summaries are able share their information as well. Based on presenting symptoms or concerns, remote monitors such as ambulatory blood

pressure cuffs and cardiac event monitors may be mailed to patients. Patients with devices such as pacemakers/ILRs/ICDs may have their devices remotely interrogated as well. Through these visits, the urgency of performing diagnostic or interventional studies can be assessed and physicians can guide flow of patients appropriately. Overall, telehealth visits are a valuable tool in assuring cardiovascular patients continue to be optimized without compromising the care they receive.



Interventional Fellowship Corner: Navigating the Intense Learning and Needed Relaxation

RAMAN SHARMA, MD, AND RADHA MEHTA, MD

I remember very distinctly my first days of Interventional Cardiology Fellowship at Mount Sinai Heart, one of the most esteemed institutions with world-renowned pioneers in all fields of interventional cardiology, when my previous excitement was quickly replaced by nervousness. The complexity, pace, and intensity of every case, from those in the early morning until those late at night, initially seemed impossible to keep up with. Fortunately, we had the greatest mentors and teachers who guided us through every step of every case, helped us build technical and procedural skills, and

enabled us to become primary operators on even the most complex cases.

The most unique part of this training here at Mount Sinai Heart was the acknowledgement of the effects of continuous high-intensity training on our mental and physical well-being. Annapoorna Kini, MD, known for her interest in practicing and promoting yoga for cardiovascular health, began her initiative, “Yoga for Interventionalists,” where the whole cardiology department spent several mornings throughout the year practicing yoga and improving our mental

well-being. Samin Sharma, MD, arranged for a gym in the fellows’ room where we would work out in between cases—perfect for letting off a little steam. Throughout the weekends of the warmer months, Dr. Kini arranges 5K races through Central Park. With the constant support of our well-being, this interventional cardiology fellowship is one-of-a-kind in training us to not only become very technically advanced interventionalists, but also simply healthier in mind and body.



Research and Clinical Trials

Study Title	Study Details	Sponsor	Principal Investigator(s) at MSH	Target Enrollment and Study Sites	Current Status/ Enrollment at MSH
AEGIS-II	This is a phase 3, multicenter, double-blind, randomized, placebo-controlled, parallel-group study to evaluate the efficacy and safety of intravenous infusion of CSL112 (APO A-1) in subjects with acute coronary syndrome.	CSL Behring LLC	N. Barman	17,400 (Global) 180 centers	Ongoing/ 9 subjects enrolled
Global cVAD Registry	The global cVAD registry is an ongoing, observational, multicenter registry that includes patients receiving the Impella devices in the daily, routine clinical care per institutional standards and treating physician's discretion.	ABIOMED	S. Sharma	1,200 (USA) 180 centers	Ongoing/ 212 subjects enrolled
XIENCE 90 SHORT-DAPT Study	Comparing three-month DAPT duration after Xience DES in patients with high-risk bleeding.	Abbott Laboratories	J. Sweeny	400 (USA) 40 centers	Ongoing/ 19 subjects enrolled
ORBID-FFR Trial	Optical Coherence Tomography Predictors of functionally significant side branch compromise after provisional main vessel stenting in coronary artery disease assessed by fractional flow reserve.	Boston Scientific Corp.	A. Kini	150 (USA) 1 center	Completed/ 71 subjects enrolled
SPYRAL HTN ON/OFF Study	EGlobal clinical study of renal denervation with the Symplicity Spryal™ multi-electrode renal denervation system in patients with uncontrolled hypertension in the absence of antihypertensive medications.	Medtronic Inc.	G. Dangas	433 (USA) 15 centers	Ongoing/ 31 subjects enrolled

Study Title	Study Details	Sponsor	Principal Investigator(s) at MSH	Target Enrollment and Study Sites	Current Status/ Enrollment at MSH
Chocolate Touch Study	A randomized trial to confirm the safety and effectiveness of Chocolate Touch paclitaxel coated PTA balloon catheter in above-the-knee lesions.	TriReme Medical	P. Krishnan	406 (USA) 48 centers	Ongoing/ 10 subjects enrolled
Triluminate Trial	To evaluate safety and effectiveness of the Tricuspid Valve Repair System (TVRS) for treating symptomatic moderate or greater tricuspid regurgitation (TR) in patients currently on medical management and who are deemed appropriate for percutaneous transcatheter intervention.	Abbott Laboratories	G. Tang	85 (Global) 20 centers in USA	Ongoing/ 7 subjects enrolled
ENVISAGE TAVI-AF Trial	Edoxaban versus standard of care and their effects on clinical outcomes in patients having undergone Transcatheter Aortic Valve Implantation—in Atrial Fibrillation.	Daiichi Sankyo INC.	G. Dangas	200 (USA) 40 centers	Ongoing/ 18 subject enrolled
Evolut-R Low Risk Bicuspid Aortic Stenosis	Evolut-R TAVR system in patients with severe bicuspid aortic valve stenosis and a low predicted risk of mortality with SAVR.	Medtronic Inc.	S. Sharma	200 (USA) 75 centers	Complete/5 subjects enrolled
ACURATE IDE Trial	Transcatheter replacement of stenotic aortic valve through implantation of a ACURATE in subjects InDicatEd for TAVR patients with at least intermediate surgical risk.	Boston Scientific Corp.	A. Kini G. Tang	640 (USA) 80 centers	Started enrolling

Top Ten Major Publications of 2019



1. Ticagrelor with aspirin or alone in high-risk patients after coronary intervention: Rationale and design of the TWILIGHT study

Roxana Mehran, Usman Baber, Samin K. Sharma, David J. Cohen, Dominick J. Angiolillo, Carlo Briguori, Jin Y. Cha, Timothy Collier, George Dangas, Dariusz Dudek, Vladimír Džavík, Javier Escaned, *et al.* *N Engl J Med* 2019; 381:2032-2042. DOI: 10.1056/NEJMoa1908419

Among high-risk patients who underwent PCI and completed three months of dual antiplatelet therapy, ticagrelor monotherapy was associated with a lower incidence of clinically relevant bleeding than ticagrelor plus aspirin, with no higher risk of death, myocardial infarction, or stroke. (Funded by AstraZeneca; TWILIGHT ClinicalTrials.gov number NCT02270242).



2. Five-Year Outcomes after PCI or CABG for Left Main Coronary Disease

Gregg W. Stone, A. Pieter Kappetein, Joseph F. Sabik, Stuart J. Pocock, Marie-Claude Morice, John Puskas, David E. Kandzari, Dimitri Karpaliotis, W. Morris Brown, III, Nicholas J. Lembo, Adrian Banning, Béla Merkely, *et al.*, for the EXCEL Trial Investigators. *N Engl J Med* 2019; 381:1820-1830. DOI: 10.1056/NEJMoa1909406

In patients with left main coronary artery disease of low or intermediate anatomical complexity, there was no significant difference between PCI and CABG with respect to the rate of the composite outcome of death, stroke, or myocardial infarction at five years. (Funded by Abbott Vascular; EXCEL ClinicalTrials.gov number, NCT01205776.)



3. A Controlled Trial of Rivaroxaban after Transcatheter Aortic-Valve Replacement

George D. Dangas, Jan G.P. Tijssen, Jochen Wöhrle, Lars Søndergaard, Martine Gilard, Helge Möllmann, Raj R. Makkar, Howard C. Herrmann, Gennaro Giustino, Stephan Baldus, Ole De Backer, Ana H.C. Guimarães, *et al.*, for the GALILEO Investigators. *N Engl J Med* 2020; 382:120-129. DOI: 10.1056/NEJMoa1911425

In patients without an established indication for oral anticoagulation after successful TAVR, a treatment strategy including rivaroxaban at a dose of 10 mg daily was associated with a higher risk of death or thromboembolic complications and a higher risk of bleeding than an antiplatelet-based strategy. (Funded by Bayer and Janssen Pharmaceuticals; GALILEO ClinicalTrials.gov number, NCT02556203.)



4. Reduced Leaflet Motion after Transcatheter Aortic-Valve Replacement

Ole De Backer, George D. Dangas, Hasan Jilaihawi, Jonathon A. Leipsic, Christian J. Terkelsen, Raj Makkar, Annapoorna S. Kini, Karsten T. Veien, Mohamed Abdel-Wahab, Won-Keun Kim, Prakash Balan, Nicolas Van Mieghem, *et al.*, for the GALILEO-4D Investigators. *N Engl J Med* 2020; 382:130-139. DOI: 10.1056/NEJMoa1911426

In a substudy of a trial involving patients without an indication for long-term anticoagulation who had undergone successful TAVR, a rivaroxaban-based antithrombotic strategy was more effective than an antiplatelet-based strategy in preventing subclinical leaflet-motion abnormalities. (Funded by Bayer; GALILEO-4D ClinicalTrials.gov number, NCT02833948.)



5. North American Expert Review of Rotational Atherectomy

Samin K. Sharma, Matthew I. Tomey, Paul S. Teirstein, Annapoorna S. Kini, Arthur B. Reitman, Arthur C. Lee, Philippe Généreux, Jeffrey W. Chambers, Cindy L. Grines, Stevan I. Himmelstein, Craig A. Thompson, Ian T. Meredith, Aparna Bhawe, Jeffrey W. Moses. *Circulation: Cardiovascular Interventions*. 2019;12:e007448.

Rotational atherectomy (RA) is an established tool in interventional cardiology for treatment of calcified coronary lesions. Heterogeneity exists, however, in RA utilization and technique. We assembled a group of experienced RA operators and device experts to summarize and critique key elements of contemporary RA technique, identify areas of consensus and controversy, and offer recommendations for optimal performance for the practicing interventional cardiologist.

6. Long-Term Clinical Effectiveness of a Drug-Coated Balloon for the Treatment of Femoropopliteal Lesions: Five-Year Outcomes From the IN.PACT SFA Randomized Trial

John A. Laird, Peter A. Schneider, Michael R. Jaff, Marianne Brodmann, Thomas Zeller, D. Chris Metzger, Prakash Krishnan, Dierk Scheinert, Antonio Micari, Hong Wang, Michele Masters, Gunnar Tepe. *Circulation: Cardiovascular Interventions*. 2019;12:e007702.

While randomized trials have demonstrated the superiority of drug-coated balloon (DCB) angioplasty versus standard percutaneous transluminal angioplasty (PTA) in patients with femoropopliteal peripheral artery disease, the long-term durability of DCB angioplasty remains uncertain. Current trial demonstrated the persistent long-term benefit of DCB in PTA up to five years.

7. Influence of Final Kissing Balloon Inflation on Long-term Outcomes After PCI of Distal Left Main Bifurcation Lesions: Analysis From the EXCEL Trial

Annapoorna S. Kini, George D Dangas, Usman Baber, Yuliya Vengrenyuk, David E Kandzari, Martin B Leon, Marie-Claude Morice, Patrick W. Serruys, Arie Pieter Kappetein, Joseph F Sabik III, Ovidiu Dressler, Roxana Mehran, Samin K. Sharma, Gregg Stone. *EuroIntervention*. 2019 Nov 26. pii: EIJ-D-19-00851. doi: 10.4244/EIJ-D-19-00851.

The impact of final kissing balloon inflation FKBI after percutaneous coronary intervention (PCI) of left main bifurcation lesions on long-term clinical outcomes remains controversial. In the Excel Trial FKBI on four-year outcomes after PCI of distal left main (LM) bifurcation lesions was not associated with improved outcomes regardless of whether one stent or two stents were used.

8. Aortic Stenosis With Severe Asymmetric Septal Hypertrophy — A Novel Management Strategy to Improve TAVR Outcomes

Asaad A. Khan, Gilbert H.L. Tang, Krysthel Engstrom, Muhammad Khan, Nish Patel, George D. Dangas, Samin K. Sharma and Annapoorna Kini. *J Am Coll Cardiol Interv*. 2019 21 2228-2230.

The study showed that the alcohol septal ablation (ASA) for severe asymmetric septal hypertrophy in 10 patients with severe aortic stenosis is feasible and is associated with successful TAVR procedure. We demonstrated the feasibility of preemptive ASA to manage ASH in patients undergoing TAVR. However, longer-term outcomes will need to be assessed.

9. Impact of Calcification on Percutaneous Coronary Intervention: MACE-Trial 1-Year Results

Samin K. Sharma, Ryan W. Bolduan, Manesh R. Patel, Brad J. Martinsen, Talhat Azemi, Gregory Giugliano, Jon R. Resar, Roxana Mehran, David J. Cohen, Jeffrey J. Popma, Ron Waksman. *Catheter Cardiovasc Interv*. 2019;94:187–194.

The Multi-center Prospective Study to Evaluate Outcomes of Moderate to Severely Calcified Coronary Lesions (MACE-Trial) was designed to provide further insight on the impact of calcification on procedural and long-term percutaneous coronary intervention outcomes. In this prospective study, patients with severe calcification had significantly worse outcomes compared to those without; however, unlike previous retrospective studies, moderate calcium resulted in similar outcomes as none/mild calcium.

10. A Transcriptomic Model to Predict Increase in Fibrous Cap Thickness in Response to High-Dose Statin Treatment: Validation by Serial Intracoronary Oct Imaging

Kipp W. Johnson, Benjamin S. Glicksberg, Khader Shameer, Yuliya Vengrenyuk, Chayakrit Krittanawong, Adam J. Russaka, Samin K. Sharma, Jagat N. Narula, Joel T. Dudley, Annapoorna S. Kini. *EBioMedicine* 44 (2019) 41-49 <https://doi.org/10.1016/j.ebiom.2019.05.007>

Fibrous cap thickness (FCT), best measured by intravascular optical coherence tomography (OCT), is the most important determinant of plaque rupture in the coronary arteries. Statin treatment increases FCT and thus reduces the likelihood of acute coronary events. However, substantial statin-related FCT increase occurs in only a subset of patients. Currently, there are no methods to predict which patients will benefit. We use transcriptomic data from a clinical trial of rosuvastatin to predict if a patient's FCT will increase in response to statin therapy. In this pilot study, transcriptomic models could predict if FCT increased following 8-10 weeks of rosuvastatin. These findings may have significance for therapy selection and could supplement invasive imaging modalities.





Clinical Interests:

Coronary Artery Disease
Interventional Cardiology
Atherectomy
Valvular Intervention

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Samin K. Sharma, MD, is a renowned interventional cardiology expert in New York, well known for performing high-risk complex coronary interventions (more than 1,500 interventions per year) with an extremely high success rate (greater than 99 percent) while achieving an extremely low complication rate (less than 0.2 percent major complication). He has received the prestigious two-star designation

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(significantly lower than expected mortality) numerous times by the New York State Department of Health and the Governor's Award of Excellence in Medicine in 1996.

He served on New York State's Cardiac Advisory Board from 2004–2016. Under Dr. Sharma's leadership, The Mount Sinai Hospital Cardiac Catheterization Laboratory has become one of the safest and busiest centers in New York, providing state-of-the-art cardiac and interventional care for all types of simple and complex heart patients. In addition to coronary interventions, Dr. Sharma specializes in the non-surgical treatment of mitral and aortic valve disease, including transcatheter aortic valve replacement (TAVR) and MitraClip procedures (TMVR).

He has been dubbed "master of Rotablator" and is regularly featured on national and local TV (CBS, TV Asia) and in newspapers and magazines including *Newsday*, *Newsweek*, the *New York Times*, the *New York Post*, *Forbes*, the *Wall Street Journal*, the *New York Daily News*, the *Washington Post*, *New York Magazine*, *India Abroad*, and *India Today*. He has received numerous awards: 2018 Chairman Board of Trustees, Association of Indians in America (AIA), 2015 *Honorary Master of Science PhD degree by Rajasthan University Jaipur India*, 2014 *Distinguished Physician Scientist by AAPI-QLI for excellence in Medicine*,

2011 *Ellis Island Medal of Honor*, 2011 *American Heart Association Achievement in Cardiovascular Science & Medicine Award*, 2011 *American Association of Physicians of Indian Origin (AAPI) Physician of the Year*, 2010 *Association of Indians in America (AIA) for Excellence in Medicine, 2003-2007 and 2010-2019 Best Doctors by New York Magazine*, 2008-2019 *Super Doctors*, 2007 *Jacobi Medallion Award by The Mount Sinai Hospital*, and 2007 *Physician of the Year by The Mount Sinai Hospital*.

He has authored more than 250 papers and 15 book chapters in the field of coronary interventions, structural heart disease and safety of percutaneous interventions. He is also a philanthropist, and The Mount Sinai Hospital Cardiac Catheterization Laboratory is now named the Dr. Samin K. Sharma Family Foundation Cardiac Catheterization Laboratory. Dr. Sharma has built a 250-bed heart hospital (EHCC) in his native Jaipur, India, to provide the best care to all patients irrespective of their financial and social status.

He also enjoys teaching other cardiologists through the annual live symposium called the Complex Coronary Cases (CCC) Symposium, which is in its 22nd year. His live monthly webcast series, Complex Coronary Cases (www.ccclivecases.org), which broadcasts live procedures to 138 countries, is in its 11th year.



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Interventional Cardiology: CTO

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Annapoorna S. Kini, MD, is internationally acclaimed for her special expertise in performing complex coronary interventions, especially in chronic total occlusion for patients with advanced coronary artery disease, high-risk interventional cases, and alcohol septal ablation for the treatment of obstructive hypertrophic cardiomyopathy. Dr. Kini has been the principal or co-investigator in numerous randomized clinical trials. She has extensive

experience with mitral and aortic balloon valvuloplasty and has been among the first few interventional cardiologists in the country to use the transcatheter aortic valve implantation procedure in the treatment of inoperable patients with critical aortic stenosis. She has also made history by performing the first live case performed entirely by women during the CRT meeting on March 5, 2018.

Dr. Kini performs more than 1,000 coronary interventions annually, the highest number by a female interventionist in the United States, with an extremely low complication rate of less than 0.3 percent; an official report from The Department of Health recognized Dr. Kini as the safest operator among 350 other physicians in the state of New York numerous times (2004-2016). She is the recipient of 2011 *Dean's Award for Excellence in Clinical Medicine* at The Mount Sinai Hospital. She also received the Physician of the year award in 2014 from The Mount Sinai Hospital nurses. She received the *Excellence in Medicine Award* from the National Association of Physicians of India (AAPI) in July 2016. In May 2017, she received the prestigious *Ellis Island Medal of Honor*, the highest award given to any immigrant civilian, and in 2018 she received the *American Heart Association's Heart of Gold Award*.

Dr. Kini is a keen researcher, particularly recognized for her studies pertaining to intra-coronary imaging studies including IVUS, NIRS and OCT, and trials such as

YELLOW, CANARY and ORBID have made major headlines. She has published more than 100 peer-reviewed scientific publications, and book chapters in major cardiology textbooks. Dr. Kini is the recipient of the "Rock Star of Science" award from the American Heart Association. She is a member of the Royal College of Physicians of London and Fellow of the American College of Cardiology. The most recent YELLOW II study was an ambitious translational combination of multi-modality imaging with clinically relevant cellular biology and comprehensive transcriptomics.

Dr. Kini is an excellent teacher, and is dedicated to the teaching of both cardiology and interventional fellows. In fact, the 2012 batch of Mount Sinai interventional fellows created a teaching award in her name, "The Annapoorna S. Kini Fellows' Choice Award" for excellence in teaching. Her achievements are not limited to serving as the Director of the Annual Live Symposium of Complex Coronary Cases at The Mount Sinai Hospital, one of the most attended and respected meetings in the field of interventional cardiology in the country. She is also the director of monthly webcast program, CCC Live Cases (www.cclivecases.org) that has a worldwide audience of 10,000+ physicians spanning more than 130 countries.



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Clinical Interests:

Interventional
Cardiology
Endovascular
Intervention
Carotid Stenting

Prakash Krishnan, MD, is a world-renowned expert in peripheral vascular disease and is internationally recognized as a leader in the catheter-based treatment of peripheral arterial disease. Dr. Krishnan's expertise includes non-surgical treatment of coronary and peripheral vascular diseases, including coronary stents, peripheral vascular angioplasty and

stents, atherectomy, carotid stents, renal stents, renal denervation, and complex venous disease intervention. Dr. Krishnan is a patient advocate and an educator. He has built a robust community-based outreach program that serves a vast population of patients with complex coronary and peripheral arterial disease. He also serves as the Director of the Endovascular Intervention Fellowship in the Cardiac Catheterization Laboratory and has been educating interventionalists globally via live satellite transmissions at national and international meetings and with the monthly webcasts showcased on www.ccclivecases.org. He served as the co-national primary investigator in the ILLUMENATE Trial and is a leading authority in the performance of non-surgical interventions for peripheral arterial disease. He has received numerous awards and honors, most recently the Reverend Dr. Martin Luther King Legacy Award for Physician Services from Clergy with a Purpose. He has also served as editor of numerous textbooks on endovascular interventions and has authored numerous peer-reviewed articles and book chapters. He is co-director of the annual LINC Mount Sinai conference and The Mount Sinai Endovascular Fellows Course and has been a key faculty member for multiple national and international conferences.

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Cardiology
Valvular Heart Disease
Endovascular
Intervention

George D. Dangas, MD, performs a wide spectrum of complex cardiovascular interventional procedures to treat coronary and valvular heart disease, aortic, carotid and peripheral arterial disease, and resistant hypertension. Dr. Dangas is a

leading authority in the performance of non-surgical cardiac and vascular interventions and in the development of innovative approaches to treat complex problems across many specialties. He is currently a trustee of the American College of Cardiology and editor-in-chief of *CardioSource WorldNews Interventions*, and has been chair of the Interventional Scientific Council and a trustee of the Society for Cardiovascular Angiography & Interventions. He is co-director of the annual conferences "Transcatheter Cardiovascular Therapeutics" and "Interventional Fellows' Courses" in the United States and Europe, and a key faculty and program committee member for multiple international conferences, including the ACCi2 Summit, ACCIS, AHA, and SCAI for many years. Dr. Dangas is the Director of Academic Affairs at the Cardiovascular Research Foundation.

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Fellows Education

Coronary Intervention

Joseph M. Sweeny, MD, performs both diagnostic cardiac catheterization and coronary interventions. He is the principal investigator of multiple national clinical trials and is actively involved in the Interventional

Cardiology Fellowship Training Program as the associate program director. In 2014, he became the medical director of the Lauder Ambulatory Cardiology Center, which provides comprehensive ambulatory care with all modalities of non-invasive cardiac testing in one central location.

With a special interest in treating post-heart transplant patients, Dr. Sweeny works closely with the Heart Transplant Team for coronary artery vasculopathy surveillance and endomyocardial biopsies in the Cardiac Catheterization Laboratory.

His research has focused mainly on antiplatelet therapy in the treatment of acute coronary syndromes. Dr. Sweeny serves as an assistant editor/reviewer for *The Journal of the American College of Cardiology* and was the Site Principal Investigator for the NIH-sponsored Ischemia Trial. As the associate program director for the Interventional Cardiology Fellowship program, he is actively involved in the selection, education and mentoring of our interventional fellows.

Dr. Sweeny also serves as the Radiation Safety Officer for the Cardiac Catheterization Laboratory. In this role, he has developed protocols and processes for tracking and monitoring patient radiation dose during interventional procedures.

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Roxana Mehran, MD, FACC, FACP, FESC, MSCAI

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Clinical Interests:

Restenosis Prevention

Contrast-Induced Acute
Kidney Injury (AKI)

Cardiovascular Disease
in Women

Roxana Mehran, MD, is an internationally renowned clinical research expert in the field of interventional cardiology. As Director of the Center for Interventional Cardiovascular Research and Clinical Trials at Mount Sinai, she has built a globally-respected academic

research center focused on developing randomized clinical trials, outcomes research projects, and high impact academic publications. A prolific researcher, she has served as principal investigator for numerous global studies, developed risk scores for bleeding and acute kidney injury, participates regularly in developing clinical guidelines, and has authored more than 900 peer-reviewed articles. She is a founder and Chief Scientific Officer of the Cardiovascular Research Foundation (CRF) and recently founded Women as One, an independent nonprofit organization dedicated to advancing opportunities for women in medicine. Very active within professional organizations, Dr. Mehran has been the Chair of the Interventional Council for the American College of Cardiology (ACC); Program Chair of the 2016 Annual Scientific Sessions of the Society for Cardiovascular Angiography and Interventions (SCAI), where she is also a co-founder of the Women in Innovations (WIN) Committee; and is a member of the American Heart Association's (AHA) Go Red for Women Scientific Advisory Group. Prior to Mount Sinai, Dr. Mehran held appointments at Columbia University Medical Center and Washington Hospital Center. She completed fellowships in cardiovascular disease and interventional cardiology at Mount Sinai Medical Center. Dr. Mehran is a recipient of the 2019 *Ellis Island Medal of Honor*.

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Coronary Interventions
Peripheral Interventions
Non-Invasive Vascular Medicine

Vishal Kapur, MD, is an interventional and endovascular cardiologist. He is board-certified in the fields of cardiology, interventional cardiology, vascular

medicine, and endovascular medicine and has trained with world renowned experts in the field. He is an expert in catheter-based vascular therapy, specializing in endovascular management of acute and chronic arterial and venous disease. He is proficient in procedures such as coronary angioplasty, stenting, rotational atherectomy, angioplasty-stenting of carotid, renal, subclavian, mesenteric, Iliac, and lower extremities, IVC filter placement, thrombolysis, rheolysis thrombectomy in the management of acute limb ischemia, and deep vein thrombosis. He is also trained in performing venous ablation and sclerotherapy in the management of reticular and varicose veins.

Dr. Vishal Kapur is an excellent teacher and educator with keen interest in complex coronary interventions and peripheral endovascular interventions. He has published numerous research articles in peer-reviewed renowned medical journals and written text book chapters. His research work has been presented at various national and international meetings and he has been a co-investigator in various multi-center trials. Dr. Kapur remains committed to the field of cardiology and has an unrelenting dedication toward being an outstanding clinician, researcher, and teacher.

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Pedro R. Moreno, MD, FACC

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Interventional Cardiology
Plaque Imaging

Pedro R. Moreno, MD, performs more than 1,000 cardiac coronary invasive procedures annually (including diagnostic catheterizations, angioplasties and coronary stents) with >99 percent success rate and <1 percent major complications.

As a world-renowned expert in atherosclerosis, Dr. Moreno has been a pioneer in the understanding of inflammation and acute coronary syndromes. Dr. Moreno also contributed to vascular biologic aspects of restenosis, a renarrowing process that occurs in coronary or peripheral arteries after stenting.

Dr. Moreno has additional extensive experimental research in novel diagnostic and therapeutic modalities for vulnerable plaques, the most common cause of a heart attack.

Dr. Moreno is an official reviewer for the American Heart Association and several scientific journals including *Annals of Internal Medicine*, *Circulation*, *The Journal of the American College of Cardiology*, *American Journal of Cardiology*, *American Heart Journal*, and *European Heart Journal*. He is honorary member of several international cardiology organizations including the Chilean Society of Cardiology, the Venezuelan Society of Cardiology, the Colombian Society of Cardiology and the Dominican Republic Society of Cardiology. Finally, he is an excellent teacher and a mentor of clinical and research fellows at The Mount Sinai Hospital.

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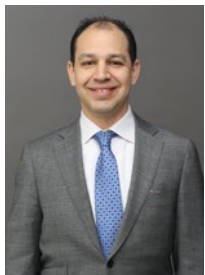


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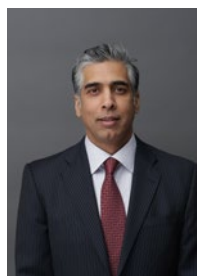
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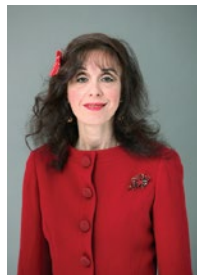
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Lynne Glasser, MD

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Since joining The Mount Sinai Hospital in November 2008, Dr. Glasser has been playing an important role in the treatment and management of interventional patients, before and after the procedure.

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Sahil Khera, MD, MPH, FACP, FACC, FSCAI

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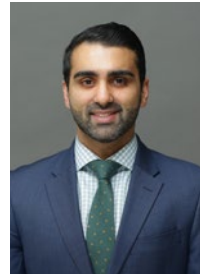
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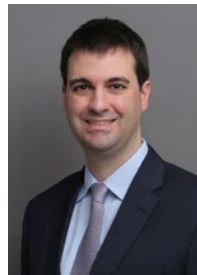


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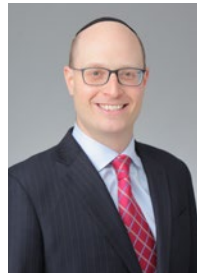
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Mechanical Circulatory Support,
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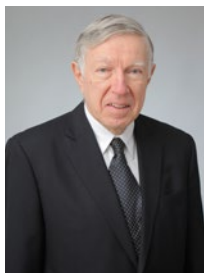


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**Beth Oliver,
DNP, RN**

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Beth leads cardiovascular service line strategy and operations and is responsible for ensuring the delivery of quality patient care to Mount Sinai Heart patients. Beth is a member of Sigma Theta Tau, the American Organization of Nurse Executives, the American College of Cardiology and the American Heart Association. In July 2018, Beth was appointed President of the American Heart Association’s Board of Directors in New York City. Beth is committed to the current and future role of nurses in achieving their goal.



**Haydee Garcia,
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Nursing Director, Mount
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Haydee Garcia started as a nurse practitioner (NP) in the Mount Sinai Hospital Cardiac Catheterization Laboratory in 2006, serving as the lead NP from 2010–2014 before transitioning into her leadership role in 2014 as nursing director for Mount Sinai Heart. She directs, oversees, and coordinates all administrative and clinical operations for the Cardiac Catheterization Laboratory, Post Intervention Units, Non-invasive Cardiology, Cardiovascular Ambulatory, and Cardiac Nurse Practitioners.



Lyora Fox, RN

Senior Clinical Coordinator,
Cardiac Catheterization
Laboratory

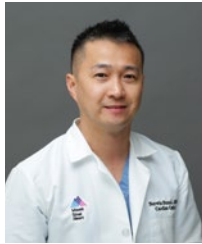
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NURSE PRACTITIONER TEAM

The Mount Sinai Hospital's dedicated staff of nurse practitioners work closely with the physicians in planning and implementing care from the time of intake to discharge, ensuring a quality experience at all points in the patient's visit.



Norwin Bunal



Misael Dimatulac



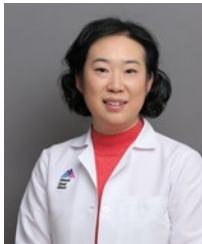
Jessica Erskine



Aira Fides Gonzales



Michelle Hang



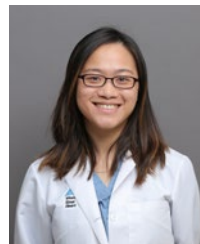
Hyo Jin Kang



Rheoneil Lascano



Genevieve Mchugh



Shuk Fan Lau-Mckee



Dana Leichter



Jessica Lim



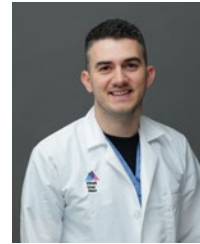
Nelya Lozynska



Derek Pineda



Supawadee
Pitakmongkolkul



Daniel Prifti



Lubov Nebeluk



Aanal Shah



Indra Sinanan



Richard Ternemille



Kevin Williams

INTERVENTIONAL CARDIOLOGY FELLOWS

Mount Sinai Heart's Interventional Cardiology Fellowship Program is the largest in the country, educating the next generation of clinical cardiology and interventional cardiology specialists. This well-regarded program, which combines academic and hands-on experience, has graduated physicians who are serving as noted leaders in community and academic medical centers.



Lorenzo Azzalini, MD



Hemal Bhatt, MD



Bimmer Claessen, MD



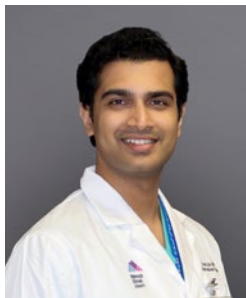
Serdar Farhan, MD



Sunny Goel, MD



Amit Hooda, MD



Tarun Jain, MD



Gurpreet Johal, MD



Haroon Kamran, MD



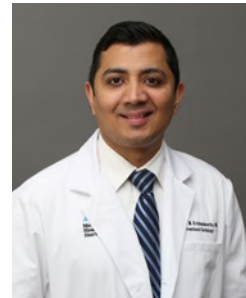
Rohit Malhotra, MD



Reza Masoomi, MD



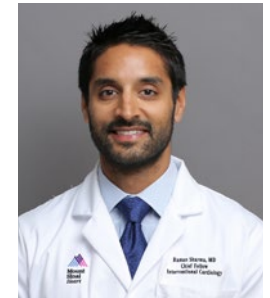
Radha Mehta, MD



Parasuram Melarcode
Krishnamoorthy, MD



Nagendra
Senguttuvan, MD



Raman Sharma, MD



Interventional Research Team

From left: Keisuke Yasumura, Yuliya Vengrenyuk, Andriy Vengrenyuk, Nicole Saint Vrestil, Simon Chen, Sowmya Muthiki, Miguel Vasquez, and Samatha Muthyala



Supporting Staff

From left: Irlene Gutierrez, Maria Diaz, Keisha Reid, Shante Hines, Carol Henry, Maria Directo, Debra Bradley, Juanita Gamboa, and Radha Gokul



Interventional Database Team

From left: Roja Thapi, Vaishvi Jhaveri, Pooja Vijay, and Prathyusha Bande



www.ccclivecases.org



HOME

COMPLEX CORONARY

PERIPHERAL

STRUCTURAL HEART

LIVE WEBCAST



SEARCH



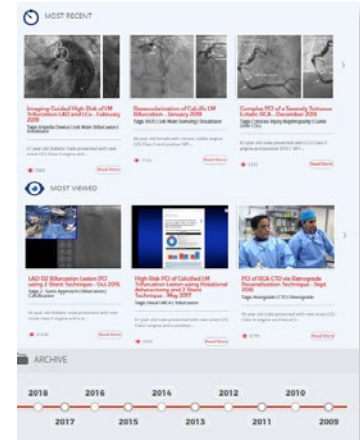
CATEGORIES

SIGN-UP FOR OUR NEWSLETTER

Coronary Moderation by:
Dr. Sameer Mehta



DR. SAMIN SHARMA AND DR. ANNAPOORNA KINI
COMPLEX CORONARY CASES AND STRUCTURAL HEART LIVE DIRECTORS



COMPLEX CORONARY CASES

Every 3rd Tuesday of the month at 8 am

LIVE PERIPHERAL INTERVENTIONS

Every 4th Wednesday of the month at 8 am

STRUCTURAL HEART LIVE CASES

Every 2nd Tuesday of every other month at 9 am



DR. PRAKASH KRISHNAN
LIVE PERIPHERAL INTERVENTIONS DIRECTOR

OVER
1 Million
VIEWS



WWW.CCCLIVECASES.ORG
an educational resource to view live
complex coronary, peripheral and
structural heart cases.

GLOBAL COMPLEX CORONARY CASES 2019

SAVE THE DATE
June 16-18, 2021

Special Focus on Calcified, Bifurcation & Total Occlusion Lesions

COMPLEX CORONARY SYMPOSIUM DIRECTORS
Samin K. Sharma, MD, FACC, FSCAI
Annapoorna S. Kini, MD, MRCP, FACC
Roxana Mehran, MD, FACC, FSCAI

CO-DIRECTORS
Usman Baber, MD, MS
Nirin Barman, MD, FACC
George Dangas, MD, PhD, FACC, FSCAI
Jason Kovacic, MD, PhD, FACC, FSCAI
Pedro B. Marano, MD, FACC
Joseph M. Sweeney, MD, FACC

www.ccsymposium.org

Save the Date:
June 16-18, 2021

TOP TEN TOPICS IN CLINICAL CARDIOLOGY

Patient Focused Evidence-Based Approach

FRIDAY, OCTOBER 4, 2019

SITE INFORMATION
Icahn School of Medicine at Mount Sinai
1160 York Ave, New York, NY 10021

COURSE DIRECTORS
Samin K. Sharma, MD, FACC, FSCAI
Jagjit Narula, MD, PhD, MRCP
Annapoorna S. Kini, MD, MRCP, FACC

Mount Sinai Heart

Save the Date:
Friday, October 9, 2020

NY ENDOVASCULAR SUMMIT

Advanced Therapies for Complex Vascular Disease

SAVE THE DATE!
October 21-22, 2020
Epic Venues
360 Madison Ave., New York, NY 10017

NEW YORK ENDOVASCULAR SUMMIT DIRECTOR
Prakash Krishnan, MD, FACC

ENDOVASCULAR COURSE DIRECTORS
Michael Antonucci, MD, MPH, FACC, FRCR
Peter J. Finkel, MD, FACC

VENOUS COURSE DIRECTORS
Robert J. Chikara, MD, PhD, FRCR, FRCR
Anand K. Saha, MD
Shiv P. Patel, MD

LIVE COMPLEX ARTERIAL AND VENOUS CASES PRE-RECORDED
Mount Sinai Hospital, NY

Expert Exchange Forum
Pre-recorded Panel Seminar
CME/MOC Credits
Industry Sponsored Exhibitors

nyevs.org

Save the Date:
October 21-22, 2020

New York Transcatheter Valves 2019

Patient Focused Evidence-Based Approach

Thursday, December 5, 2019 | New York, NY

Course Directors:
Samin K. Sharma, MD, FACC, FSCAI
Annapoorna S. Kini, MD, MRCP, FACC
Gilbert T. Tang, MD, PhD, MBA, FACC

Course Co-Directors:
Andrew C. Angerson, MD
George D. Dangas, MD, PhD, FACC
Sudeep Khanna, MD, MPH
Stavros A. Lankin, MD, PhD, FACC, FAHA
Roxana Mehran, MD, FACC, FACC, FRCR

www.nytranscathetervalves.org

Save the Date:
Thursday, December 10, 2020

Mount Sinai Heart holds several important educational events throughout the year, including The NY Endovascular Summit, The Complex Coronary Cases Symposium, The Top Ten Topics in Clinical Cardiology and the NY Transcatheter Valves Symposium. To learn more about upcoming events, visit mssm.cloud-cme.com or email kimberley.kostiw@mountsinai.org.

Cardiac Catheterization Laboratory Achievements

1 New York Magazine



Samin Sharma, MD (Total 11 times in 17 years),
Pedro Moreno, MD (4th year in a row),
Annapoorna Kini, MD, and George Dangas, MD



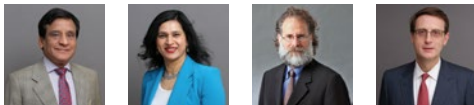
5 Annapoorna Kini, MD, received the Jacobi Medallion



2 New York Times Magazine SuperDoctors



Samin Sharma, MD (12th year in a row),
Annapoorna Kini, MD (10th year in a row),
William Schwartz, MD (5th year in a row), and
George Dangas, MD (3rd year in a row).



6 Roxana Mehran, MD, received the Ellis Island Medal of Honor



3 Castle Connolly Top Doctors

Samin Sharma, MD, Annapoorna Kini, MD, Prakash Krishnan, MD,
George Dangas, MD, Pedro Moreno, MD, Roxana Mehran, MD,
Joseph Sweeny, MD, and William Schwartz, MD.



7 George Dangas, MD, Received the ACC Distinguished Fellowship Award



4 Three Mount Sinai physicians receive NYS top safety rating for cardiac catheterization

Samin Sharma, MD, Annapoorna Kini, MD, and
Pedro Moreno, MD.



Mount Sinai Heart Directory

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MS Heart Director	212-241-7911
Adult Congenital Heart Disease Center	212-241-1382
Cardiac Rehab Program	212-241-8597
Cardiology Administration	212-241-4030
Cardiology Appointments	212-427-1540
Cardiology Privileges	212-241-4029
Cardiothoracic Surgery	212-659-6800
Cardiovascular MRI and CT Imaging	855-MSHEART
Catheterization Laboratories	212-241-5881
Cardiac Catheterization Laboratory Assistance (any issues)	212-241-0935
Catheterization Laboratory Events	212-241-0592
Catheterization Laboratory Office	212-241-4021
Catheterization Laboratory Research	212-241-0229
Catheterization Laboratory Scheduling	212-241-5136
Coronary Care Unit	212-241-7222
Electrophysiology/Pacemakers	212-241-7272
Genetic Disorders	212-241-3303
Heart Failure/Transplantation	212-241-7300
Lipid Management	212-241-7651
MS Heart Information Technology	212-241-4026
Non-invasive Cardiology	855-MSHEART
Pediatric Cardiology	212-241-8662
Pulmonary Hypertension	212-241-7300
To Transfer a Patient	212-241-6467
Vascular Laboratory	212-241-6773

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- Dr. Rakesh and Pammi Sahni
- Corinne Graber, in loving memory of her mother Theresa Griffiths
- The Dr. Samin K. Sharma Family Foundation

Scan the following QR code to request an appointment:



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To make an appointment:

Phone: 212-241-0884

To refer a patient:

Phone: 212-241-5136

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Marketing and Communications



Cardiac Catheterization Laboratory Mission:

**“To improve outcomes and safety of interventional patients
by delivering clinical innovations, unrivaled research,
and personalized clinical care as a Team Concept.”**

