Combined Therapy for Peripheral Vascular Disease

Catheter Ablation of Tachycardia

Pulmonary Thromboendarterectomy Clinic

Minimally Invasive Cardiac Surgery

UAB Ambassador Program

The Ambassador Program gives referring physicians complete access to patient notes, letters, reports, and other data through a secure Web portal. To join this program, please contact Physician Services at 1.800.822.6478.
Welcome

Welcome to the first issue of UAB Insight on Heart and Vascular Disease. Designed to keep you informed about UAB’s leading role in evaluation and treatment of cardiac and vascular diseases. UAB consistently ranks among the top 30 cardiac programs rated in U.S. News & World Reports, and is a regional, national, and international referral center for cardiac and vascular disease diagnosis and treatment.

With expertise in every major area of heart and vascular diseases, and as home to the Southeast’s largest and most technologically advanced Heart and Vascular Center, we offer innovative, scientifically based treatments, providing patients with better outcomes, improved quality of life, and access to the latest translational research.

UAB is Alabama’s major referral center for complex cardiac and vascular disorders and the only hospital in the state that offers heart transplantation and long-term mechanical circulatory support. UAB is the state’s only facility for surgery for complex congenital heart diseases, and our clinicians also provide care for adults with congenital heart disease.

Our vascular surgeons offer advanced surgical and endovascular stenting technologies for aortic aneurysms, carotid occlusive disease, peripheral vascular disease, and venous disease.

UAB also provides comprehensive care for pulmonary hypertension, including surgery for chronic pulmonary thromboembolism. One of the world’s most active clinical and research programs, UAB’s Pulmonary Vascular Disease Clinic has participated in the development and evaluation of virtually all new therapeutic avenues for pulmonary arterial hypertension in the last 15 years.

Our minimally invasive and state-of-the-art robotic surgery programs offer minimally invasive treatments for coronary artery disease and valve repair and replacement. Working collaboratively, cardiothoracic surgeons and cardiologists have developed a variety of hybrid minimally invasive approaches for ischemic heart disease. Our valve program provides percutaneous balloon valvuloplasty for selected cases of aortic, mitral, pulmonic, and tricuspid valve repair using intracardiac echocardiography, percutaneous repair of arterial septal defects and patent foramen ovale, and alcohol septal ablation for hypertrophic obstructive cardiomyopathy.

UAB’s pioneering cardiac electrophysiology service is a regional referral center for electrophysiological and therapeutic care of patients with common and complex arrhythmias, including radiofrequency ablation for atrial fibrillation. Ablation of ventricular tachycardia is now highly successful in carefully selected cases of structural heart disease and idiopathic ventricular tachycardia (VT). Patients with implantable cardioverter-defibrillators who experience repeated shocks can benefit from VT ablation, as can patients with diabetic VT or dilated cardiomyopathy-associated VT.

UAB physicians also offer advanced therapies for heart failure, resistant hypertension, and hyperlipidemias, as well as unique diagnostic echocardiography, cardiotopics, and imaging studies.

Our collaborative approach to heart and vascular diseases is designed to provide timely, seamless care that serves our patients and referring physicians, to everyone’s benefit. We look forward to working with you.

James K. Kirklin, MD
Robert C. Bourge, MD
William D. Jordan Jr, MD
Cardiothoracic Surgery

Robotic-Assisted and Minimally Invasive Cardiac Surgeries

Riding the Wave of the Future

Cardiac procedures comprise a large portion of ever-increasing options for minimally invasive and robotic-assisted surgery at UAB, one of five pilot institutions designated to train residents on the da Vinci robot, a minimally invasive surgical system. Robotic-assisted surgical techniques, performed at UAB since 2001, offer advantageous advantages over traditional approaches. Hybrid surgeries, which address multivessel disease, are the wave of the future, says UAB cardiothoracic surgeon Christopher W. Akins, MD.

Compared with traditional open procedures, robotic-assisted surgeries have many advantages: smaller incisions, reduced postoperative pain and medication use, less blood loss, decreased risk of infection, shorter hospital stays and recovery times, and in some cases, improved mortality rates.

CABG

Using the da Vinci system, Akins performs coronary artery bypass graft (CABG) surgery for patients with blockages in the left anterior descending artery and its branches. This procedure requires one small (4-5 cm) incision and three ports on the left side of the patient’s chest. The internal mammary artery is grafted to the diseased coronary artery on the beating heart, circumventing the need for external harvest of blood vessels, cardiopulmonary bypass, medium sternotomy, and the resulting extensive recovery.

Many patients present with multivessel disease. To meet their needs Akins and UAB cardiologists have adopted a hybrid approach, combining robotic-assisted CABG for left anterior descending lesions with angioplasty and percutaneous coronary intervention for other coronary artery blockages.

“Hybrid procedures offer exponential benefits to patients who may be able to avoid multiple surgeries, extended hospital stays, and downtime from work. It is a quality of life issue,” he says.

“Patients request the robotic approach because they can return to work in just 2 weeks — rather than 8 — with no activity restrictions. They appreciate the superior cosmetic effects: no large chest scar and no scarp down their leg.”

Akins has also begun a program for total endoscopic bypass surgery, or “port access surgery,” which requires one to four very small (5-10 mm) incisions in the chest wall. He plans to offer this keyhole approach to select patients for CABG, valve surgery, and epicardial lead placement for cardiac resynchronization therapy.

VALVE REPAIR, REPLACEMENT; ATRIAL FIBRILLATION

“Anyone with isolated mitral valve disease of any etiology is a candidate for robotic mitral valve repair or replacement,” Akins says. The largest incision made during these procedures is about 1 cm. “The Society of Thoracic Surgeons national database reports a greater than 90% chance of success in the first-year repair (in- stead of valve replacement) with the da Vinci robot. With stemotomy chances of a successful repair rather than replacement are greater than 90%,” says Akins.

Robotic technology provides superior visualization and dexterity, allowing surgeons to perform all complex repairs with the system, including chordal placement, leaflet resec- tion, and ring annuloplasty.

“This totally endoscopic approach allows patients to return to work in about 2 weeks with much less discomfort, blood loss, and morbidity than with traditional procedures.” He prefers robotic valve replacement as a minimally invasive procedure using a 1- to 2-inch para- sternal incision with no sternal incisions.

Other procedures Akins does robotically are aortic septal defect repair, tricuspid valve repair, combination mitral and tricuspid valve repair, and ablation of atrial fibrillation. “A robotic approach using the minimaze procedure achieves results equivalent with radiofrequency ablation,” he says.

FOR MORE INFORMATION

Christopher Akins, MD, one of the foremost authorities on robotic-assisted heart surgery, with one of UAB’s da Vinci robots.

Adult Congenital Heart Disease Clinic

A Continuum of Multidisciplinary Care Is Crucial

Cardiologists in UAB’s Adult Congenital Heart Disease Clinic follow patients with congenital heart disease who have reached adulthood. The number of adults with CHD has surpassed the number of children with the condition. Many of these adults have residual heart problems requiring ongoing follow-up and treatment by specialists.

As they age, these adults are at risk for CHD as well as the same adult illnesses that affect the general population. Consequently, comprehensive care must address congenital cardiac issues and general health issues, including preventive efforts to avoid obesity, a sedentary lifestyle, and smoking. “Adults with congenital heart disease have a pediatrician but are no longer pediatric patients, and thus need care from a multidisci- plinary team that includes adult cardiol- ogists and cardiologists with expertise in con- genital heart disease,” says UAB pediatric cardiologist Walter H. Johnson Jr, MD.

The broad spectrum of CHD requires different levels of care. Patients with simple problems, such as small atrial or ventricular septal defects or isolated valvular disease, may not need to see a specialist except for an annual checkup.

Cardiologists in UAB’s Adult Congenital Heart Disease Clinic follow patients with moderately complex congenital disease closely, working with referring primary care physicians and cardiologists to design and implement treatment plans that anticipate problems and emphasize prevention. “Pri- mary care physicians need to keep patients’ congenital heart disease history in mind when treating routine health issues and ad- vising lifestyle adjustments,” says UAB pe- diatric cardiologist Edward V. Colvin, MD.

People with complex congenital disease require a well-coordinated team of experi- 
enced interventional cardiolo- gists, electrophysiologists, surgeons, perfusionists, an-esthesiologists, intensivists, ob- stetricians, operating room and intensive care unit staff, and social services staff. UAB’s Adult Congenital Heart Disease Clinic’s synergistic care ad- dresses all aspects of CHD. “Mapping out an appropriate treatment course for patients with complex disease requires extensive experience in pediatric and adult cardiol- ogy,” Johnson says.

A minority of patients may present in late teen- age years or as adults with disease that necessitates a primary operation. “As children, some patients have had palliative operations that were not durable, such as those requiring extracardiac conduits with valves,” says UAB cardiothoracic surgeon James K. Kirklin, MD, director of UAB’s Division of Cardiothoracic Surgery.

“They may need five or six operations during their lifetime. This realm of multiple reoperative cardiac surgeries is a specific area of expertise found at UAB and is un- common in other centers,” he says. Some patients eventually will have problems that can be helped only with heart or lung trans- plantation. For these patients UAB has a renowned team of transplant surgeons.

“UAB’s multifaceted enterprise has a long history of caring for the full range of congenital cardiac abnormalities in children and adults. We provide a continuum of care to keep patients healthy and preserve good quality of life for as many years as pos- sible,” Kirklin says.
Patients with multiple occluded segmental pulmonary arteries or with obstructive scars are candidates for surgery. Proximal location of the obstruction is key, McGiffin says, because more distal disease may not be resectable. Coronary artery disease or valve disease are not contraindications and can be addressed during PTE.

PTE

PTE is a highly specialized procedure requiring a median sternotomy for bilateral access and cardiopulmonary bypass. Hypothermic arrest creates an operating field for complete visualization of the pulmonary vasculature. The complex procedure and long-term follow-up require the care of an experienced multidisciplinary team.

The surgery carries the same risks as open-heart procedures; additional perioperative complications can include hemorrhage and injury to the lung during reperfusion. Follow-up includes monitoring of hemodynamic recovery and return of exercise capacity. Patients require lifelong anticoagulation and can be addressed during PTE.

“Pulmonary thromboendarterectomy (PTE) is potentially curative for chronic thromboembolic pulmonary hypertension, providing immediate relief of pulmonary hypertension associated with pulmonary thromboembolic disease,” says UAB cardiothoracic surgeon David C. McGiffin, MD.

Patient selection is complex. Wille and McGiffin employ an evaluation protocol using an established clinical pathway to determine the diagnosis, obtain baseline data required for monitoring, and assess the likelihood of successful surgical resection. The diagnostic algorithm includes pulmonary function tests, echocardiogram, computed tomography angiogram, an assay to detect a hypercoagulable state, and pulmonary arteriogram.

With its Mechanical Circulatory Support Device (MCSD) Program UAB is the state’s first and only destination therapy center certified by The Joint Commission. The UAB MCSD Program has the highest volume in the region, accepting referrals from southeastern states and beyond.

Ventricular assist device (VAD) therapy is appropriate for patients with endstage heart failure (HF) and depressed systolic function, either as a bridge to cardiac transplantation or as permanent therapy. “No longer reserved mainly as a bridge to transplant, VAD therapy is a viable long-term option for patients who are not candidates for transplant and have exhausted optimal medical management,” says UAB cardiologist Salpy V. Pamboukian, MD, MSPH, medical director of the MCSD program.

Experts estimate that in 2008 as many as 250,000 US patients were in the terminal phase of systolic HF with symptoms refractory to medical therapy. Fewer than 1000, however, received mechanical device therapy. “This population is underserved, possibly because of a perception, based on old therapy. ‘This therapy should not be reserved as the last step before hospice or death,” says UAB cardiothoracic surgeon James K. Kirklin, MD, director of UAB’s Division of Cardiothoracic Surgery. “Patients must be robust enough to survive surgery and the postoperative period.”

“Recognizing that a patient has reached the end of conventional therapy can be difficult,” Pamboukian says. “We partner with referring physicians to identify appropriate patients, and treatment is a cooperative effort between referring cardiologists and MCSD Program physicians.”

Physicians should consider referring patients with New York Heart Association class III or IV disease who have recurrent hospitalizations, cannot tolerate medications, and who require isotopes intermittently or continuously. To discuss therapy for a potential patient, contact Pamboukian through MIST at 1.800.822.6478. “UAB’s multidisciplinary team-oriented approach can support patients to successful outcomes,” she says.

A fluid research pipeline of improved technology produces new devices, and UAB participates in multiple studies of these novel tools. “The new generation of continuous flow pumps has increased the time devices can support patients,” says Kirklin. “Unlike the pulsatile pumps, newly developed rotary pumps provide continuous flow throughout the cardiac cycle. Consequently, pumps are more durable, and patients rarely require reoperation. The device and its drive line are smaller, resulting in fewer infections, and it can be used in patients who are too small for implantation of larger pulsatile pumps.

The pump, called the HeartMate II (Thoratec, Pleasanton, CA), is Food and Drug Administration-approved for bridge-to-transplant therapy, and surgeons use it for destination therapy under the Food and Drug Administration Continuing Access Protocol.

Kirklin is principal investigator of a study consortium that has established a multi-institutional registry and database of VADs and total artificial heart devices, the Interagency Registry for Mechanically Assisted Circulatory Support. The database coordinates data from more than 100 clinical facilities, tracking outcomes in patients implanted with new devices. The registry is designed to facilitate investigations and improvements in mechanical circulatory support as long-term therapy and increase duration and quality of life for patients with advanced HF.

The UAB Pulmonary Thromboendarterectomy Clinic provides comprehensive clinical and surgical care to patients with pulmonary vascular disease due to chronic thromboembolic pulmonary hypertension (CTEPH), which causes pulmonary arterial occlusion, impaired gas exchange, and right heart failure. Medical therapy aims to prevent further embolization and risk of local thrombus, but survival rates are poor.

Pulmonary artery thromboendarterectomy

Restores Near-Normal Pulmonary Artery Pressure

Patients often present with nonspecific complaints such as exertional dyspnea and exercise intolerance,” says UAB pulmonologist Keith M. Wille, MD. Treatment has evolved from a strategy that emphasized anticoagulation and lung transplant to surgical resection and novel vasodilator agents when feasible.

“Pulmonary thromboendarterectomy (PTE) is potentially curative for chronic thromboembolic pulmonary hypertension, providing immediate relief of pulmonary hypertension associated with pulmonary thromboembolic disease,” says UAB cardiothoracic surgeon David C. McGiffin, MD. Patient selection is complex. Wille and McGiffin employ an evaluation protocol using an established clinical pathway to determine the diagnosis, obtain baseline data required for monitoring, and assess the likelihood of successful surgical resection.
Obstructive Sleep Apnea and Resistant Hypertension

Uncovering Underlying Mechanisms

Obstructive sleep apnea (OSA) is potentially lethal in patients with treatment-resistant hypertension (blood pressure >140/90 mm Hg or >130/80 mm Hg in people with diabetes or chronic kidney disease who are refractory to a regimen of optimal doses of ≥3 antihypertensive medications). These patients frequently have additional cardiovascular risk factors, including obesity and diabetes.

“Research shows 50% of patients with hypertension have sleep apnea, and half of individuals with apnea have hypertension,” says UAB hypertension specialist David A. Calhoun, MD. “Our studies confirm the prevalence of obstructive sleep apnea in patients with treatment-resistant hypertension far exceeds that of other adult populations.”

In a National Heart, Lung, and Blood Institute-funded study at UAB, Calhoun unveiled a direct relationship among plasma aldosterone elevation, the severity of OSA, and hypertension, with a known cardiovascular connection between OSA’s changes, particularly left ventricular remodeling, a known risk factor for heart failure (Chest. 2007;131[2]:453-459).

Researchers now are investigating causal relationships among those factors.

“Obstructive sleep apnea may stimulate aldosterone release, or aldosterone excess may worsen apnea — either scenario suggests a need for new treatments,” he says. To determine the underlying mechanism of OSA-related hyperaldosteronism in people with resistant hypertension, Calhoun is recruiting participants for a two-arm clinical trial.

The trial’s first arm has two approaches. First, to determine if OSA stimulates aldosterone release, CPAP will be used to reduce upper airway resistance. If OSA stimulates aldosterone release, CPAP should reduce urinary aldosterone levels.

The second approach is a randomized crossover study comparing 24-hour urinary aldosterone excretion before and after withdrawal of CPAP use in patients already receiving the therapy. Participants with excessive daytime sleepiness (Epworth Sleepiness Scale score >10) are excluded.) Calhoun will evaluate effects of CPAP withdrawal on aldosterone, cortisol, and plasma aldrenocorticotropic hormone (ACTH) levels. ACTH stimulates aldosterone and cortisol production, and sleep disruption adversely affects ACTH release.

The second arm is a randomized parallel comparison of spironolactone and conventional antihypertensive agents to determine if the aldosterone antagonist decreases OSA severity. Investigators will measure changes in OSA severity using the apnea-hypopnea index, which is calculated by dividing the number of apneas and hypopneas by hours of sleep. Researchers also will measure change in anterior-posterior upper airway dimension by helical computed tomography to determine if aldosterone-induced sodium retention increases neck edema, which contributes to upper airway resistance.

The American Heart Association in its 2008 Scientific Statement on Resistant Hypertension recommended that physicians examine all subjects with resistant hypertension for primary aldosteronism and consider mineralocorticoid receptor antagonists for routine use in patients whose blood pressure remains uncontrolled despite use of multidrug regimens (Circulation. 2008;118:1000-1111).

“Physicians should question all resistant hypertension patients about signs of sleep apnea and consider evaluating them for that condition as well as for aldosterone excess,” Calhoun says. Hypertensive patients whose blood pressure is severe and uncontrolled despite optimal medical management may benefit from evaluation through UAB’s Hypertension Program. If OSA underlies resistant hypertension, patients have increased risk of cardiac complications and may benefit from spironolactone.

Cardiac Rehabilitation Program

Underutilized Despite Proven Benefits

Comprehensive cardiac rehabilitation (CR) substantially improves outcomes. It achieves optimal results by combining exercise training with multifaceted strategies aimed at reducing modifiable cardiovascular risk factors, such as smoking, hypertension, diabetes, dyslipidemia, obesity, and stress, says UAB cardiologist Vera A. Bittner, MD, MSPH, medical director of UAB’s CR program. Participation in CR is associated with lower mortality and recurrent myocardial infarction (MI) rates. A recent study in the Journal of the American College of Cardiology found CR participation among Medicare patients after hospitalization for coronary heart disease or coronary revascularization was associated with mortality rates 21% to 24% lower than those among comparable patients who did not attend CR (J Amer Coll Cardiol. 2009;54[12]:25-33).

SERVICES ARE UNDERUTILIZED

“Despite proven efficacy, cardiac rehabilitation programs are underutilized,” says UAB cardiologist Todd M. Brown, MD, MSPH. “Physician awareness about benefits of cardiac rehabilitation is lower than for other healthcare interventions.” Guidelines issued by the American Heart Association (AHA), American College of Cardiology, and American Association of Cardiovascular and Pulmonary Rehabilitation recommend CR for patients after MI or revascularization with coronary artery bypass grafting most frequently. Other factors independently associated with referral included younger age, ST-segment elevation MI, and a history of dyslipidemia or smoking.

Individuals with comorbidities and older patients were less likely to be referred despite recent evidence that these populations benefit from CR. “A wider range of patients benefit from cardiac rehabilitation than has previously been described,” says Bittner. In a recent study UAB medical student Sanjay Manat, working with Bittner and colleagues, found that age was not a significant predictor of achieving secondary prevention goals of CR. Researchers compared changes in selected measures between CR entry and completion among younger (<65 years) and older (≥65 years) patients (J Cardio- pulm Rehabil Prev. 2009;29:322-328). “Both groups experienced significant improvements upon completing cardiac rehabilitation programs. Moreover, benefits extended to the oldest patients — those older than 75 years — many of whom had a higher comorbidity burden than did younger patients,” Bittner says. “A recent analysis of Medicare data also shows older patients accrue a mortality benefit.”

UAB’s Cardiopulmonary Rehabilitation Program combines comprehensive medical management, patient education, and research to speed recovery, improve individuals’ overall physical and mental functioning, and slow or reverse disease progression.

Patients also may consult with dietitians, diabetes educators, psychologists, and other health care specialists.

“Our ultimate goal is to help patients reach their risk-reduction goals and effectively achieve optimal health outcomes,” Bittner says.
**Cardiovascular Disease**

**Catheter Ablation of Ventricular Tachycardia**

Epicardial Access Produces High Level of Success

Although implantable cardioverter-debrillator (ICDs) save lives, many patients with these devices experience recurrent shocks for ventricular tachycardia (VT) or fibrillation that markedly reduce quality of life. Antiarrhythmic drugs — primarily sotalol or amiodarone — can decrease recurrent shocks, but high failure rates and adverse effects, including proarrhythmia, limit clinical tolerance. Radiofrequency (RF) catheter ablation is an excellent option for reducing the need for ICDs in patients with recurrent VTs and offers an alternative to drug therapy, says UAB electrophysiologist G. Neal Kay, MD.

**CATHETER ABLATION FOR IDIOPATHIC VT**

Idiopathic VT accounts for about 50% of all patients referred for VT evaluation. Most common is idiopathic right ventricular outflow VT, for which ablation is straightforward. However, many forms of idiopathic VT arise from the ostium of the left ventricle (LV), often from foci in the aortic root or mural anulus, or from the epicardial surface of the left ventricle. These patients have no indication for an ICD, and ablation should be considered early in the patient’s therapy because of high success rates and low risk of complications. For these patients, successful ablation is curative and antiarrhythmic medications are unnecessary. If the VT arises from an epicardial focus, a percutaneous epicardial approach is appropriate. “Careful cardiac mapping is integral to pinpoint the precise site of origin,” Kay says.

In a recent paper, Kay and colleagues detailed the electrocardiographic, electrophysiological, and angiographic characteristics relevant to epicardial mapping and ablation of idiopathic ventricular arrhythmias from the LV (Circ Arrhythmia Electrophysiol. 2008;1:396-404).

They found that the left ventricular ostium is a common site of origin for idiopathic ventricular arrhythmias. These foci are accessible from the aortic sinuses of Valsalva or from a point adjacent to the mural anulus, and these approaches produce good results, Kay reports.

“Recognizing this difference has led to epicardial ablation techniques that have dramatically improved the success of ablation,” says Kay. Epicardial ablation involves entering the pericardial space through the subxiphoid approach to reach the area of interest. Important precautions include reversal of anticoagulation, careful definition of coronary anatomy and the left phrenic nerve to avoid injury, and continual aspiration of the pericardial space during the procedure to minimize fluid accumulation.

“With these precautions, epicardial ablation has a very low complication rate and is more than 85% successful,” says Kay.

---

**Vascular Medicine: Conditions and Medical Management**

**Risk Factors, Intervention**

Vascular medicine encompasses screening, diagnostic evaluation, and surgical treatment or medical management of the circulatory system. Medically manageable vascular disease risk factors include coronary artery disease, diabetes, dyslipidemia, kidney dysfunction, hypertension, obesity, tobacco use, and physical inactivity,” says Bart R. Combs, MD, assistant professor in UAB’s Section of Vascular Surgery and Endovascular Therapy. “Aggressive medical management of atherosclerosis-associated risk factors improves patients’ quality of life, reduces repeat events, and may prevent onset or progression of vascular disease.”

Cardiovascular disease, cerebrovascular disease, abdominal aortic aneurysm, lower extremity peripheral arterial disease (PAD), varicose veins, deep vein thrombosis (DVT), vascular neuropathy, and pulmonary embolism are common vascular disorders.

Medical management by a vascular specialist can improve outcomes and reduce incidence of many of these conditions. Patients with Buerger disease and Raynaud phenomenon, two poorly understood nonatherosclerotic conditions, also benefit from appropriate medical management and a reduction of risk factors for vascular disease. The prevalence of PAD, extracranial carotid artery disease, and renovascular disease is increasing along with the aging of the US population. PAD affects up to 10 million people, most of whom are older (>60 years) and asymptomatic. Many do not get optimal care. Patients with coronary artery disease, for example, receive intervention more often than patients with PAD, despite the condition’s prevalence and its associated cardiovascular morbidity and mortality (JAMA. 2001;286:1317-1324).

There are numerous noninvasive methods for diagnosing PAD, the condition is underreported in primary care settings, and medical treatment or surgical intervention is often delayed. “The ankle-brachial index (ABI) is an effective and noninvasive method for PAD screening,” Combs says. “ABI testing sensitivity is 90% and can substantiate the presence and severity of PAD.” Treatments include cholesterol-lowering and antihypertensive or antplatelet medications in addition to counseling on smoking cessation and increasing physical activity.

Cerebrovascular disease is the third leading cause of US deaths and causes more than 2500 strokes a year in Alabama alone. Evidence suggests therapeutic intervention targeting carotid blockages may prevent or reduce stroke incidence. Aggressive risk factor reduction, antplatelet therapy, and, for some patients, intervention with percutaneous angioplasty or endarterectomy may reduce incidence of primary or secondary events, Combs says.

Ankle-brachial index (ABI) can be used as reliable cost-effective screening tool for lower extremity PAD or to monitor effectiveness of therapy. The ABI involves using a blood pressure cuff and Doppler probe to measure systolic pressure from both brachial arteries in each leg and from both the dorsalis pedis and posterior tibial arteries after the patient has been at rest in the supine position for 10 minutes. ABI: Ankle systolic pressure divided by highest brachial systolic pressure.

- ABI <0.95 indicates significant narrowing of ≥1 vessels
- ABI <0.8 indicates intermittent claudication may occur with exercise
- ABI <0.4 indicates symptoms may occur at rest
- ABI <0.25 indicates severe, possibly life-threatening PAD

**Ankle-Brachial Index**

The ankle-brachial index (ABI) can be used as reliable cost-effective screening tool for lower extremity PAD or to monitor effectiveness of therapy. The ABI involves using a blood pressure cuff and Doppler probe to measure systolic pressure from both brachial arteries in each leg and from both the dorsalis pedis and posterior tibial arteries after the patient has been at rest in the supine position for 10 minutes. ABI: Ankle systolic pressure divided by highest brachial systolic pressure.

- ABI <0.95 indicates significant narrowing of ≥1 vessels
- ABI <0.8 indicates intermittent claudication may occur with exercise
- ABI <0.4 indicates symptoms may occur at rest
- ABI <0.25 indicates severe, possibly life-threatening PAD

**ABI**

- **ABI**
- **ABI**
- **ABI**
- **ABI**

**Alternative Therapy**

Although implantable cardioverter-debrillator (ICDs) save lives, many patients with these devices experience recurrent shocks for ventricular tachycardia (VT) or fibrillation that markedly reduce quality of life. Antiarrhythmic drugs — primarily sotalol or amiodarone — can decrease recurrent shocks, but high failure rates and adverse effects, including proarrhythmia, limit clinical tolerance. Radiofrequency (RF) catheter ablation is an excellent option for reducing the need for ICDs in patients with recurrent VTs and offers an alternative to drug therapy, says UAB electrophysiologist G. Neal Kay, MD.

**CATHETER ABLATION FOR IDIOPATHIC VT**

Idiopathic VT accounts for about 50% of all patients referred for VT evaluation. Most common is idiopathic right ventricular outflow VT, for which ablation is straightforward. However, many forms of idiopathic VT arise from the ostium of the left ventricle (LV), often from foci in the aortic root or mural anulus, or from the epicardial surface of the left ventricle. These patients have no indication for an ICD, and ablation should be considered early in the patient’s therapy because of high success rates and low risk of complications. For these patients, successful ablation is curative and antiarrhythmic medications are unnecessary. If the VT arises from an epicardial focus, a percutaneous epicardial approach is appropriate. “Careful cardiac mapping is integral to pinpoint the precise site of origin,” Kay says.

In a recent paper, Kay and colleagues detailed the electrocardiographic, electrophysiological, and angiographic characteristics relevant to epicardial mapping and ablation of idiopathic ventricular arrhythmias from the LV (Circ Arrhythmia Electrophysiol. 2008;1:396-404).

They found that the left ventricular ostium is a common site of origin for idiopathic ventricular arrhythmias. These foci are accessible from the aortic sinuses of Valsalva or from a point adjacent to the mural anulus, and these approaches produce good results, Kay reports.

“Recognizing this difference has led to epicardial ablation techniques that have dramatically improved the success of ablation,” says Kay. Epicardial ablation involves entering the pericardial space through the subxiphoid approach to reach the area of interest. Important precautions include reversal of anticoagulation, careful definition of coronary anatomy and the left phrenic nerve to avoid injury, and continual aspiration of the pericardial space during the procedure to minimize fluid accumulation.

“With these precautions, epicardial ablation has a very low complication rate and is more than 85% successful,” says Kay.
Abdominal Aortic Aneurysm Repair

More Robust Screening; Interventional Flexibility

Abdominal aortic aneurysm (AAA) remains a significant cause of morbidity and mortality in US patients aged >65 years. Ruptured AAAs cause approximately 15,000 deaths a year, making the condition one of the leading causes of US deaths. Diagnosis of AAA prior to rupture has been problematic as the condition often is asymptomatic. “Screening patients younger than 65 years may be indicated after consideration of mitigating risk factors,” says UAB vascular surgeon William D. Jordan Jr. MD, chief of the UAB Section of Vascular Surgery and Endovascular Therapy. Clinicians should evaluate patient age, sex, comorbidities, family history, and manifestation of other vascular diseases when selecting patients for AAA screening and subsequent surgical options. In February 2009, the Screening Abdominal Aortic Aneurysms Very Efficiently (SAAVE) Act introduced legislation to expand future Medicare benefits. If approved, the legislation will eliminate current constraints limiting ultrasound screening to the initial Medicare physical. In addition, at-risk Medicare beneficiaries, including men with a smoking history and women with a positive family history, will be eligible for screening.

TREATMENT OPTIONS

Increasingly, vascular surgeons offer carefully selected patients endovascular aortic aneurysm repair (EVAR) as an appropriate alternative to an open surgical procedure. Traditional aneurysm repair involves repair of the diseased vessel with a graft. EVAR deploys a stent-graft to the affected site using a minimally invasive catheter-based approach. Patients who undergo EVAR for AAA have a lower rate of short-term complications, shorter hospitalizations, and lower perioperative mortality compared with those undergoing open surgery. (Ann Surg. 2003;5:623-630) and (N Engl J Med. 2008;358:454-74). “A key to optimal patient selection for EVAR is consideration of anatomic suitability,” Jordan explains. Vessel tortuosity, neck angle, and access vessel size may limit the use of EVAR in some patients. Close proximity to renal arteries, for example, often restricts the use of a stent-graft reliant on springs or staples to secure the graft. Use of a “chimney graft,” created by inserting a second graft high up in the renal artery parallel to the stent-graft, overcomes EVAR limitations by extending the fixation zone to hold the original graft in place. After more than 10 years of experience, UAB vascular surgeons are adept at tailoring graft selection to meet patient needs and are using endovascular techniques for more than 60% of patients treated for AAA at UAB.

Endovascular repair of an infrarenal abdominal aortic aneurysm as now used in the majority of repairs done at UAB. “New data suggest earlier treatment of AAA may result in improved patient outcomes,” Jordan says. Many vascular surgeons recommend waiting until an aneurysm is 5 to 5.5 cm and opting for a period of careful monitoring and observation before considering surgical intervention, he says. However, study data indicate some individuals with aneurysms 4.5 to 5 cm are optimal surgical candidates and have the best postoperative outcomes. Patients who underwent EVAR for aneurysms <5.0 cm had the best long-term outcomes, with 99% freedom from AAA death at 5 years. (J Vasc Surg. 2006 Nov;44(5):920-929. These data underscore the need for improved screening and increased physician awareness and patient education about risk factors for AAA, Jordan says.

Hybrid Vascular Procedures Expand Options

Combining Open Surgery with Endovascular Therapy

Increasingly sophisticated technology emerging during the last decade has made minimally invasive endovascular procedures available for complex vascular problems, often as an alternative to open surgery. Yet some patients have vascular pathomorphy or risk factors that make an exclusively endovascular or open approach less favorable. Hybrid vascular surgical intervention, a combination of conventional open surgery and catheter-based therapies, expands patients’ options for treatment of vascular disease. “In select patients surgeons can use a hybrid approach or a combination of vascular surgical techniques when catheter-based interventions are inappropriate or an open procedure involves excessive risk,” says UAB vascular surgeon Steven M. Taylor, MD.

Depending on the nature and location of the occluded vessel, comorbidities, and other risk factors, surgeons can perform an open bypass with endovascular therapy during the same surgical procedure. If patients have extensive aortic disease accompanied by respiratory and cardiac disease, hybrid procedures allow surgeons to offer staged surgical intervention. “A hybrid procedure lets surgeons optimize surgical intervention in patients with complex pathology and limited options for an analogous graft,” explains Taylor. “Individuals with a history of coronary bypass or previously failed bypass procedures often have limited autogenous veins and are potential candidates for a hybrid procedure, for example.”

POTENTIAL APPLICATION

Hybrid intervention can provide revascularization for persons with lower limb ischemia. Older patients with complex vascular lesions or younger patients in need of durable revascularization are potential candidates for hybrid procedures. Combination procedures for this population are less extensive, require less operative time, and may reduce perioperative risk. (Ann Vasc Surg. 2009;23:414-424). Endovascular repair of thoracoabdominal aneurysm can be paired with surgical reconstruction of aortic vessels in single procedure or in multiple stages. (Circulation. 2005;112:2619-2626). Traditionally, thoracoabdominal and aortic arch procedures are physiologically stressful operations,” Taylor says. “Aortic arch replacement surgery typically requires hypothermic circulatory arrest; hybrid techniques avoid this, decreasing stress on patients.” Hybrid carotid revascularization also is an alternative for persons with occlusive carotid disease and accompanying atherosclerotic occlusive disease or difficult aortic arch anatomy. Utilizing a hybrid technique in these patients expands intervention options rather than replacing standard open surgery, he says. Postoperative hospitalization is not necessarily shorter following hybrid procedures, because many of these patients have extensive comorbidities. The postoperative surveillance program and need for lifestyle modifications to reduce vascular risk are the same for hybrid and traditional procedures. Evaluating all options — endovascular therapy, open surgery, and hybrid techniques — results in the best treatment plan for each patient. “Hybrid techniques allow surgeons to help an expanded pool of patients and can potentially decrease mortality and morbidity,” Taylor says.
UAB Heart and Vascular Faculty at a Glance

CARDIOTHORACIC SURGERY
Cardiovascular Surgery: Surgery for congenital heart disease, adult congenital heart disease, acquired heart disease, advanced heart failure, coronary artery disease, and cardiac arrhythmias; acute and chronic mechanical circulatory support; heart and lung transplantation (adult and pediatric); pulmonary thromboendarterectomy; robotic and minimally invasive cardiac surgery, valve surgery, thoracic aortic surgery.

James K. Kirklin, MD
Chris W. Atkins, MD
Constantine L. Athanasuleas, MD
Robert J. DeBalsi, MD
James E. Davies, MD
William L. Holman, MD
Wade C. Lamberth, MD
David C. McGiffin, MD
William L. Holman, MD
James E. Davies, MD
Constantine L. Athanasuleas, MD
David C. Mcgiffin, MD
William L. Holman, MD
James E. Davies, MD
Constantine L. Athanasuleas, MD

Thoracic Surgery: Surgery for benign and malignant diseases of the trachea, bronchi, lungs, esophagus, and mediastinum; hyperhidrosis.

Robert J. Cerfolio, MD
Douglas J. Minnich, MD

Cardiothoracic Research:

James F. George, PhD
David C. Naftel, PhD

CARDIOVASCULAR DISEASE
Electrophysiology: Diagnosis, evaluation of drug therapy, and catheter ablation for atrial fibrillation, supraventricular tachycardias, and ventricular tachycardia (endocardial and epicardial); experimental antiarrhythmic drugs;

mapping of cardiac arrhythmias; device therapy including implantable cardioverter defibrillator (ICD) and biventricular pacemaker (ICD) implantation.

Sharon M. Dailey, MD
Harish Doppalapudi, MD
Hugh Thomas McEldry, MD
G. Neal Kay, MD
Vance J. Plumb, MD

Interventional Cardiology: Innovative technology and complex cardiovascular interventions including catheter-based closure of atrial septal defects, ventricular septal defects, and patent foramen ovales; percutaneous bypass, angiogenesis, cardiac angioplasty, and stenting; cardiac catheterization.

Brigitta C. Brut, MD
William B. Hillegass, MD
Viya K. Misra, MD
Silvia E. Papapetrou, MD
Gilbert J. Zoghbi, MD

Advanced Heart Failure/Pulmonary Hypertension: Cardiac transplantation for congestive heart failure, pulmonary vascular disease, cardiomyopathy; mechanical circulatory support (ventricular assist devices); advanced diagnostic and therapeutic medications and devices; remote hemodynamic monitoring devices.

Robert C. Bourge, MD
James R. Monteith, MD
Saiy V. Pamboukian, MD
Barry K. Rayburn, MD
Jose A. Talledo, MD

Echocardiography: Noninvasive cardiac imaging, new echocardiographic techniques to better delineate heart disease and guide therapies; exercise echocardiography; contrast (bubble) echocardiography.

Vhooey Fan, MD
Navin C. Nanda, MD
Gilbert J. Perry, MD
Frank F. Seghal-Estami, MD
Srinivas Venugala, MD
Gilbert Zoghbi, MD

Preventive Cardiology: Cardiac rehabilitation and preventive interventions for hyperlipidemia, coronary heart disease in women, and congestive heart failure.

Vera A. Bittner, MD, MSPH
Todd M. Brown, MD

Hypertension: Diagnosis and management of systemic, complex, and refractory hypertension and hyperaldosteronism.

David A. Calhoun, MD
Suzanne Oparil, MD

Cardiographics: Electrocadiography, event electrocardiogram (ECG) monitoring, remote ECG and blood pressure monitoring; metabolic exercise testing for unexplained dyspnea, and external electromechanical counter pulsation therapy.

Sharon M. Dailey, MD
John R. Holt, MD
Gilbert J. Perry, MD
Fordham Uphalter, MD

General Cardiology:

Vera A. Bittner, MD, MSPH
Todd M. Brown, MD
David A. Calhoun, MD
Louis J. Dell’Italia, MD
Lelad W. Eaton, MD

Alan S. Gertler, MD
Himanshu Gupta, MD
Aimi E. Iskandrian, MD
Steven G. Lloyd, MD, PhD
Suzanne Oparil, MD
Gilbert J. Perry, MD
Steven M. Popovic, MD
Robert P. Robichaux, MD
William J. Rogers, MD
Frank F. Seghal-Estami, MD
James L. Taylor, MD

Cardiac MRI and CT Imaging: Noninvasive imaging including cardiac MRI and computerized x-ray tomography; cardiac metabolism studies.

Himanshu Gupta, MD
Steven G. Lloyd, MD, PhD

Nuclear Cardiology: Nuclear cardiac imaging; exercise testing; myocardial viability; cardiovascular positron emission tomography; new therapeutic and diagnostic nuclear cardiology studies.

Vera A. Bittner, MD, MSPH
Jaekeyoung Heo, MD
Aimi E. Iskandrian, MD

Cardiovascular Research:

Kun Ai, MD
John C. Chatham, PhD
Yiu-Fai Chen, PhD
Louis J. Dell’Italia, MD
Derek J. Dossall, PhD
William T. Ewancheko, PhD
Joel N. Glasgow, PhD
Herman E. Grennet, PhD
Fadi G. Hage, MD
Jan den Hollander, PhD
Juan Huang, PhD
Raymond E. Meek, PhD
Cheryl R. Killingsworth, DVM

Steven M. Popovic, MD
Edise M. Talenega, PhD
Patrick K. Umeda, PhD
Gregory P. Walcott, MD
Peipei Wang, MD, PhD
Chih-Chang Wei, PhD
C. Roger White, PhD
Paul E. Wolkowicz, PhD
Donqi Xing, MD
Takumi Yamada, MD, PhD
Martin E. Young, PhD

VASCULAR SURGERY AND ENDOVASCULAR THERAPY
Vascular Surgery and Endovascular Therapy: Treatment for aortic, carotid, renal, mesenteric, and extremity disease with open reconstructions and catheter-based therapy including lytic therapy, angioplasty, stentography, and endografts for arterial treatment for venous disease; deep venous thrombosis prophylaxis including inferior vena cava filters.

William D. Jordan Jr, MD
Marc A. Paxman, MD
Mark A. Patterson, MD
Steve M. Taylor, MD

Vascular Medicine: Treatment of hypertension and diabetic and vascular neuropathy; wound care; periprofessional vascular medical management; thrombotic risk assessment and treatment; prevention of contrast nephropathy.

Bart R. Combs, MD
Bruce G. Lowman, MD

Steven M. Popovic, MD
Edise M. Talenega, PhD
Patrick K. Umeda, PhD
Gregory P. Walcott, MD
Peipei Wang, MD, PhD
Chih-Chang Wei, PhD
C. Roger White, PhD
Paul E. Wolkowicz, PhD
Donqi Xing, MD
Takumi Yamada, MD, PhD
Martin E. Young, PhD

PEDIATRIC CARDIOLOGY
Pediatric Cardiology: Diagnostic and interventional catheterization for congenital heart disease; treatment of rhythm disturbances, pediatric and adult congenital heart disease, pulmonary hypertension, fetal arrhythmias, cardiac vascular and structural disease.

Edward V. Colvin, MD
Walter H. Johnson, MD
Yung R. Lau, MD
Mark A. Law, MD
William S. McMahon, MD
Bennett F. Pearce, MD
Robb L. Romp, MD

Pediatric Interventional Cardiology: William S. McMahon, MD
Mark A. Law, MD

Pediatric Electrophysiology: Yung R. Lau, MD

Pediatric Transplant and Pulmonary Hypertension: Bennett F. Pearce, MD

Congenital Heart Disease: Edward V. Colvin, MD
Walter H. Johnson, MD
Mark A. Law, MD

Fetal Echocardiography: Edward V. Colvin, MD
Walter H. Johnson, MD
Bennett F. Pearce, MD
Robb L. Romp, MD

Pediatric MRI and CT Imaging: Robb L. Romp, MD

"UAB Heart and Vascular Faculty at a Glance"