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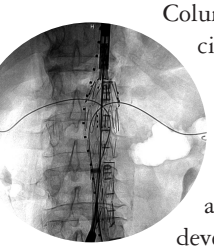
Studies Focus on Early Detection of Aneurysms

In recent years, significant technological advances have expanded treatment options available for patients with abdominal aortic aneurysms (AAAs).



Columbia and Weill Cornell physicians at NewYork-Presbyterian Hospital, however, believe that even the best treatment options are only effective when patients with aneurysms are identified before symptoms develop. Hence, a major focus of their research has been early detection.

A team of researchers at the Hospital demonstrated several years ago that AAAs can be identified with 100% accuracy by using a quick screen (an ultrasonic assessment that takes less than 5 minutes). Using sophisticated Markov modeling techniques, the team went on to prove that ultrasound screening of select populations is cost-effective.

The prevalence of undetected aneurysm is high, about 5% to 8% in men aged 65 or older, and still higher for those with a history of smoking and/or other cardiovascular risk factors. K. Craig Kent, MD, helped bring national attention to the rising incidence of AAAs and was instrumental in efforts to expand Medicare coverage to include screening. He and his colleagues at the Hospital are about to publish a study that will show that certain subgroups of older women—those, for instance, with certain cardiovascular risk factors—should also be screened (Outcomes of screening for AAA in

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Saving Lives and Limbs: Minimally Invasive Options for PAD

Peripheral arterial disease (PAD) is significantly more common than is currently recognized. In a study recently spearheaded by Issam Moussa, MD, at NewYork-Presbyterian Hospital, systematic noninvasive screening in 800 patients undergoing cardiac catheterization for suspected coronary artery disease revealed that 1 out of 3 patients has PAD. Until recently, people with severe PAD had 2 alternatives to medical therapy: angioplasty, with or without stenting, or surgical bypass. The experienced vascular specialists at NewYork-Presbyterian Hospital, however, offer a variety of new and innovative minimally invasive options.

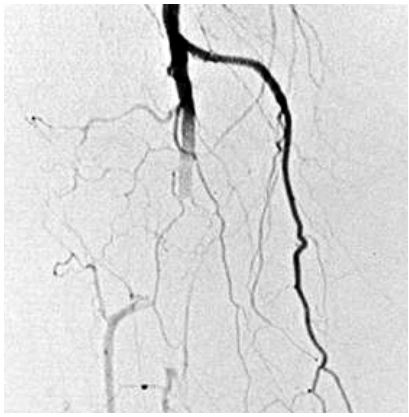

Image courtesy of Centers for Disease Control and Prevention

Right femoral arteriogram shows patient with atrial fibrillation who presented with acute ischemia.

"Physicians realize that when they have a complex case, they can refer their patients to us," noted Nicholas Morrissey, MD. "We have developed a reputation for being comfortable with all devices and comfortable with cutting-edge technology. We really pride ourselves on being able to offer minimally invasive options to patients whom others believe are nonsalvageable. We are willing to take a chance when other people would go straight to amputation."

"The Hospital is unique in having a strong vascular medicine practice, employing expert physicians in the treatment and prevention of PAD," added Jonathan Susman, MD. "We work hard in identifying risk factors and offering preemptive treatment for patients at risk of developing arterial disease."

The multidisciplinary team at NewYork-Presbyterian Hospital uses percutaneous, minimally invasive revascularization as the primary method of therapy in patients with lower-extremity ischemia. K. Craig Kent, MD, led a study involving 1,000 patients who underwent percutaneous interventions for PAD—one of the largest single-center experience with this procedure that has been reported (*Ann Surg* 2007;246:415-424). Results showed that limb-salvage rates with percutaneous interventions are similar to those of surgical bypass; 3-year secondary patency was achieved in nearly 80% of patients. Dr. Kent presented these results to the American Surgical

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Vascular Services at NewYork-Presbyterian Hospital

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NewYork-Presbyterian
The University Hospital of Columbia and Cornell

Hospital Emphasizes Diagnosis, Treatment of Vascular Disease in Women

Misleading historical data has resulted in a popular misconception: that the prevalence of arterial vascular disease is less in women than in men. However, recent compelling evidence has repeatedly shown that arterial disease, whether it is occlusive or aneurysmal, is very common in elderly females. Furthermore, arterial disease behaves differently in women than in men in terms of anatomy, physiology, and clinical manifestations. "The indications for treatment of vascular disease in women are derived from large studies where women were significantly underrepresented," noted Ageliki Vouyouka, MD. For these reasons Columbia and Weill Cornell researchers at NewYork-Presbyterian Hospital are now seeking to address this knowledge gap through ongoing studies and clinical innovations.

"The long-standing bias that women are not as prone as men to develop vascular disease is to some extent true. Hormonal and metabolic factors create an atheroprotective environment in premenopausal women through mechanisms that are not totally understood," said Maya Salameh, MD. "However, arterial disease in women increases significantly during and after menopause. Considering the fact that on average women nowadays live 30 to 40 years after menopause, arterial disease in women is a major issue in our aging society."

With lower extremity occlusive disease, the incidence in women and men in their 60s and 70s is at least identical, according to Dr. Vouyouka. The prevalence of lower extremity arterial occlusive disease among women is as low as 3% to 4% in a population that is 40 to 60 years old but increases to 15% to 30% in those aged 80 years or older, she added.

According to Dr. Vouyouka, diagnostic studies, such as the ankle-brachial index (ABI) are valuable screening tools for diagnosing lower extremity arterial occlusive disease in women because these studies detect vascular disease at 3 to 5 times the frequency than would be found using history or symptoms alone.

"Even more important is the finding that an ABI less than 0.9 is strongly correlated in an otherwise healthy women with a high overall cardiovascular mortality," she added.

Photo courtesy of Ageliki Vouyouka, MD

Researchers seek to correct the underdiagnosis and undertreatment of women with vascular disease.

When it comes to abdominal aortic aneurysms (AAAs) there are many differences between the genders, according to Dr. Salameh. "These changes occur after menopause in women and usually become more pronounced during their 60s and 70s," she noted. "These findings in part, explain why women who undergo intervention for aortic aneurysms are well into their postmenopausal years and older than men by at least 4 to 5 years."

Furthermore, she added, the infrarenal aorta is significantly smaller in healthy women than in men and this gender-specific difference in diameter ranges from 2 to 4 mm. Because of this, a uniform definition of aneurysmal disease across genders is not possible. Many physicians delay surgical treatment of AAAs in women until the aneurysm reaches 5 to 5.5 cm, as outlined in current treatment guidelines. But these guidelines are derived from large studies where women comprised only 2% to 17% of the participants. According to Dr. Vouyouka, meta-analyses of these studies, focused on the female participants only, consistently show that women with AAAs have 4 times the risk of rupture and that they rupture at smaller absolute aneurysmal diameters as compared to men. Surgeons at NewYork-Presbyterian Hospital often perform repairs on otherwise healthy women when their aneurysms reach 4.5 to 5 cm.

"Women with AAAs should be considered candidates for all minimally invasive surgical treatments" said Dr. Vouyouka. "Unfortunately, women are often likely to be excluded from endovascular aortic repair. The aortic anatomy of women is different than that of men in ways that make endovascular repair more challenging. They have shorter aortic necks, smaller iliac vessels, and probably more iliac occlusive disease. However despite these difficulties, women still have a perioperative mortality after endografting that is low and close to that of men and once the stent graft is in, women actually respond better than men with more rapid shrinkage of the aneurysm. For these reasons, as a group we're very aggressive about treating women with minimally invasive aneurysm repair."

According to Dr. Salameh, carotid plaques appear to be focal and more stable in women than in men, but they are more likely to be a predictor of generalized atherosclerosis. The problem stems from lack of clear consensus about how to treat women with carotid disease. Controversy exists over whether carotid revascularization is truly beneficial in asymptomatic women or women with symptoms and only moderate (50% to 70%) carotid stenosis. Dr. Vouyouka believes that until new data from large studies are available, endarterectomy should be offered to younger, asymptomatic women with unstable plaque as determined by carotid duplex or in patients with a high degree of stenosis (>80%).

"Theoretically, women should be very good candidates for carotid stenting since they tend to have more focal stenosis and their carotid arteries have higher velocities when compared to men," said Dr. Vouyouka. "However, so far, there is no substantiated evidence comparing the outcomes from carotid stenting between the 2 genders." ■

PAD

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Association in April 2007.

According to Drs. Susman and Kent, the multidisciplinary team that treats PAD includes interventional radiologists, interventional cardiologists, and vascular surgeons. All have national reputations for their work with vascular disease and have access to cutting-edge technology that is available for treatment of patients with PAD.

A unique feature of the multidisciplinary group is that clinical trials are shared among all of the specialties. Physicians at the Hospital headed the trials that led to FDA approval of the first covered stent for the treatment of iliac artery disease. They also performed the first cryoplasty in the tri-state region, treating a patient with recalcitrant superficial femoral artery stenosis.

NewYork-Presbyterian Hospital is among the first hospitals in the country to use drug-eluting stent technology to treat PAD. Already in common use in the coronary circulation, drug-eluting stents also hold great potential for arteries of the lower extremity. The larger-sized vessels and the more diffuse nature of disease in the superficial femoral artery make thrombotic complications less likely and the benefit potentially higher than what has been observed in the coronary circulation, according to John Karwowski, MD, who has a research interest in the causes of restenosis after peripheral angioplasty and stenting.

Interventionalists are currently enrolling patients in a large international trial that randomizes patients with PAD to treatment with a drug-eluting or a conventional stent. The coated stent is considered investigational and is not approved for use outside the trial.

The interventional team also performs a novel therapy known as plaque excision, in which a mini-driller with a tiny rotating blade the size of a grain of rice is used to trim away plaque. "The drill is used commonly around the country, but what sets us apart is we are fairly aggressive about it," noted Dr. Morrissey.

NewYork-Presbyterian Hospital is currently enrolling patients with limb-threatening ischemia and gangrene in a randomized trial to compare plaque excision with surgical bypass and a second study to compare endovascular plaque removal with angioplasty in patients who have pain when walking. James F. McKinsey, MD, is the national principal investigator for both trials.

Several other novel approaches to femoral, popliteal, and below-the-knee interventions are under investigation at the Hospital. A randomized trial investigating the long-term durability of a Gortex-covered stent versus a standard bare metal stent is currently underway.

"The logic being employed here is to replicate the surgical conduit material and durability, but without the trauma of surgery," said William Gray, MD, the study's principle investigator. "While there are many active trials underway that provide patients unique opportunities to the latest technology, the team is also working on the next generation of devices, which offer injection of drugs directly into the adventia of a vessel following angioplasty to prevent restenosis; photodynamic therapy, in which a light activated compound is also used after an intervention to promote patency; and a novel atherectomy device, which is designed to cut and extract plaque from heavily calcified vessels."

Vascular teams at the Hospital are also researching the role stem cells can play in the treatment of PAD. In one trial, a vascular growth factor is being tested for its ability to heal diabetic wounds of the foot. In addition, the teams are participating in a trial in which patients' bone marrow is injected into the leg. "The presumption is that these bone marrow cells will promote growth of blood vessels and heal arterial wounds of the lower extremities," explained Ageliki Vouyouka, MD.

"There's a lot that we still need to learn about this disease," added Harry Bush, MD. "Once we get there, we will replace more open surgeries with minimally invasive techniques." ■

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women. *J Vasc Surg* in press).

Minimally invasive endovascular repair (EVAR) has become the procedure of choice for AAAs, and is now employed in 4 of 5 cases at the Hospital. Originally designed with elderly patients in mind, EVAR boasts a number of advantages, including shorter hospital stays, reduced blood loss, less transfusion, and faster return to full activity. "Over time we've become more aggressive about using EVAR," said Roman Nowygrod, MD.

Discovery of AAAs by screening does not inevitably mean surgery. "In a patient who can tolerate repair, we use 5 to 5.5 cm as our threshold for surgery," said John Karwowski, MD. "This threshold is even less in women since women rupture their aneurysms at smaller sizes." A study underway at the Hospital is testing the hypothesis that aneurysms less than 5 cm should be repaired in reasonably healthy patients when an endovascular approach can be used.

"We have a full array of all of the available devices and this provides us with tremendous flexibility when treating patients with aneurysms," said Nicholas Morrissey, MD. "The anatomy of every aneurysm is different and having that flexibility allows us to create the best fit for every patient."

Recently, the Hospital was 1 of 3 hospitals in the nation to receive an investigational device exemption that enables use of a "fenestrated graft" for the treatment of aneurysms with very short "necks" below the renal arteries. These grafts are customized so they can extend up the renal arteries. They have small window-like holes to preserve blood flow into the side branches of the aorta. According to James McKinsey, MD, this procedure avoids "open repair with cross-clamping above the renal arteries that is associated with a risk of kidney failure."

Researchers at the Hospital are also exploring percutaneous EVAR. "The usual EVAR procedure is typically performed using an incision in one or both groins in order to have direct access to the femoral artery for the larger catheters typically employed in the endovascular

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aneurysm repair," said William Gray, MD. "Using percutaneous suture closure devices we have been able to successfully complete most of both our abdominal and thoracic EVAR procedures without the need for access cut-downs, significantly limiting the requirements for anesthesia." Dr. Gray and colleagues report that these "awake" patients (with mild sedation) require less intensive post-procedural care, freeing up higher care level beds and allowing next day discharge as a rule.

Even as EVAR gains greater acceptance, there remains a place for open repair. EVAR is inappropriate for AAAs patients with Marfan's syndrome or other hereditary connective tissue disorders. AAAs that involve the renal or visceral vessels, such as the celiac artery, should also have traditional surgery. Additionally, for relatively young patients who are healthy, with a long life expectancy, more traditional surgery may be a better choice.

"Open surgery is known to be a very durable, long-lasting procedure that rarely has to be repeated," said Harry Bush, MD. "But it is definitely a bigger incision with more initial pain and suffering, and in the long run it takes people longer to recover from it." ■

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Important news from the NewYork-Presbyterian Multidisciplinary Vascular Teams—current research projects, clinical trials, and advances in the diagnosis, treatment, and rehabilitation of vascular disease.

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