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Nonsurgical Interventional Radiology Procedures Offer Less Risk, Less Pain and Less Recovery Time Compared to Open Surgery

What Is Interventional Radiology?

The landscape of medicine is constantly changing, and for the past 30 years, interventional radiologists have been responsible for much of the medical innovation and development of the minimally invasive procedures that are commonplace today. Interventional radiologists pioneered modern medicine with the invention of angioplasty and the catheter-delivered stent, which were first used to treat peripheral arterial disease. By using a catheter to open the blocked artery, the procedure allowed an 82-year-old woman, who refused amputation surgery, to keep her gangrene-ravaged left foot. To her surgeon's disbelief, her pain ceased, she started walking, and three "irreversibly" gangrenous toes spontaneously sloughed. She left the hospital on her feet—both of them. Charles Dotter, M.D., the interventional radiologist that pioneered this technique, is known as the "Father of Interventional Radiology," and was nominated for the Nobel Prize in medicine in 1978.

Angioplasty and stenting revolutionized medicine and led the way for the more widely known applications of coronary artery angioplasty and stenting that revolutionized the practice of cardiology. Today many conditions that once required surgery can be treated nonsurgically by interventional radiologists. Through a small nick in the skin, they use tiny catheters and miniature instruments so small they can be run through a person's network of arteries to treat at the site of illness internally, saving the patient from open invasive surgery. While no treatment is risk free, the risks of interventional procedures are far lower than the risks of open surgery, and are a major advance in medicine for patients.

Some of the more recent advances in interventional radiology include:

- Nonsurgical ablation of tumors to kill cancer without harming the surrounding tissue
- Embolization therapy to stop hemorrhaging or to block the blood supply to a tumor
- Catheter-directed thrombolysis to clear blood clots, preventing disability from deep vein thrombosis and stroke
- Carotid artery angioplasty and stenting to prevent stroke

What Is an Interventional Radiologist?

Interventional radiology is a recognized medical specialty by the American Board of Medical Specialties. Interventional radiologists are board-certified physicians with additional advanced training in minimally invasive, targeted treatments performed using imaging to guide them. Their board certification includes both Vascular and Interventional Radiology and Diagnostic Radiology which are administered by the American Board of Radiology.

Interventional radiologists' unique blend of skills fosters innovation and enables them to quickly adapt their imaging expertise to pioneer nonsurgical treatments that are guided by imaging. Because they are first trained in diagnostic radiology, they use imaging to understand, visualize,

and diagnose the full scope of the disease's pathology and to map out the procedure tailored to the individual patient. Then during the procedure, they image as they go, literally watching and guiding their catheter to the site of the problem

Innovation and Patient Safety

Interventional radiology is one of the most dynamic medical fields today as these physicians adapt a technique proven to work for one problem and find a way to apply it to another. For example, only a few years ago, they were researching the potential of delivering radio-wave energy to inoperable liver tumors to see if they could be killed with heat. Today, not only have they made enormous strides in treating liver tumors, they are using the same technique for kidney, breast, bone and other cancers.

When it comes to the best practices for safely performing minimally invasive medicine, interventional radiologists pioneered the procedures and the standards for safety and quality. First, these procedures are performed by specialists with an in-depth foundation in diagnostic radiology. In addition, patient safety was incorporated into the development of these advances because interventional radiology and diagnostic radiology training programs include radiation safety, radiation physics, the biological effects of radiation, and injury prevention.

The Society of Interventional Radiology (SIR) publishes guidelines for minimally invasive medicine, including criteria for adequate training for specific interventional procedures, as well as expected success and complication rates. These evidence-based guidelines are used by the FDA, hospitals, and state regulatory groups and can be found at the Web site www.SIRweb.org.

Interventional Radiologists—The Best Kept Secret in Medicine

According to a national survey, only three percent of Americans are aware of interventional radiologists (Riley Research Associates, 2001). Modern, minimally invasive treatments are available for many diseases, but few patients know to ask about them, or to seek out a second opinion from an interventional radiologist. Historically, interventional radiologists have been the “specialist’s specialist,” and patients didn’t have direct contact with this specialty.

Because surgery was the only treatment available for many years, many primary care physicians still refer their patients to surgeons and rely on the surgeon to provide the consult on available treatment options. However, surgeons are generally poor gatekeepers for knowing the minimally invasive treatments that another specialty offers. Eventually this paradigm will change and patients will be sent to the least invasive practitioner for consult first, but in the meantime, it is important for patients to know their options.

Milestones Pioneered by Interventional Radiologists

- Angioplasty: 1964
- Embolization therapy to treat tumors and spinal cord vascular malformations by blocking the blood flow: 1966
- The Judkins technique of coronary angiography, the technique still most widely used around the world today: 1967
- Closure of the patent ductus arteriosus, a heart defect in newborns of a vascular opening between the pulmonary artery and the aorta: 1967
- Selective vasoconstriction infusions for hemorrhage, now commonly used for bleeding ulcers, GI bleeding and arterial bleeding: 1967
- The catheter-delivered stenting technique and prototype stent: 1969
- Tools for interventions such as heparinized guidewires, contrast injector, disposable catheter needles and see-through film changer: 1960–74

- Percutaneous removal of common bile duct stones: 1970s
- Occlusive coils: 1970s
- Selective arterial embolization for GI bleeding, which was adapted to treat massive bleeding in other arteries in the body and to block blood supply to tumors: 1972
- Embolization for pelvic trauma: 1973
- Selective arterial thrombolysis for arterial occlusions, now used to treat blood clots, stroke, DVT, etc.: 1974
- Transhepatic embolization for variceal bleeding: 1974
- Embolization technique for pulmonary arteriovenous malformations and varicoceles: 1977–78
- Bland- and chemo-embolization for treatment of hepatocellular cancer and disseminated liver metastases: 1977-83
- Cryoablation to freeze liver tumors: 1980
- Development of special tools and devices for biliary manipulation: 1980
- Biliary stents to allow bile to flow from the liver saving patients from biliary bypass surgery 1980s
- Embolization technique for spleen trauma: 1981
- TIPS (transjugular intrahepatic portosystemic shunt) to improve blood flow in damaged livers from conditions such as cirrhosis and hepatitis C: 1982
- Dilators for interventional urology, percutaneous removal of kidney stones: 1982
- The balloon-expandable stent (peripheral) used today: 1983
- Self-expandable stents: 1985
- Percutaneous extraction of gallbladder stones: 1990
- Radiofrequency ablation (RFA) technique for liver tumors: 1990
- Treatment of bone and kidney tumors by embolization: 1990s
- RFA for soft tissue tumors, i.e., bone, breast, kidney, lung and liver cancer Early 90's
- Abdominal aortic stent grafts: 1991
- The balloon-expandable coronary stent used today: 1994
- Intra-arterial delivery of tumor-killing viruses and gene therapy vectors to the liver: 1997
- Percutaneous delivery of pancreatic islet cells to the liver for transplantation to treat diabetes: 1999
- Developed the endovenous laser ablation procedure to treat varicose veins and venous disease: 1999

For Further Information

For more information on interventional radiology, including a local Doctor Finder, visit the SIR Web site at www.SIRweb.org.