

What Is Interventional Radiology?

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Coined by Dr. Alexander Margulis in 1967, *interventional radiology* is a medical specialty devoted to patients' clinical care in an image-guided, innovative, and minimally invasive manner. Dr. Charles Dotter first introduced interventional radiology to the world in 1964, when he percutaneously dilated a superficial femoral artery stenosis in an 82 year-old woman and averted an amputation. Since then, interventional radiologists have pioneered treatments in many areas of medicine, including balloon angioplasty and stenting in peripheral vascular disease, catheter directed thrombolysis, embolization for cessation of bleeding, needle biopsies and drainages, etc. Many recent and exciting advances have come in the areas of peripheral vascular disease, oncology, uterine fibroid disease, varicose vein management,

and dialysis and venous access. In neurointerventional radiology, endovascular therapies for intracranial aneurysms, vascular malformations and atherosclerotic occlusive disease have expanded treatment options for many patients.

Perhaps more important than the technical advances, the field has evolved from a procedure-oriented specialty to a clinical practice with commitment to direct patient care. Interventional radiologists routinely perform inpatient and outpatient consultations, make diagnoses, perform treatments, and longitudinally follow their patients. This issue highlights some of the latest advances in the field of interventional and neurointerventional radiology. For more information please refer to Society of Interventional Radiology (www.sirweb.org) and Society of NeuroInterventional Surgery (www.snisonline.org).

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The authors have no financial interests to disclose.

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Intracranial Aneurysms: Perspectives On the Disease and Endovascular Therapy

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There are approximately 30,000 cases per year in the United States of aneurysmal **subarachnoid hemorrhage (SAH)**, leaving 60% of patients dead or disabled. However, improvements in treatment have occurred in the past few decades; a recent meta-analysis shows decreasing case fatality rates from 1973 to 2002.¹

This article will discuss the epidemiology, natural history, diagnosis and treatment of intracranial aneurysms. We hope that the reader will leave with an understanding of the strengths and limitations of endovascular treatment for intracranial aneurysms.

EPIDEMIOLOGY AND NATURAL HISTORY

Intracranial aneurysms are present in 1-5% of the general population;² 10 to 30% of patients will have multiple aneurysms.³ The majority of aneurysms occur in the anterior circulation near the Circle of

Willis with the most common locations in descending frequency being the **anterior communicating artery (Acomm)**, **posterior communicating artery (Pcomm)**, and **middle cerebral artery (MCA)**.

Ruptured aneurysms most often present with subarachnoid hemorrhage. After the initial hemorrhage, the highest risk for rehemorrhage occurs in the first 2 weeks at a rate of 1-2%/ day. If untreated, 50% of patients will re-hemorrhage within 6 months of initial hemorrhage; up to 72% of these patients will suffer death or severe disability.^{4,5} While historically, patients were treated 2 to 3 weeks after hemorrhage, the International Cooperative study on timing of Aneurysm surgery^{6,7} showed that early treatment was superior. The current standard of care is to treat ruptured intracranial aneurysms as soon as reasonably possible after hemorrhage. Upon presentation, patients are assessed clinically using the Hunt and Hess grading system, from I

(minimal headache, no other symptoms) to V (comatose, moribund). As would be expected, the lower the grade at presentation, the better the outcome.

RUPTURE RISK OF UNRUPTURED ANEURYSMS

Unruptured aneurysms may present with headache, stroke, neurologic deficits related to mass effect or as incidental findings on imaging. The **International Study of Unruptured Intracranial Aneurysms (ISUIA)**⁸ showed that the risk of rupture was related to the size, location and history of prior SAH. The 5-year rupture rates are summarized in Table 1. To summarize their findings, larger aneurysms, those in the posterior circulation (or Posterior communicating artery), and those in patients with prior history of SAH are all associated with higher rupture rates. In general, most small (<7mm) aneurysms in the anterior