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Evolution of A New Multidisciplinary Subspecialty: Interventional Neuroradiology/Neuroendovascular Surgery

The field of interventional neuroradiology was developed originally in the early 1960s when Lussenhop, a neurosurgeon, described the technique of intravascular embolization of brain arteriovenous malformations by injecting silastic beads directly into the arteries of the neck for occlusion (1). In the 1970s, Serbinenko, a Russian neurosurgeon, described his technique for treating cerebral aneurysms and carotid cavernous sinus fistulas with a detachable latex balloon (2). In the 1980s, a number of pioneering interventional neuroradiologists in North America and Europe began to refine these techniques for treating surgically ''difficult or inoperable'' intracranial aneurysms, traumatic vascular injuries, dural and cerebral vascular malformations, and highly vascular tumors of the head and neck (3, 4).

In the early 1990s, studies began to evaluate the Guglielmi detachable coil system for treating intracranial aneurysms, and this device eventually gained FDA approval in 1995 (5). Since then, over 70,000 cases of cerebral aneurysms, at over 300 medical centers throughout the world, have been treated using this technique. In addition, well-controlled, randomized, FDA-approved, phase III studies recently have been published revealing the clinical efficacy of intraarterial direct infusion of thrombolytic agents within 6 hours of symptom onset for acute middle cerebral artery strokes (6). Clinical studies are also underway to compare carotid artery stenting against surgical carotid endarterectomy, for which there are now more than 150,000 cases each year being treated in North America alone. Other studies are in progress to evaluate newer mechanical devices to treat both ischemic and hemorrhagic stroke in evolution.

Recent reports by the American Stroke Association, an affiliate of the American Heart Association, indicate that stroke is on the rise. It is estimated that this year there will be more than 750,000 new cases, resulting in over 150,000 deaths, in North America. Stroke remains the third leading cause of death and the leading cause of adult disability (7).

It is in this environment that the field of ''cerebrovascular intervention'' is now evolving. A number of specialties have become interested in learning how to manage these types of patients by ''minimally invasive'' therapies. In North America and Europe, although the original pioneers were neurosurgeons, neuroradiologists with special interest in this field have been leading the advances over the past 2 decades.

It is becoming more difficult to determine who can and who cannot perform specific endovascular procedures, and which group of physicians is best qualified to be performing them. For example, currently the procedure of carotid artery stenting is being performed by the following specialties: interventional cardiology (60%), interventional radiology (15%), interventional neuroradiology (10%), interventional neurosurgery (5%), interventional vascular surgery (5%), interventional neurology (2%), and other specialties (3%) (8). Cardiologists are stating, ''we should do these procedures because we have the most experience with intravascular angioplasty and stent techniques.'' Neuroradiologists and radiologists are stating, ''we should do this procedure because we have the most expertise in cerebral and peripheral interventional techniques and angiography skills.'' Neurosurgeons and vascular surgeons are saying, ''this has always been our territory and our procedure, and no one is going to take this away from us.'' Neurologists are saying, ''we have the most clinical knowledge about the natural history of this disease and are best at managing these patients.''

Clearly, each specialty offers certain insight, expertise, and perspective regarding management and therapy. It is in this environment that the two major groups of leading practitioners in this area, interventional neuroradiology and neurosurgery, have agreed to common and uniform training practice guidelines (page 1153). This is to ensure that any physician entering this field will have certain minimally acceptable levels of education and training. These requirements are not meant to be exclusionary to any other specialty. Rather, they have been broadened to encourage other groups of physicians, including neurologists, cardiologists, vascular surgeons, and others, to embrace and accept the fact that certain minimal levels of education and training are required. The purpose of these guidelines is to avoid potential injury to patients caused by physicians who have not gained an adequate baseline level of clinical and technical understanding and expertise in the field of interventional neuroradiology/neuroendovascular surgery.

The program requirement guidelines for training and education in the neuroendovascular surgery/interventional neuroradiology document have evolved over 14 years, and have involved numerous committees and experts in the field. It signals the evolution of a new specialty that has come of age as a recognized subspecialty within the neurosciences. Tremendous advances are yet to be achieved in this field. I am convinced that with all the interest of these different medical subspecialties, along with advances by the medical device companies, improvements in newer imaging techniques, and recent pharmaceutical and basic sci-

ence knowledge gained in this field, it will continue to grow and prosper.

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