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Surgical Neuroangiography: Search for a Specialty

Embolization has been performed in many European countries and in North America for over 20 years and is now beginning to find its place in many more nations throughout the world. At first, experience with embolization techniques was shared in the form of individual case reports. Until recently, a valid assessment of the efficacy of this therapeutic practice was hampered by frequent changes in techniques and materials; today, some centers have treated enough patients to transform this anecdotal material into more concrete data. Vascular lesions and tumors are the traditional targets of embolizations, and with the knowledge acquired from experience, the techniques have greatly improved. Proximal arterial endoluminal occlusion has been succeeded by a desire to produce an effect at the cellular level with the use of microemboli and cytotoxic agents. The development of rational protocols for specific lesions and territories, as well as the guarantee of reliability and safety, have constituted the other objectives in the maturation of this relatively new therapeutic technique.

Interventional neuroradiologist, therapeutic neuroradiologist, and embolizer are some of the most commonly heard names for the radiologist or surgeon who performs embolization of the head, neck, brain, and spine. But the expression "interventional" associated with neuroradiology today is too restrictive. It focuses attention on the technical aspect of our activity and its imaging support. Pejorative denominations express even more strongly this feeling, such as the term "embolizers of pictures." This denomination also conveys to the public and to patients a false notion of an innocuous treatment. As embolization techniques have become more efficacious, they have also become more aggressive and invasive. Poorly performed, they have the same potential to do harm as do poorly conceived or executed surgical maneuvers. Consequently, it is imperative that the operators have a strong background in functional neuroanatomy and clinical neurology, as well as adequate technical training.

For that reason Alex Berenstein and I have tried to intro-

duce the term surgical neuroangiography in the context of endovascular approaches. Surgical (from the Greek *kheirourgia* or *kheir*, the hand; and *ergon*, the work) is an adjective that better describes the additional competence that should be acquired by the conventional neuroradiologist. This search for identity can appear unnecessary, but psychologically it may be important because medical bureaucracy continues to be a limiting factor to innovation. Although we are not performing open surgery in the conventional sense, our treatments (therapeutic neuroradiology) or our interventions (interventional neuroradiology) require, in addition to the actual technical skill, competence in such clinical areas as hospitalization care, clinical-ward rounds, postoperative care, outpatient consultation and follow-up, seminars with referring and sister specialties, and relations with patients and their relatives.

Surgical neuroangiography and neurologic surgery, as similar treatment techniques, share the same types of complications. First there are the complications related to the treatment itself—the effects on the topography of the lesion and on the vicinity of eloquent or fragile tissues (for neurologic surgery) or territories (for the surgical neuroangiography). These complications represent a concrete therapeutic risk that can be explained to patients in advance. The diminution of such risks over time is due to improvements in endovascular techniques and in the selection of patients. The differences in results can be attributed to the relative expertise of the individuals performing these surgical neuroangiographic procedures and to the difference between *average* and *excellent* patient care. A second type of complications are those related to technical mistakes or incorrect intraoperative decisions. These represent the difference between *proper* and *inexperienced* patient care. Their continuing decrease in frequency (they represented 85% of the overall complications of embolization in a cooperative study by Doyon, Lasjaunias, Manelfe, et al. presented at the Neuroradiology Symposium in Wiesbaden in 1978) expresses the success of modern training. Their per-

sistence in many places emphasizes the need for individual operators to update their knowledge and skills.

Some thoughts on a few commonly asked questions will complete these general remarks, and sharpen the surgical neuroangiographer's profile:

(1) Is there anything radiologic in surgical neuroangiography? The angiosuite, our most expensive tool, is only a tool, and like the neurosurgical operating room, can be used by others and for other purposes. Thus, the concept of surgical neuroangiography should be derived from its clinical content and not from its technical surroundings. Even the angiosuite may not remain as a link with radiology, since diagnostic angiography with sonography, CT, and MR already frequently provides the same information as IV digital angiography. Thus, this latter type of global angiography will soon disappear, we hope, converting the angiosuite almost exclusively into a sophisticated invasive technique for high-quality pretherapeutic (regardless of the type of treatment) or therapeutic purposes (embolization).

(2) What remains in surgical neuroangiography that is purely radiologic? It is the capability of using an image to make decisions and of performing therapeutic interventions without direct visual control. Stereotactic neurosurgery, which uses the same concept, constitutes the closest link found within traditional neurosurgery.

(3) Should we train like neurosurgeons or be neurosurgeons? I do not think so, since the surgical training has to achieve specific clinical and technical goals during a difficult training program. However, there are definitely overlapping areas of knowledge.

(4) Should a surgical neuroangiographer perform or train in areas other than neuroscience? Probably not, since the neurosciences encompass enough anatomy, physiology, clinical information, pharmacology, and therapeutic methods without requiring further experience in other organ systems.

(5) Should the surgical neuroangiographer train in diagnostic neuroradiology throughout the present conventional train-

ing? Is it necessary for the neuroangiographer to read a chest radiograph better than an internist does? I do not think so; I am sure, on the contrary, that he should be able to examine with more accuracy than an internist and a radiologist a patient presenting a disease in which he may be involved in the treatment. Unfortunately, the present training in neuroradiology, through radiology, is long and contains much unnecessary information, therefore compromising the training in surgical neuroangiography. Thus, because of our clinical and therapeutic involvement, the present neurosurgical training, although imperfect, may soon represent the best available program for surgical neuroangiography.

My view is that a surgical neuroangiographer does not need to receive a full training course either in radiology or in surgery. If neuroradiologists performing embolization can provide proper clinical care and research, it is their duty to create the conditions for the specific training in the subspecialty. A properly *clinically oriented neuroradiologic training* (separate from radiology) *completed by a specific program in endovascular procedures* will provide the best possible education.

Surgical neuroangiography is a difficult specialty to learn and a gratifying one for those who are fortunate enough to practice it full time. However, one should not believe that specifically designed instruments can compensate for insufficient training. As is true in surgical experience, further improvements in results are partly dependent on proper (or better) patient selection as well as on improved performance. Finally, my impression is that if neuroradiology does not in the near future become a specialty that permits individualized experience, with recognized training opportunities, surgical neuroradiology will become a neurosurgical subspecialty.

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