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Current Challenges in the Management of Intracranial Aneurysm

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The Context

Modern techniques for the management of intracranial aneurysms (IAs) began to emerge in the early 20th Century. In 1937, Walter Dandy clipped a posterior communicating artery aneurysm using a technique that resembles surprisingly that used even today. Over the subsequent 50 years, the introduction of reliable, repositionable aneurysm clips as well as the operating microscope established microsurgical exposure and clipping as the primary method of repairing both ruptured and unruptured IAs. Endovascular options for treating IAs were first suggested in the mid 20th Century, and in the 1980's Guglielmi introduced detachable coils for the treatment of IAs revolutionizing endovascular therapy for IAs. Since that time, coils have been progressively refined and a variety of stents have been introduced dramatically impacting IA management.

Today, open microsurgery and endovascular stent/coil technology represent the primary treatment options for IAs. Over the past 20 years, endovascular therapy has emerged as the preferred treatment in many centers; in fact, many hospitals now offer exclusively or almost exclusively endovascular therapy. Although some surgeons are being trained to perform both open surgery and endovascular therapy, the vast majority end up treating most lesions endovascularly due to the higher demands of open microsurgery and the difficulty associated with remaining proficient at both techniques. In reality, the skill set necessary to coil an aneurysm is quite different from that required for open surgery, and it is illogical to assume that those individuals best able to practice endovascular therapy will also be gifted microsurgeons. At the same time, the rapidly decreasing number of IAs being treated with open surgery has made it progressively more difficult to train the next generation of competent microsurgeons. Although endovascular proponents might argue that this matters little as endovascular options advance quickly and may eventually be used to treat all IAs, at the present time, there remain a significant number of aneurysms that cannot be treated endovascularly or are better treated with microsurgery.

The Dilemma

We now have two different methods for treating IAs. To an open microsurgeon, the "rise" of endovascular therapy has resulted in an interesting conflict. First, we must always put our patients first, and there is no doubt that there are many lesions most safely treated with endovascular therapy. At the same time, the erosion of proficiency with open surgery means that those patients with aneurysms better treated or that can only be treated with open surgery are finding it increasingly more difficult to locate a competent surgeon able to address their illness. The rise of a minimally invasive technique for the treatment of aneurysms has also carried an unintended and adverse consequence. The increasing number of physicians trained to coil aneurysms has allowed even small community hospitals to begin managing complex aneurysm patients rather than referring them to higher volume centers. As such, many smaller hospitals have begun treating a small number of IAs, often fewer than 10 aneurysms per year. This decentralization of care will likely affect patient outcomes adversely and will further limit the concentration of expertise in true centers of excellence.

At the very heart of the matter rests the fundamental concept that just because a technique is less invasive does not always mean that it is less dangerous and should be the "treatment of choice". There is no doubt that many aneurysms can be treated endovascularly with excellent short and long-term results. The problem is that certain aneurysms can be treated with better results using open microsurgery when performed by a skilled surgeon. If a particular hospital does not have such a surgeon but one is available "down the street" or in a nearby city or somewhere else, is an endovascular practitioner justified in offering an option that is less durable and carries a higher complication rate? Furthermore, how does one define "informed" consent when treating a disease process for which one hospital treats five aneurysms a year while a nearby center treats 150 per year? Do physicians have a responsibility to disclose such information to their patients? In more general terms, is there an ethical responsibility to refer patients with complex problems to practitioners who have substantially more experience?

A Proposed Solution

In the late 1990's, the author completed his neurosurgical residency and fellowship experience in neurovascular surgery. By then, it had become clear that endovascular therapy would eventually become an important part of the management of IAs. While some centers and surgeons ignored endovascular therapy as unproven, the author created a multidisciplinary team consisting of neurosurgery, stroke neurology, and interventional neuroradiology to offer patients all possible options for aneurysm treatment in a single high volume center. The center rejected an overly simplified "clip first" or "coil first" policy, instead favoring a situation in which every case is discussed as a team to determine, based on our experience, which option would offer the best chance for a favorable outcome. This treatment, as well as other alternatives and their associated risks are then presented to the patient, and individuals are encouraged to consider their options and seek additional opinions if wanted. In those rare instances when a surgeon at another center is felt to have significantly more experience with a particular problem, a level of experience that could meaningfully effect the patient's likelihood of achieving a favorable outcome, we have not hesitated to refer that patient to a more experienced center.

Over a period nearing 20 years, our group has evaluated more than 10,000 patients with IAs. We have treated almost 5000 aneurysms, with treatment split almost evenly between clipping and coiling. Over time, we have come to appreciate that certain lesions are more safely treated in our hands with one modality as opposed to the other. Today, the majority of basilar apex aneurysms are treated endovascularly, the majority of middle cerebral aneurysms are clipped. Still, the occasional basilar apex lesion may be better treated with surgery, and we will coil some MCA lesions under particular circumstances.

Based on our experience, we would suggest that the rapidly evolving technology associated with IA treatment, the high morbidity and mortality of this disease process and its treatment, and the overall increasing costs of healthcare all mandate the establishment of true, credentialed, "high volume" centers of excellence for the management of disease processes such as IAs. Such centers allow for a multidisciplinary team to establish significant expertise in the management of a complex and uncommon disease process. In regard to IAs, a high volume center can offer all treatment options (surgical, endovascular, or some combination of the two in selected cases), take advantage of the latest technological advances, and limit costs of treatment by improving outcomes and decreasing length of stay. Such a center can offer more complicated options such as extracranial-intracranial bypass surgery to allow for safer vascular sacrifice in the setting of otherwise untreatable aneurysms. And such centers can advance the field of IA surgery by introducing new techniques and performing clinical and basic science research bringing us closer to a true "cure" for IAs.

Although it is unlikely that this editorial piece will change directly the referral and practice patterns related to the management of IAs, it is hoped that this type of work will generate a healthy and meaningful dialogue regarding the future triage and management of patients with complex disease processes such as intracranial aneurysms.