

EDITORIAL

Intracranial Aneurysm with Clipping Versus Coiling: Is Management Paradigm Shifting toward Microsurgical Clipping?

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Ruptured intracranial aneurysm is a disastrous and fatal medical emergency requiring immediate surgical intervention. About 12% of patients die before reaching hospital, 33% within 48 hours and 50% within 30 days of rupture and 50% of survivors suffer from permanent disability and dependency¹⁻². That's why, it is said that patient with ruptured intracranial aneurysm (sub arachnoid hemorrhage-SAH) should be managed with surgical intervention before sunrise or sunset which comes first.

Morgagni of Padua described dilatation of the posterior branch of both carotid arteries in 1761. Ruptured aneurysms were first reported in 1765 by Biumi of Milan. In 1814, Blackall published the report of a patient with subarachnoid hemorrhage (SAH) related to an intracranial aneurysm. Prior to the development of angiography, few aneurysms could be defined prior to the onset of hemorrhage. Occasionally, they presented as a neoplasm or mass lesion that could be seen on the pneumoencephalogram. In 1890, Keen described Victor Horsley's operation on a patient with a large pulsating blood cyst. Much debate has taken place about whether this was an aneurysm or pituitary apoplexy with a capsule. Harvey Cushing may have discovered a cerebral aneurysm in approaching what he perceived to be a pituitary tumor. In his description of the pituitary body and its disorders, he lists the case of an individual with bitemporal visual problems, hypopituitarism, and a probable interpeduncular aneurysm. In 1917, Cushing ligated an internal carotid artery (ICA) intracranially after an aneurysm burst during surgery. The patient died shortly thereafter. In 1926, Cushing packed an aneurysm of the ICA with muscle, leading to hemiplegia; the patient subsequently died. At autopsy, however, the aneurysm was thrombosed.

The preoperative diagnosis had been an intracerebral cyst³.

The first direct operation on an intracranial aneurysm was performed by Norman Dott, who wrapped a ruptured aneurysm in 1933, and the first obliterative clipping of an aneurysm was performed by Walter Dandy in 1938. The results of surgery improved dramatically when the operating microscope was introduced in the 1960s⁴. The first experience with cerebral angiography was developed by Portuguese doctor Egas Moniz at the University of Lisbon in 1927 by injecting iodinated contrast medium into a carotid (direct puncture) and using the rays discovered 30 years earlier by Roentgen to visualize the cerebral vessels⁵.

In 1964, the Norwegian radiologist Per Amudsen was the first to perform a complete brain angiography with a transfemoral approach. Charles Dotter, the father of the angioplasty and all interventional radiology as well as the first to have performed endovascular treatment, on January 16, 1964, he performed a therapeutic angioplasty of a superficial femoral artery in a 82-year-old woman with an ischemic leg refusing amputation⁶. In the 1970s Fedor Serbinenko developed a technique for closing aneurysms with balloons that were released into the internal carotid artery by occluding the light. The first treatment was performed in 1970 in Moscow, with the occlusion of an internal carotid to treat a carotid-cavernous fistula. He can be considered, therefore, the first interventional neuroradiologist⁷. This technique was subsequently refined by neuroradiologists all over the world: the first and most brilliant were Gerard Debrun in Canada, Grant Hieshima in San Francisco and Jacques Moret in Paris. Parallel to the development of catheters, in the radiology and neuroradiology

units, image technology dramatically improved: Charles Mistretta in 1979 invented digital subtraction angiography (DSA), the technique currently in use⁸.

Between the end of the '80s and the beginning of the '90s, INR was suddenly revolutioned after the work of two Italian physicians: Cesare Gianturco and Guido Guglielmi. The first combined a deep knowledge of diagnostic radiology with a great ability to solve technical and manual problems. He invented Gianturco's coils, which he used to make the first attempts to embolize arteries and aneurysms. Gianturco also patented the first endovascular stent approved by the American FDA; a device with a great legacy. In the second half of the 1980s, Hilal was the first in Columbia University to use coils to treat brain aneurysms; but this technique was inaccurate and dangerous because the coils were released with little control with great risk of occluding the vessel from which the aneurysm originated. The coil embolization was revolutionized by the work of Guido Guglielmi in UCLA, who realized that electricity could function as a controlled release mechanism for coils; in 1991 he published two works dealing with the embolization of brain aneurysms by means of detachable platinum coils (Guglielmi's coils). The treatment of aneurysms was thus made more accessible and safe⁹.

When coiling was started for intracranial aneurysm, paradigm shifted suddenly toward the endovascular coiling throughout the world and proportionately, aneurysm surgery & number of aneurysm surgeons went down. It was intensified by the early result of ISAT trial where early result showed superiority of coiling over clipping. Sometime it was thought that aneurysm surgery will be dead soon! Though long term result of ISAT showed favorable result to clipping in respect of aneurysm obliteration, recurrence, rebleed and re-treatment of aneurysm, still Coiling was preferred. But when the results (early and long term) of Barrow Ruptured Aneurysm Trial (BRAT) published, it showed there was no significant difference in short term result of coiling vs clipping and in long term follow up BRAT showed clear advantageous result of clipping over coiling, in respect of aneurysm obliteration, recurrence, rebleed and re-treatment of aneurysm.^{10,11,12,13,14,15}

So, a question rise in mind, Is management paradigm of intracranial aneurysm treatment shifting toward microsurgical clipping?

Clipping and coiling team are not the competitor rather complimentary to each other for better management of aneurysm. Drive for new technological development among the endovascular neuroscientist and endeavors for generation of more skillful and experience vascular neurosurgeon are going all over the world. Another 5-10 years to wait to see which modality of treatment will dominate on other for better management of the aneurysm patient.

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