events of mild and 13% of moderate severity. In another study,2 capsulotomy caused “some personality changes in the majority of the patients.” Adverse events in those studies included fatigue, emotional blunting, emotional incontinence, indifference, low initiative, disinhibition, and an impaired sense of judgment. In a very recent study,4 26 patients with anxiety who had undergone bilateral thermocapsulotomy were followed up for a mean of 13 years. Psychiatric diagnostic methods included symptom rating scales and neuropsychological testing. To avoid bias, ratings were done by psychiatrists not involved in patient selection and postoperative treatment. Seventeen of 23 patients underwent long-term follow up and relatives were interviewed.

The reduction in anxiety ratings was significant both at 1-year and long-term follow up. Seven patients, however, were rated as having significant adverse events, the most prominent symptoms being apathy and dysexecutive behavior. Examples of poor execution were poor planning and problem-solving abilities, including inability to perform simple household tasks such as taking out the garbage, and showing poor judgment resulting in several economically disastrous car purchases. Examples of apathy included neglect of hygiene and clothing, lack of initiative, passivity, and fatigue. Disinhibition included behavior such as foul language and indecent exposure, unmotivated laughter, undue familiarity, being outspoken in an insulting way, and poor control of aggression. Neuropsychological performance was significantly worse in the patients with adverse events.

I would agree with Matthews and Eljamel1 who, in a recent review, concluded that “the accumulated literature on neurosurgery for mental disorder remains highly unsatisfactory” but, at the same time, there is evidence to suggest that capsulotomy is associated with significant risk.

CHRISTIAN RÜCK, M.D.
Karolinska Institutet
Stockholm, Sweden

References

RESPONSE: We appreciate Dr. Rück’s interest and his response to our case report. The excellent article authored by Dr. Rück and colleagues1 was not available for our review prior to submission of our own case. Nonetheless, the disease spectrum included in their report is inclusive of several psychiatric disorders not within the purview of our discussion. We acknowledge Dr. Rück and colleagues’ article as an important addition to the sparse literature addressing the issues surrounding anterior capsular stereotactic lesions. Furthermore, Dr. Rück cites Herner’s 1961 paper,1 which refers to ablative frontal stereotactic thermal lesions that were administered for several disparate diagnoses. Herner’s summary of the data includes observations that “the results appeared best in the obsessive group” and that “according to the patients’ subjective condition at the reexamination, permanent improvement had occurred in 78% of the obsessive neuroses.” Furthermore, the side effects “as shown by psychological testing . . . were as a rule mild and transient.” Six months after the operation “the IQ [intelligence quotient] was more than 4 points higher than beforehand.”

We would certainly agree with Matthews and Eljamel1 in their claim that more research is needed in the area of neurosurgery for mental disorder, and also with their statement that “it is our view (and our experience) that neurosurgery still represents a potentially useful strategy to augment the management of chronic depression and OCD in a small number of patients.”

All of the above supports the use of deep brain stimulators for the treatment of intractable OCD as an alternative to traditional ablative therapies. The presence of “psychic side effects” following psychosurgery needs to be carefully analyzed in the context of complex intractable psychiatric diagnoses. The presence of such side effects following permanent stereotactic anterior capsular lesions creates further impetus for the use of DBS, a therapy that is modifiable and reversible.

DOUGLAS ANDERSON, M.D.
JOSHUA WIND, B.S.
Loyola University Medical Center
Maywood, Illinois

Aneurysm Clips

TO THE EDITOR: The article by Louw, et al. (Louw DF, Kaibara T, Sutherland GR: Aneurysm clips. Historical vignette. J Neurosurg 98:638–641, March, 2003) was first published 19 months earlier in only a slightly different format and contains errors and omissions in need of correction.

Abstract

This communication outlines the development of aneurysm clips, from those originally used by Walter Dandy to those in use today. The history is rich, with many contributions from neurological pioneers and innovators. As a result, the modern neurosurgeon has a wide selection of biocompatible aneurysm clips from which to choose, clips that have known closing pressures and various sizes and shapes, as well as a selection of clip applicators that do not obstruct the surgical field.

The predominant modern aneurysm clip resembles a modified safety pin with its legs crossed and was first made by George Kees in 1969, who based it on designs given to him for combining the more salient features of the Mayfield
and Scoville clips. Kees patented the clip in his name only and began selling it as the McFadden clip in 1970. Codman and Shurtleff later took over distribution. Almost all clips in use now are founded on this prototype. Its imitators include Sugita, Yaşargil, Sundt, Spetzler, and others. Of these, only Yaşargil and colleagues have published recognition of the priorities. Sugita, et al., claimed invention outright and were refuted in the Journal of Neurosurgery. Subsequent modifications of the McFadden–Kees clip were designed to prevent scissoring, and holes were added in the spring arms to accommodate variable application. This information has been published and republished. The article by Louw, et al., contains not a single photograph of a McFadden–Kees clip and makes no reference to the applier, which affords the surgeon unusual ability to remove or re-adjust a clip once applied.

Louw, et al., claim the McFadden modification of the aneurysm clip to be the replacement of flat blades with round ones. The statement refers to a previous invention, a mid-1960s modification of the original Mayfield clip, and the statement is erroneous. Half round, not round, metal (split wire) was used to round off the edges and tips of the Mayfield clip blades. In later models Kees subdued the outer rounds, but kept the approximating edges smooth. This became known in the trade as the Mayfield–McFadden clip. The cited reference is a historical article published in a general surgery periodical. Furthermore, in regard to this modification, the clip was made in three major configurations: straight, curved, and right angle. Mayfield had designed a straight and an oblique model only. These three prototypes and the Mayfield originals became the foundation for the many configurations later developed in the McFadden–Kees clip and its descendants. Suggestions for the 75 or more shapes now in use were made largely by Drake and Peerless to George Kees and others (SJ Peerless, personal communication, mid-1970s). The fenestrated clip was the idea of Charles Drake; George Kees made the first one by modifying a Mayfield–McFadden clip.

Disagreement about the proper way to weld split wire onto the Mayfield clip legs in the mid-1960s invention revealed the abysmal paucity of metallurgical information in the existing annals of neurosurgery. This led to publications bringing this subject up to date and reporting tissue reaction to the metals then in use. As a consequence, neurosurgery sent representatives to the American Society for Testing and Materials where other surgical specialties and dentistry were already trying to improve and standardize their metallurgical practices. This in turn led to the use of MP35N as the metal (alloy) of choice for aneurysm clips. The MP35N was devised by DuPont for acid vats and proved to be stronger and more biocompatible than the steels in use then, and furthermore, it is not a steel and it is nonferromagnetic. The McFadden–Kees clip was made from this metal, predating the magnetic resonance (MR) imaging era by several years.

The neurosurgical committee on devices and drugs (under the chairmanship of McFadden, then Piepgras, followed by Friedman) wrote the standards for aneurysm clips, eliminating unsatisfactory materials including stainless steel from the choices, and establishing mechanical characteristics, such as the closing pressures. Contrary to implications of Louw, et al., the articles published by Dujovny and colleagues (note the many refutations) had nothing to do with stimulating or guiding the neurosurgical committee in its work. Much confusion about ferromagnetic clips has been created by publications containing the careless use of terms and outright misinformation. Regrettably, published letters seeking to correct previously published erroneous material do not seem to come to the attention of the person researching the annals of neurosurgery on a particular subject.

The bibliography of Louw, et al., otherwise ignores the McFadden articles published on the history of aneurysm clips, and the letters correcting published mistakes. It is difficult to imagine anyone purporting to write on the history of aneurysm clips either missing these articles altogether or choosing to ignore them, while making a sole reference to an anachronism. The previous article by Louw, et al., as well as the present one, in both publications misrepresent the origin of the paramount clip in use today while describing failed devices and modifications as though they were significant contributions. The article also ignores the improvements made by American neurosurgeons in removing unsatisfactory materials and devices from use. As a glaring example, the sterling silver clips of Cushing and Olivecrona did untold damage from corrosion (a silver and copper alloy, it disintegrates in body fluids even to the point of disappearing) and the subsequent tissue reaction.

Titanium clips are now in vogue, due largely to the confusion about ferromagnetic properties of the old stainless steel clips. Aneurysm clips made of 301 stainless steel (Mayfield) are borderline ferromagnetic. The modern cobalt alloy clips (MP35N), the McFadden–Kees, the Sundt, and the Yaşargil clips in use before titanium, are not ferromagnetic. The Sugita clip for many years, and perhaps even yet, was made of Eligiloy, a product of the Elgin watch company for watch springs, and the alloy contains 17% iron and is not ferromagnetic in behavior. The singular advantage of a titanium clip is the lesser degree of image distortion of the clip itself on computerized tomography scans and MR imaging studies. Titanium and its alloys are not entirely bio-compatible, as is evident in the reports beginning to appear concerning tissue reactions to these materials implanted in orthopedic patients. Titanium has half the elastic modulus of MP35N, and reports of clip slippage have begun to appear. The considerable contention about the real mechanical characteristics of pure titanium and titanium alloy clips needs to be addressed by the committee on neurosurgical standards.

**Joseph T. McFadden, M.D.**

Vail, Colorado

**References**
