In their interesting report Lanzino and colleagues carefully describe outcomes in 100 patients with subarachnoid hemorrhage (SAH) from a ruptured intracranial aneurysm treated by a neurosurgeon who has completed fellowships in both open neurovascular surgery and endovascular technique. More important than the results is the thoughtful decision-making process that the attending neurosurgeon followed in selecting the best form of treatment for a particular patient with a particular aneurysm. I enjoyed reading this paper very much and in many ways found it to be music to my ears in light of my own emphasis over the years on the importance of tailoring treatments to individual patients rather than adhering to arbitrary protocols or categorically applying the results of the most recent prospective randomized study (level one evidence).

Let me begin by pointing out some limitations of the study. The authors excluded from the analysis patients in very poor neurological condition (World Federation of Neurosurgical Societies [WFNS] Grade V SAH) whose aneurysms had not been treated given their poor condition. Therefore, the findings cannot be considered overall management results but rather surgical results (regardless of whether the procedure was open microsurgery or endovascular surgery). The follow-up data were gathered via telephone by a nurse who was aware of the treatment modality used (not blinded), and conceivably, this factor could have introduced bias. I doubt that this bias could have had any significance given the use of a questionnaire on which the patients or their family members were asked to evaluate outcome according to the simple but very useful modified Rankin scale. Among the 100 patients, the authors claim that there was only one poor outcome, a death, related to vasospasm. This result is especially remarkable considering that many of the patients presented with severe SAH of WFNS Grades III, IV, or V. Unfortunately, the authors keep us in suspense, promising that the reasons they encountered so little morbidity due to vasospasm will be the subject of a future paper. Another limitation of their analysis is the fact that they report only short-term results, which tell us very little about the durability of either form of treatment. This restriction is not relevant to the central message of their paper, which is not that one treatment or the other is better, but rather that the patient is best served by having both forms of treatment available. Finally, although this series was fairly representative in terms of the initial neurological grade, only one giant aneurysm was included in the analysis.

These minor limitations do not detract significantly from the central message of the paper: patients with SAH benefit from being cared for at a center where both open microsurgery and endovascular surgery are available and where ideally the recommendation of one or the other form of therapy is tailored to each patient with relative freedom from disciplinary or financial biases. I could not agree more with this message. The authors tell us that they make a definitive recommendation to each patient without regard to the preferences of the referring physician, the patient, or the patient’s family members. I think that most would agree that the referring physician’s preferences should not influence the therapeutic recommendation, although some may take issue with the suggestion that patient and/or family member preferences should not influence the treatment recommendations. Clearly, the patient and his or her family will ultimately make the final decision of whether to accept the neurosurgeon’s proposed method, but I agree with the authors that therapeutic advice should be based strictly on what the neurosurgeon, after a careful analysis, determines to be the best alternative for a particular patient regardless of the patient’s or the family’s biases. Were we unduly influenced by the latter, we would have every patient choosing a less invasive or more cosmetically appealing approach, which may or may not be the best and safest treatment modality.

The authors carefully and thoughtfully describe the different factors that would influence their recommendation of clip ligation or coil occlusion to each patient. Such factors include the patient’s age, neurological condition, and associated comorbidities as well as the aneurysm location, size, configuration, and so forth. Obviously, coil occlusion tends to be favored in older patients in poor neurological condition and with associated severe comorbidities, whereas clip ligation tends to be favored in younger patients in good neurological condition and with no associated major comorbidities. The location of the aneurysm is very important, as dis-
discussed by the authors. I agree that open microsurgery for basilar artery top aneurysms carries relatively high morbidity, whereas coil occlusion in this location is no more difficult and perhaps even easier than occlusion in other locations. I also agree that middle cerebral artery (MCA) aneurysms and most posterior communicating artery (PCoA) aneurysms, when all other factors are equal, are best treated with open microsurgery. Surgery for small ruptured anterior communicating artery (ACoA) aneurysms can be difficult, but the dangers of coil occlusion in these small lesions may be greater than those of surgery. As pointed out by the authors, however, posteriorly pointing ACoA aneurysms are very difficult surgically because of the perforating arteries. In contrast, this particular projection does not seem to interfere with endovascular coil placement. Although the authors do not mention it, I tend to favor coil occlusion for superior hypophysial aneurysms because I generally find these aneurysms more difficult than, for example, the superiorly projecting ophthalmic artery aneurysms. In general, a wider aneurysm neck is more amenable to surgery given that coil ligation often involves maneuvers such as stent insertion or balloon remodeling, which can increase morbidity. As such techniques improve and become safer, a wide aneurysm neck may not be a relative contraindication to coil placement, as it is now. I also pay close attention to the severity of the SAH and the mental status of the patient; a drowsy patient as a result of a severe SAH is likely to have a “red, angry, swollen brain,” which makes surgical exposure difficult and retraction dangerous, thus favoring coil insertion in these cases. Note that this condition would bother me less in aneurysms that require little or no retraction, such as posterior inferior cerebellar artery aneurysms and most PCoA and MCA aneurysms. I believe that open surgery in patients with vasospasm, even in those who are asymptomatic, can precipitate or worsen symptoms; therefore, even though there is no compelling evidence supporting this impression, I favor coil occlusion in these patients.

Although unruptured aneurysms are not the topic under discussion, I will add for completeness that currently I generally favor open surgery for unruptured aneurysms given that the object is not to reduce the high incidence of rebleeding in the short term, which coil occlusion clearly does, but rather to reduce the incidence of hemorrhage and growth of the aneurysm in the long term, which coil occlusion has not yet been proven to do. After considering all of these factors carefully, I currently recommend coil occlusion for approximately 50 to 60% of all patients with SAH and for approximately 15 to 20% of patients with unruptured aneurysms. Obviously these percentages are likely to change if coil placement techniques become safer and are proven to be durable or if, conversely, the rate of recanalization and the incidence of recurrent hemorrhage in patients with occluded aneurysms are found to be unacceptable in long-term follow-up studies; a scenario that I consider less likely.

Local expertise, as pointed out by the authors, must also be taken into account. In most centers, even though both treatments are available, there is greater expertise in one or the other modality. Furthermore, even when one surgeon is well trained in both modalities, as in the case of Dr. Lanzi no, it is likely that he or she will be more comfortable treating a particular kind of aneurysm by using one or the other modality.

The exhortation to individualize a treatment recommen-