Doctors Laidlaw and Siu provide us with a nice analysis of a consecutive series of 391 patients with ruptured aneurysms treated with a policy of “ultra-early surgery” (all patients surgically treated within 24 hours and 85% of them within 12 hours after subarachnoid hemorrhage [SAH]). From their analysis, the authors reach two conclusions. The first is that the major risk of rebleeding following SAH exists during the first 6 to 12 hours; they certainly provide evidence that supports this conclusion, which, although not new, is important. The second conclusion is that the aneurysm should be secured as early as possible to prevent this early rebleeding. The validity of the latter recommendation rests on two premises: 1) that securing the aneurysm early prevents rebleeding; and 2) that this policy results in an overall improvement in outcome, compared with the policy of less urgent surgery. The authors provide us with good support for the first premise by assuring us that none of their patients experienced rebleeding after surgery. In my opinion, however, they have not provided convincing support for their implied claim that ultra-early surgery results in better outcome.

The most important reason to make a comparison between this particular series and series in which patients underwent surgery at a later time is commented on by the authors, but should be further emphasized. The patients in this series were graded neurologically at the time of admission to the hospital; obviously, this was the only time at which patients could be clinically graded because they were immediately transferred to the angiography suite and then to the operating room. Any experienced neurosurgeon knows that many patients with SAH who arrive at the hospital in bad neurological condition improve within the next several hours, either spontaneously or as a result of early therapeutic measures such as ventricular drainage, treatment of intracranial hypertension, and so forth. Undoubtedly, this is an important factor, accounting for the fact that 40% of patients with poor grades in this particular series achieved a “good” outcome. We know that a patient whose neurological grade remains poor several hours after institution of early resuscitative measures, including ventricular drainage when appropriate, is unlikely to achieve a good outcome unless the grade was associated with an intracerebral hematoma, which can be drained surgically. The reader should not be misled by data in Table 3, that indicate that 32% of patients with World Federation of Neurosurgical Societies (WFNS) Grade V achieved a “good” outcome because they underwent ultra-early surgery. We can only speculate how many of these patients would have improved to a good neurological grade either spontaneously or as a result of early, nonsurgical therapeutic interventions, had they not undergone surgery.

The lack of intraoperative or postoperative confirmation of the adequacy of aneurysm obliteration adds to the difficulty in accepting the authors’ implication of better results with ultra-early surgery. The authors could claim that the fact that they had no cases of postoperative rebleeding is good enough; however, the relatively short follow-up period detracts from the legitimacy of this claim. The issue of anatomical confirmation of the adequacy of clipping will become even more important as we compare not only the early safety, but also the effectiveness of clipping compared with coil embolization in the future.

Although the authors are careful to provide us with a table detailing the results of their series, we should bear in mind as we read the text what they consider to be a good outcome. As the authors carefully point out in their article, for reasons of convenience, they include as “good outcomes” patients with a Glasgow Outcome Scale (GOS) score of 5 and 4. This includes patients who are capable of independent living with or without mild persistent sequelae (GOS Score 5) as well as those having a moderate disability, which could include “memory or personality change, hemiparesis, dysphasia, ataxia, seizures, or major cranial nerve deficits” (GOS Score 4). There is a tendency in recent literature to lump these two outcome categories together and call them good outcomes. This may be reasonable when one is focused on patients with severe head trauma.
who had a poor neurological grade at onset of treatment. Whether moderate disability is a good outcome for a patient who was well before SAH occurred is a very subjective judgment. Again, this issue will become increasingly important as we compare surgical and endovascular results, and it will not be sufficient to classify patients with moderate disability as having achieved a good outcome.

The authors comment briefly on the fact that there may be ethical problems with a policy of indiscriminate ultra-early surgery in all patients regardless of age, neurological condition, medical condition, and technical difficulties related to the location, size, or configuration of the aneurysm. Some readers may frown on the decision to perform surgery on very elderly patients, some of whom are in the 10th decade of life. Some may feel that patients with aneurysms that are very difficult to treat—those for which deep brain retraction may be necessary—may fare better if they underwent surgery later when the brain has relaxed. Of course, the issue of whether endovascular therapy is preferable for early treatment of certain aneurysms, particularly those harbored by patients in poor neurological conditions, is one that cannot be addressed by the authors because endovascular therapy was not available at their institution during the study period.

Clearly, these authors have provided us with a very good account of what can be expected with a policy of indiscriminate ultra-early surgery in patients with SAH. I consider their results excellent, despite the limitations and concerns that I have already expressed.

References


Response: We thank Dr. Heros for his thoughtful editorial and comments; however, he indicates that we made an implied claim that ultra-early surgery results in a better outcome than delayed surgery, whereas we make no such claim, implied or otherwise.

The purpose of clipping an aneurysm is to prevent rebleeding. Delaying procedure until the peak incidence of rebleeding has subsided is, therefore, difficult to justify unless we believe that ultra-early surgery entails significant risks or difficulties. The high rebleeding rate witnessed during the first 6 to 12 hours post-SAH provides a strong rational basis for ultra-early surgery. Patient outcomes and the review of surgical difficulties encountered in our series indicate that very acceptable results can be achieved using the policy of ultra-early surgery, adding strength to this rational justification. Therefore, although the hypothesis that ultra-early surgery might provide better results can form a very reasonable basis for a comparative trial, it currently remains just a hypothesis. As tempting as it may be, we deliberately did not compare our results with those of other surgical series because such a comparison would not be legitimate for the reasons mentioned in our report and in Dr. Heros’ editorial. With this in mind, we are pleased that Dr. Heros has emphasized our statement that our grading of patients (best neurological grade determined before surgery) was made very early. This precludes a possible comparison between our series and other surgical series in which surgery and grading were conducted at a later time. Speculation on how many patients might have improved if surgery had been delayed might be interesting, but speculation on how many might have experienced rebleeding is more important. At presentation we cannot accurately predict which patients will improve and, more importantly, which will experience rebleeding. This uncertainty forms the basis of our inclusive unselected management strategy. Only by strict analysis of ultra-early rebleeding rates, management outcome results, and outcomes for different management strategies can these issues be addressed. We believe that our series adds to the body of this information available for review.

Table 3 is straightforward and self-explanatory, and we would be surprised if readers find it misleading. Thirty-two percent of WFNS Grade V patients who underwent ultra-early surgery did achieve an independent outcome (classified according to the GOS as good recovery [GOS Score 5] and moderate disability [GOS Score 4]). Ultra-early surgery was a key component of our treatment strategy, but we also believe that our aggressive cardiopulmonary support, vasospasm prophylaxis, and general medical and nursing care played major roles in this favorable outcome. The capacity of the individual patient for spontaneous improvement, as stressed in Dr. Heros’ editorial, may have contributed to some of our success, and we hope that prevention of rebleeding might also have been a contributing factor.

As we have stated in our article, after aneurysm clipping we followed a strategy of routine puncturing of the aneurysm, micro-Doppler ultrasonography assessment of vessels, and postoperative angiography in all patients with posterior circulation aneurysms and in any patients with anterior circulation aneurysms in whom we had any doubt regarding the adequacy of clipping. We considered this to be an appropriate standard of care to assess the adequacy of aneurysm obliteration, and we did not consider routine postoperative angiography to be clinically indicated in all patients. The point is well made, however, that postoperative angiography would have been an important quality assessment tool if we had wished to compare series or operative techniques with others.

The comments made regarding Dr. Heros’ outcome assessment are valid; the GOS is a relatively blunt instrument that is not likely to distinguish patients with subtle neurological deficits. Recent reports on surgery for unruptured aneurysms highlight the frequency of neurological complications associated with aneurysm surgery that is determined when a more sensitive assessment is made, and, of course, this is a major consideration in a comparison of surgical and endovascular treatments. For our present purposes, however, we have used the GOS because of its simplicity, widespread use, and acceptance in the neurosurgical literature. We believe that, despite its obvious deficiencies, it allows the best compliance with findings of most other SAH studies.

Ethical dilemmas are discussed in our paper, and we hope and believe that analyses such as these can give us some factual basis for ethical discussions, rather than relying only on generally accepted truisms. In fact, readers who