Complications During Stroke Rehabilitation

To the Editor:

We read with interest the article by Dromerick and Reding about medical and neurological complications during inpatient stroke rehabilitation. It was noted that the medical complications thought to occur commonly during stroke rehabilitation were rare or absent in this study. We were puzzled by the attribution of this finding to factors such as admission criteria and risk management protocols despite the authors' belief that the delay of 37 days from stroke onset to rehabilitation hospital admission was an unlikely reason. It is our view that this delay would indeed be a likely reason for the low incidence of such medical complications.

Dromerick and Reding noted that there was no correlation between the interval from stroke onset to rehabilitation hospital admission and the number of complications. They believe it is therefore unlikely that there is a correlation with the types of complications. The study by Dobkin, in which subjects were admitted to the rehabilitation unit an average of 9 days after stroke and stayed for an average of 33 days, is the only study with shorter time frames that is cited to support this conclusion. The restrictive nature of the admission criteria for the sample population, the admission at an average of 37 days after stroke onset, and a 52-day average length of stay all have to be considered as reasons for the low incidence of certain complications.

In current rehabilitation clinical practice, the stroke patient is admitted 14 to 21 days after stroke onset and has an average stay of 25 days. We believe this study needs replication, but with less time before admission, to determine whether there is a correlation between the number of days from stroke onset to rehabilitation admission and the types of medical and neurological complications the stroke patient experiences.

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References

Response

Dr DeMatteis and Ms Tome caution that our data may not be generalizable to institutions with shorter intervals between stroke onset and rehabilitation hospital admission. Our patients were admitted 8 to 300 days after stroke (mean, 37 days). With such a wide range of stroke-to-admission intervals our data probably accurately reflect the gamut seen at other freestanding rehabilitation hospitals. As we noted in our introduction, "any rational assessment of quality of care must compare similar patient populations and similar care settings."

DeMatteis and Tome also note, as we did, that serious complications such as thrombophlebitis and pulmonary embolism were infrequent or nonexistent in our study. The majority of medical complications in our subjects were more mundane: for example, urinary infection, musculoskeletal pain, urinary retention, falls, and fungal rashes. Our experience with venous thromboembolic complications in more than 900 sequentially admitted stroke rehabilitation hospital patients has been reported. No relation was found between the frequency of thromboembolic events and the time since the stroke.

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Preoperative Risk Factors for Carotid Endarterectomy

To the Editor:

We read with interest the article by Goldstein et al in the June issue of Stroke in hopes of finding useful information that would help prevent complications associated with carotid endarterectomy in patients with ipsilateral symptoms. After a careful review, however, we are concerned about the concept put forth by the authors that complications are primarily related to patient characteristics.

Although the authors performed an extensive retrospective review and a multivariate analysis of risk factors for carotid endarterectomy, they failed to identify or even acknowledge the most important factor associated with poor outcome: the surgeon. The article suggests that the success or failure of this procedure is patient dependent, even though most authors, including many whose work is cited in their bibliography, feel that poor results are related to surgical technique.

In a recently published report on the cause of perioperative stroke after carotid endarterectomy, we found that 65% of the cases of perioperative stroke reviewed were clearly technically related, and therefore potentially preventable. Most of these strokes were due to postoperative thrombosis at the site of the endarterectomy, which in turn was due to a technical defect (edge, kink, residual stenosis, or clamp injury). Other technical failures were due to inability to maintain adequate perfusion during carotid clamping, perioperative embolization, bleeding, and infection. Postoperative intracranial hemorrhage and reperfusion were the most common complications among patients whose strokes were not associated with technical mishaps. We learned from analysis of our failures that technique-related strokes were random events unrelated to the patient's age, sex, or associated medical problems. Preoperative neurological deficit, contralateral carotid occlusion, and hypertension did increase the likelihood that a technical failure would result in a perioperative stroke, but these factors were not the immediate cause of stroke. If Goldstein et al were to study the events related to the poor outcomes in their study, it is likely that they would come to a similar conclusion.

The purpose of emphasizing the importance of technical factors in the outcome of carotid endarterectomy is neither to discredit the surgeons involved in the study nor to initiate yet another debate about shunts, patches, and anesthesia. The reason for
acknowledging the role of the surgical team in the results of carotid surgery is that we can do little to change the clinical presentation of our patients, but we can do much to improve the quality of surgery for them. If we perceive that poor outcomes are related to patient selection, it is unlikely that the results for the next 1200 patients will be any different. If, on the other hand, we recognize that perioperative stroke and death are most often due to failure in technique, then we will put our efforts toward improving the operation.

It is our belief that a continued focus on these issues can result in carotid endarterectomy with a morbidity and mortality rate of less than 2%. Furthermore, we see no reason these results cannot be obtained in community hospitals and by less active and less experienced surgeons. First, one step toward this goal is the recognition by surgeons that perioperative complications are not inevitable. A search for the cause will most often lead to an event, a decision, or a procedure that resulted in cerebral ischemia or embolization from the endarterectomy site. Second, it is important that surgeons analyze the problems with the intent of changing the procedure to avoid the complication in the future. Third, surgeons need to share their poor results as freely as they share their successes. Carotid endarterectomy failures are fortunately infrequent. Few surgeons have a sufficient number of cases in a decade to encounter all of the possible mechanisms of failure. Although most surgeons do not have the time for another registry, a repository of data on failed carotid endarterectomy would help practitioners understand their own problems and perhaps serve as a means of arriving at a consensus as to which techniques are most successful and which are to be avoided in special situations. Finally, surgical training must incorporate the lessons learned from past failures. Outcome analysis must be a ritual for all who do this operation.

At present the best treatment for the prevention of stroke in most patients is carotid endarterectomy. We should do whatever we can to ensure that this procedure is as safe as possible for our patients. Accepting the fact that poor outcomes are often physician related rather than patient related is the first step.

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References

Response
The comments of Drs Riles and Imparato focus on the perioperative risk of stroke after carotid endarterectomy. As we have written, we concur with their opinion that the benefit of carotid endarterectomy is highly dependent on surgical risk and is strongly influenced by the skill of the surgeon performing the operation. However, the stated purpose of our recent study was to examine preoperative patient factors that may be associated with an increased risk of stroke, myocardial infarction, or death after carotid endarterectomy in patients undergoing the procedure for ipsilateral symptoms. The analysis was designed to provide a method of risk stratification to adjust for different levels of severity between institutions for retrospective outcomes research. It was neither our intent nor our purpose to study operative variables.

The meticulous nature in which Drs Riles and Imparato record and attempt to analyze the causes of perioperative stroke is to be applauded. However, the type of data reported in their recent communication (the presence of ledges, kinks, etc) is rarely available in the medical record, and when available is certainly not noted in a uniform fashion. This currently precludes analysis of the data in a retrospective multicenter review. Furthermore, without control data it remains uncertain whether some of the "technical deficiencies" that they cite caused or are even significantly associated with increased perioperative stroke risk. Even if all of these technical deficiencies were causally related to stroke, for 35% of their patients who had a stroke there was no technical cause. In addition, perioperative complications other than stroke were not addressed.

Striving for technical perfection by carefully analyzing surgical mishaps is a laudable goal. However, in procedures by even the best of surgeons there may be operative complications unrelated to surgical technique. Careful preoperative assessment may help identify patients in whom the hoped benefit of carotid endarterectomy is not outweighed by its risk.

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