Operative Mortality Following Carotid Endarterectomy

To the Editor:

I read with great interest the editorial by Dr. Gary G. Ferguson in the May-June 1982 issue of STROKE, Volume 13, p. 287, entitled "Intraoperative Monitoring and Internal Shunts: Are They Necessary in Carotid Endarterectomy?". I was dismayed, however, by the manner in which he displayed our data in the table using his reference #12, which makes our data appear to be the worst of all that quoted, which is simply not the case.

The article of ours which he quoted is 12 years out of date at present and includes mortality and morbidity figures since our study began in 1957. At that time we were operating on acute and progressing strokes and were not using shunts. This is, therefore, not a true representation of the situation as it exists today. In the last 17 years we have used general anesthesia, routine shunts, and have avoided operation on acute and progressing strokes in a series of more than 1300 operations. Our overall operative mortality has been 1.4%, being 1.1% for TIA's and zero for asymptomatic bruits. Proper classification of patients has to be used when carotid mortality data are reported.

Likewise, in a series of 516 recent operations on patients with TIA's and asymptomatic bruits, all operated upon by the same surgeon, our total incidence of mild and severe permanent deficits has been 1.36%.

Granted that selective shunting properly used gives excellent results, I continue to use and advocate routine shunting. Dr. Ferguson states, "In fact, the best results have been reported by those who avoid shunts." He quotes Baker, et al, in this category as having a stroke rate of 1.6% with no shunting. However, in the article by Baker, et al, if one looks at the data, one sees that when operation is performed with the contralateral carotid occluded and no shunt is used, the stroke rate was 3 in 34 patients, or 8.8%. In our own series of 142 such operations done with routine shunting, there was one permanent neurologic deficit, or an incidence of 0.7%. The advocacy of no shunting at all times is unacceptable. One must know and use the proper indications for shunting when advocating selective shunting if best results are to be obtained.

Thank you very much.

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Controversy in Neurovascular Surgery

To the Editor:


The major debate that has existed with respect to the intraoperative cerebral protection in patients undergoing carotid endarterectomy is whether one should routinely use an intraluminal shunt or selectively shunt those patients identified as having poor collateral blood flow. A new school of thought has developed, to which Dr. Ferguson subscribes, and that is based upon the hypothesis that no one requires intraoperative shunting during expedient carotid endarterectomy with the additional protection of general anesthesia. The series that we presented in our report was used to justify the concept of selective shunting as an alternative to the routine shunting based upon our results that demonstrated a combined stroke morbidity and mortality of 1.5 percent. Since we have no experience with routine non-shunting, I cannot comment on that option, nor was our report intended to imply such a position. The thesis presented in our report is simply that there are patients who do not require internal shunt. Their operation can be done safely during temporary, but unhurried crossclamping of the carotid artery. I presume the only area of dispute between Dr. Ferguson and ourselves is whether or not the other patients are or are not better off with the use of a temporary shunt. Certainly the experience with carotid endarterectomy done under local anesthesia indicates that crossclamping of the carotid artery in patients with back pressures of less than 25 mm of mercury resulted in varying degrees of neurologic dysfunction ranging from mild obtundation to hemiparesis; these deficits are promptly reversed with clamp removal or placement of a shunt. Under these circumstances, I have never had the courage to persist without a shunt, nor am I aware of any reports in the literature which described outcome under these conditions. Perhaps general anesthesia affords sufficient additional protection to permit reversibility as Dr. Ferguson suggests. Yet, there must be a close correlation between clamp occlusion time and whether or not permanent neurologic damage is incurred. As Dr. Ferguson correctly points out, the majority of stroke complications are thromboembolic. These complications are often due to technical problems related to such considerations as endarterectomy end point. I would submit that in the small group of patients with low back pressure, any advantage gained by not using a shunt would be more than given up by a "hurried" endarterectomy. Our teaching of this operation emphasizes importance of doing a careful and deliberate endarterectomy, taking whatever time is necessary to accomplish a perfect technical result. Sufficient available time is provided by either good collateral circulation (back pressure greater than 25 mm of mercury) or the use of an internal shunt.

Dr. Ferguson rightly points out that a larger than usual percentage of patients were shunted because of our policy of shunting all patients who had experienced a prior cerebral infarction as an indication for operation. However, I beg to differ with him when he states that this is an unsubstantiated practice. In our second publication on back pressure, we observed that 17 percent of patients with prior cerebral infarction and a back pressure greater than 25 mm of mercury experienced a temporary worsening of their neurologic deficit when no shunt was used in contrast to similar patients with back pressures less than 25 mm of mercury in whom routine shunting was associated with no exacerbation of neurologic deficit. Green and Charleton, evaluating EEG response with carotid crossclamping noted that 31 percent of patients with prior stroke had a significant change with clamping in contrast to only a 10 percent incidence of EEG changes in those patients without a prior cerebral infarction. We have theorized that there is a zone of tissue around an area of cerebral infarction that is functional, but marginally perfused through collaterals and therefore may have a higher perfusion pressure requirement which will be quite variable from patient to patient. For this reason, we have chosen to include this group of patients in those selected for shunting.

We are quite interested in Dr. Ferguson’s point of view and will watch with interest as his series as well as others articulating this viewpoint develop. In the meantime, I still prefer the confidence obtained in knowing that there is more than adequate perfusion taking place during endarterectomy so as to permit a deliberate, careful, and unhurried approach to an optimum technical result.

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Controversy in neurovascular surgery.
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