Carotid Endarterectomy in Patients With Intraluminal Thrombus

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In response to the extraordinary increase in the number of carotid endarterectomies performed in this country, there is a rising wave of skepticism about the value of and the indications for this procedure. Conventional wisdom has held that one of the strongest indications for urgent carotid endarterectomy is the finding that a patient with ipsilateral ischemic symptoms has an intraluminal thrombus associated with an atherosclerotic plaque at the carotid bifurcation. An important article in this issue of Stroke by Buchan and colleagues from the University of Western Ontario describes the relatively poor results obtained at that institution with endarterectomy based on these conditions. In contrast, another group of patients under similar circumstances who were treated "conservatively" with anticoagulant drugs fared better. On the basis of their experience Buchan et al recommend deferring surgery and treating these patients with anticoagulants, at least initially. Because this recommendation is contrary to a widely accepted therapeutic approach, it should not go unchallenged.

First of all, Buchan et al are not the first to point out that the morbidity rate of carotid endarterectomy is increased in cases that demonstrate an intraluminal thrombus in the preoperative arteriogram. Sundt and colleagues at the Mayo Clinic listed this as one of the factors known to be associated with increased operative morbidity. It appears from their retrospective analysis, however, that none of their complications could be specifically attributed to this factor, although Sundt et al did not specify how many patients had such a finding. More recently, an excellent article not quoted by Buchan et al reviewed this problem. Biller et al from the University of Iowa described five patients who had an endarterectomy soon after the demonstration of an intraluminal thrombus by angiography. Two patients developed a neurologic deficit postoperatively but the deficit was mild in both. With "volume expansion" therapy, the signs resolved completely in one patient and almost completely in the second. Biller et al went on to review the literature on this subject and found 49 patients who had surgery soon after the demonstration of an intraluminal thrombus and 14 patients under similar circumstances who were treated "conservatively," with anticoagulants in 12 of the 14. Biller et al indicate that these two groups may not have been comparable. However, while accepting that the surgical risk is higher in these cases, they concluded from their analysis that surgery is indicated if the lesion is accessible and if the patient has transient ischemic attacks, a mild neurologic deficit, or a progressive stroke refractory to medical therapy.

In our own series at the Massachusetts General Hospital, we found 11 patients who had emergency endarterectomy after the angiographic demonstration of an intraluminal thrombus. Two of these patients died and one had a stroke, but neither death was neurologic in nature. One was due to a myocardial infarct and the second to sepsis from an emergency colectomy for ulcerative colitis in a patient who was very ill preoperatively. Still, a third patient suffered an intraoperative stroke that was probably embolic in nature and related to dislodgement of the intraluminal clot early in the procedure (the EEG deteriorated during dissection prior to clamping).

Better operative experience in cases of intraluminal clot has been reported by Gunning et al, who encountered only one instance of transient postoperative worsening in six patients, and by Goldstone and Effeney, who operated urgently on 28 patients with either extremely tight stenosis (>95%) or intraluminal thrombus without any postoperative strokes in the carotid distribution. Unfortunately, Goldstone and Effeney did not specify how many patients had intraluminal thrombus.

In the article by Buchan et al, the available literature on this subject was largely ignored and their recommendations were based on their own institutional experience. Of 16 patients who were operated upon urgently after the demonstration of an intraluminal clot, two had a postoperative transient ischemic attack and four suffered intraoperative or postoperative neurologic deterioration. In two of these four, the resulting deficit was "mild," and it was probably of embolic origin in one, but in the second patient the deficit was described as an extension of his previous stroke. The other two of the four suffered severe strokes and deserve some comment. One apparently did not have an endarterectomy, but rather a planned operative occlusion of the internal carotid artery. Ten hours after occlusion he developed transient hemiparesis and soon thereafter a dense hemiplegia that did not improve. The second patient is interesting in that he had a carotid thrombus without significant stenosis that was removed by thrombectomy without endarterectomy. Following postoperative carotid occlusion, the vessel was reopened, but again the artery thrombosed, with resultant distal embolization after the second operation. Retro-
respectively, it is tempting to suggest that this second patient should have been treated with endarterectomy or carotid reconstruction rather than by carotid occlusion. Nevertheless, the overall results in the surgical group were disappointing, whereas only one of the 14 patients treated initially with heparin or aspirin (six had an endarterectomy later) had a subsequent stroke. As Buchan et al clearly recognize, the small number of patients involved, the retrospective nature of their analysis, and the lack of randomization make a definite statistical statement impossible. Without a case-by-case analysis, the differences in outcome between the two groups are impressive. When the permanent complications are analyzed in detail, it appears that only one of the two minor and neither of the two major complications in the early surgery group could be directly attributed to embolism from dislodgement of an intraluminal clot in a patient undergoing carotid endarterectomy. It seems unfair to use cases of a patient directly attributed to embolism from dislodgement of an intraluminal clot in a patient undergoing carotid endarterectomy to condemn carotid endarterectomy in patients with intraluminal thrombi. In spite of the above reservations, the article by Buchan and colleagues has emphatically confirmed what has been suspected: the overall operative risk in patients with intraluminal thrombus is increased. This is especially true because most of these patients present with a stroke (22 of 30 in the series of Buchan et al), which attests to the fact that having a thrombus in the lumen of the internal carotid artery is an already dangerous condition. It is well known that the risk of carotid endarterectomy is higher in patients with recent stroke, and whether endarterectomy should be undertaken under these circumstances is an entirely different issue, which cannot be properly discussed here. In addition to the increased incidence of recent stroke, these patients tend to have a higher-than-expected incidence of serious medical problems, which was clearly evident in our own series, in the study of Caplan et al, and in the review by Biller and colleagues. This finding may account for the presence of a state of relative hypercoagulability in many of these patients. Probably the most important contribution of the article of Buchan et al is the demonstration that initial therapy with anticoagulants appears to be safe in these patients. This knowledge gives us a viable alternative form of treatment in symptomatic patients with an intraluminal thrombus. It appears prudent to initiate therapy with heparin urgently in these patients and then evaluate each situation individually, not only from the neurologic point of view, but also from the general medical and hematologic points of view to detect those patients with serious intercurrent illness and/or a hypercoagulable state. Clearly, endarterectomy, if considered at all, should be deferred if the latter is the case. It should probably also be deferred in patients with more than a minor recent neurologic deficit or in patients who are unstable neurologically. Whether a stable patient with a mild or no neurologic deficit and no serious medical or hematologic problems who has symptoms appropriate to a demonstrated intraluminal thrombus should be treated surgically with urgent endarterectomy or medically with anticoagulants remains a matter of individual judgment. Nothing learned from the article by Buchan et al can serve as a definite indictment against either approach. However, the article does remind us that if surgery is undertaken, it should be with the full knowledge by both physician and patient that endarterectomy under these circumstances carries a higher-than-normal risk.

References

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