The Effect of Antiplatelet Therapy on the Incidence of Carotid Plaque Hemorrhage

RONALD L. ERNST, M.D.,* ALEX D. AMMAR, M.D.,† JOE J. LIN, M.D.,‡ AND HENRY TRAVERS, M.D.§

SUMMARY Hemorrhage into the carotid atheroma has recently been gaining attention with respect to the pathophysiology of cerebrovascular disease. Many patients are currently receiving platelet agents for various vascular diseases. Some researchers have postulated that antiplatelet therapy may be detrimental by possibly inducing intraplaque hemorrhage or by increasing preexisting hemorrhage. This retrospective study was undertaken to determine if the use of antiplatelet therapy increases the incidence of carotid plaque hemorrhage.

Ninety-five consecutive carotid endarterectomies were performed and the atheromas examined microscopically for intraplaque hemorrhage. The atheromas were divided into two groups; those from patients receiving preoperative antiplatelet therapy and those who were not.

Forty-five atheromas were removed from patients receiving preoperative antiplatelet therapy; 39 (87%) of these demonstrated intraplaque hemorrhage. Of the 50 atheromas which were removed from patients not receiving preoperative therapy, 45 (90%) showed intraplaque hemorrhage. We conclude that antiplatelet therapy does not increase the incidence of carotid plaque hemorrhage.

STROKE is a leading cause of morbidity and mortality in the United States. The role of extracranial carotid artery disease in the production of cerebral ischemia has been well accepted. More specifically, hemorrhage into the carotid atheroma has recently been gaining attention with respect to the pathophysiology of cerebral vascular disease.1,2 Also many patients are currently receiving antiplatelet therapy since it has been shown to reduce cerebrovascular ischemic symptoms.3,4 Nonetheless, some investigators have questioned the rationale of administering antiplatelet drugs to patients with hemorrhagic lesions.1,2 With the above information in mind, this retrospective study was undertaken to determine if antiplatelet therapy increases the incidence of carotid plaque hemorrhage.

Materials and Methods

From May to September 1983, 85 consecutive patients who underwent 95 carotid endarterectomies were studied at two large community hospitals in Wichita, Kansas.5 The average age was 68 years. Ten patients had bilateral operations. Of the plaques removed, 44 were from patients with ipsilateral hemispheric or retinal symptoms and 51 were from patients with either nonspecific, nonlateralizing symptoms or asymptomatic. Preoperative cervicocephalic angiography was performed on all patients. In the patients with nonspecific symptoms and those who were asymptomatic, the vast majority of lesions reduced the luminal diameter by 70 percent or greater. The patients were interviewed to determine if any preoperative antiplatelet agents had been used within two months prior to operation. Medications specifically questioned included aspirin, dihydramole, antiarthritic medications, analgesics, cough and cold preparations (containing aspirin). Although hundreds of over the counter medications contain aspirin products, the authors believe the above list represents the overwhelming majority of antiplatelet drugs commonly used in this age group.

Carotid endarterectomy was performed by several different surgeons in the routine fashion utilizing general or regional block anesthesia. The atheromas were removed en bloc. Two sections were taken from the area of most gross pathology and examined microscopically for evidence of intraplaque hemorrhage. The plaques were prepared using a modified elastochrome stain. Atheromas which demonstrated operative hemorrhage only were considered to be nonhemorrhagic lesions. One pathologist from each hospital examined all slides from his respective institution.

Results

Eighty-four of 95 (88%) carotid atheromas showed intraplaque hemorrhage. Forty-five of 95 atheromas were removed from patients receiving antiplatelet agents preoperatively. Of these 45, 39 (87%) showed intraplaque hemorrhage. Fifty of 95 atheromas were...
removed from patients not receiving antiplatelet agents preoperatively. Of these 50, 45 (90%) demonstrated intraplaque hemorrhage. Eleven (12%) atheromas showed no intraplaque hemorrhage; six (55%) of these were from patients receiving preoperative antiplatelet therapy.

**Discussion**

Hemorrhage has multiple effects on a carotid plaque. It can increase the plaque size and, consequently, decrease blood flow leading to surface platelet aggregation with platelet embolization or thrombosis.\(^1\) In addition, hemorrhage into a plaque can lead to intimal ulceration and subsequent embolization of hemorrhagic debris.\(^1\) Moreover, Persson and associates have suggested that hemorrhage is significant only when a connection occurs between the arterial lumen and the plaque hemorrhage.\(^6\) These events have been felt to result in the production of cerebrovascular ischemic symptoms. A recent study by this senior author (A.D.A.) demonstrated hemorrhage to be a common finding in most carotid plaques; however, intraplaque hemorrhage was as likely seen in asymptomatic patients as compared with symptomatic patients.\(^3\) On the other hand, research by Lusby, et al.\(^1\) and Imparato and colleagues\(^2\) did demonstrate a significant relationship between intraplaque hemorrhage and symptoms.

In 1978, the Canadian Cooperative Study concluded that aspirin was an efficacious drug for men with threatened stroke. In men the risk reduction for stroke or death was 48 percent whereas no significant trend was observed in women.\(^4\) Bousser et al.\(^1\) reported similar beneficial effects of aspirin in both men and women. Presently, many symptomatic patients are treated with antiplatelet therapy. Antiplatelet agents are thought to inhibit platelet aggregation on carotid plaque surfaces, thereby reducing embolization and subsequent ischemic symptoms. Some researchers,\(^1,2\) however, have postulated that antiplatelet agents have the potential of increasing symptoms in some patients by inducing intraplaque hemorrhage or by increasing preexisting hemorrhage. This would explain why antiplatelet therapy could be detrimental.

Results of the present investigation show that hemorrhage was seen as frequently in carotid plaques not exposed to antiplatelet agents as in plaques that were exposed. More importantly, as many nonhemorrhagic plaques were identified in patients on antiplatelet therapy as in those not receiving antiplatelet therapy. Thus, the concept that antiplatelet medications increase the incidence of intraplaque hemorrhage is not supported in this study.

**References**

The effect of antiplatelet therapy on the incidence of carotid plaque hemorrhage.
R L Ernst, A D Ammar, J J Lin and H Travers

*Stroke*. 1986;17:540-541
doi: 10.1161/01.STR.17.3.540

*Stroke* is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 1986 American Heart Association, Inc. All rights reserved.
Print ISSN: 0039-2499. Online ISSN: 1524-4628

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://stroke.ahajournals.org/content/17/3/540

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in *Stroke* can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at: http://www.lww.com/reprints

Subscriptions: Information about subscribing to *Stroke* is online at: http://stroke.ahajournals.org//subscriptions/