ly reproduce either the fortification (teichopsic) or the scintillating scotoma seen in classic migraine which characteristically lasts 15–30 minutes and really cannot be differentiated from vertebro-basilar insufficiency. It was this association that led the author to name these attacks "Isolated Ophthalmic Migraine".2,3 Others have referred to these visual episodes as Acephalgic Migraine4 since they do not have headache associated with them.

Fischer recently reported his experience at length of "migrainous accompaniments" including transient attacks of blindness, homonymous hemianopsia and blurring in patients after the age of 40 without headache and with normal cerebral angiograms.3 He defended the use of the term "migraine" as used by this author.3 However, to save confusion, these visual attacks would probably be best referred to as Transient Binocular Blindness. Their pathogenesis may be different from the vasoconstriction as defined by Wolff6 or the shunting mechanism as described by Heyck.7 Fisher feels they are rarely caused by basilar artery disease.

The following terminology is suggested: 1) transient blurred vision as an overall designation, 2) transient monocular blindness to be divided into — a) amaurosis fugax (seconds to minutes), b) transient monocular blurring, more prolonged unilateral attacks, 3) transient binocular blindness — homonymous attacks of 5–30 minutes duration. The mechanism and the pathogenesis of these symptoms are complex and, in particular, the attacks of transient binocular blindness are poorly understood but if we all refer to them in similar terminology we may have taken a step forward.

References
3 Hedges TR: An Ophthalmologist's View of Headache Headache 19: 1979
5 Fisher CM: Late-life Migraine Accompaniments as a Cause of Unexplained Transient Ischemic Attacks, Canad. Journal Neuro-Sci 7: 9-17, 1980

Cerebral Infarction Secondary to Unsuspected Intracranial Fibromuscular Dysplasia Following Bypass of Aortic Coarctation

DAVID S. MALLOY, M.D.,* VIRGILIO E. SANGALANG, M.D.,† AND GEORGE M. FRASER, M.D.†

SUMMARY Fibromuscular dysplasia (FMD) is an uncommon finding in the cerebral circulation. We present a case of unsuspected intracranial FMD in a patient dying from a large cerebral infarct following a bypass operation for coarctation of the aorta. The need for recognizing the possible co-existence of these two lesions is emphasized.

FIBROMUSCULAR DYSPLASIA (FMD) is a non-atheromatous, segmental stenosing angiopathy. There are reports of involvement of nearly all systemic arteries.1 FMD, however, is uncommon in the intracranial circulation.2-5 Many patients with FMD harbor other vascular or developmental lesions1 but it has not previously been reported in association with tubular segmental aortic stenosis or coarctation. This report concerns fatal cerebral infarction in a patient with unsuspected intracranial FMD following bypass of an aortic coarctation. It illustrates the importance of recognizing the possible co-existence of FMD and other vascular anomalies.

Case Report
A 41 year old right-handed man was admitted to the Victoria General Hospital on September 28, 1983, for elective repair of an aortic coarctation. During the year prior to admission he complained of exertional dyspnea, intermittent claudication and chest discomfort. For a number of years he had been taking propranolol for hypertension.

He was described as a "small thin male." He was mildly retarded. Blood pressure was 170/60 in both arms. Femoral pulses were delayed and diminished. A
A loud precordial systolic murmur radiated to the left carotid artery. Neurological examination was normal. He had a high arched palate and small testes. No firm diagnosis of a possible congenital syndrome was recognized. Family history was unremarkable.

Admission blood pressure was normal. The electrocardiogram revealed left ventricular hypertrophy, old anterior myocardial damage, and first degree A-V block. Angiography disclosed a 5 cm. segmental narrowing of the aorta just distal to the left subclavian artery. The left common carotid and innominate arteries arose from the same trunk. The aortic "coarctation" was felt to be atypical because of the length of the stenotic segment. The carotid arteries were not included in the angiographic study.

On September 30, he underwent a left subclavian artery to aorta bypass graft. There were no intra-operative problems. Post-operatively, he was awake and following commands. In the 24 hours following surgery, there was continuous bloody drainage from his chest tubes. Hemoglobin fell to 8 grams. Blood pressure fell, briefly, to 90 systolic but there was no sustained period of hypotension. He returned to the operating room where an exploration for bleeding sites proved negative. Ten hours after the second procedure, he was able to follow commands. Six hours later, he had a dense right hemiplegia and a diminished level of consciousness. There was no period of hypotension recorded in the interim. A CT scan of the head revealed a large left hemispheric infarction with shift of the midline structures. He deteriorated rapidly. Forty hours after the second procedure, he was declared neurologically dead. He expired after withdrawal of respiratory support.

At post-mortem a 5 cm. segment of tubular aortic stenosis was seen just distal to the left subclavian artery (fig. 1). The graft was patent and the suture lines clean. There was left ventricular hypertrophy. There were no mural thrombi or valvular vegetations. Two large trunks arose from the aortic arch. The proximal one trifurcated into the right subclavian and right and left common carotid arteries. The distal trunk was the left subclavian artery. There were minimal atherosclerotic changes in both common and internal carotid systems. The supraclinoid portions of both internal carotid arteries were stenosed, the right minimally and the left significantly, to a luminal diameter of only 1.5 mm. The stenosis on the left side extended up to the origin of the anterior cerebral artery. There was a recent large hemorrhagic infarct in the territory of the left middle cerebral artery. No embolus was identified.

Serial histologic sections of the supraclinoid portion of the left internal carotid artery revealed intimal fibromuscular dysplasia (fig. 2). Similar changes were seen in other systemic arteries including the proximal internal carotid, right coronary and superior mesenteric arteries as well as the aortic coarctation (fig. 3). The renal arteries were normal.
Discussion

Fibromuscular dysplasia is reported in many systemic vessels including the cervical carotid arteries. Reports of intracranial involvement are rare. Histological confirmation is even less common. FMD has never been reported in association with aortic coarctation or aortic arch anomalies. Our patient also displayed other developmental anomalies but did not represent any specific dysgenetic disorder or syndrome.

The histopathological classification of FMD is based on the locations of the major lesions within the vessel wall. Intimal, medial and adventitial forms are described. Many patients display a spectrum of lesions with a mixed histological pattern. The intimal lesions in our case represent one of the less common forms of FMD. Most cases are of the medial type. The adventitial variety is unusual but was present in the superior mesenteric artery of our case.

This patient suffered a hemorrhagic cerebral infarction. Most of these are secondary to embolization. Given the severity of the stenosis in the supraclinoid portion of the left internal carotid even a small embolus could produce complete occlusion. However, there was no identifiable source of emboli in our patient. Alternatively, a brief period of relative hypotension or altered hemodynamic state subsequent to a bypass could produce a "low flow" state with subsequent infarction in the region of the tightly stenosed vessel.

This case illustrates the unusual occurrence of intracranial FMD in association with a "coarctation" of the aorta. The latter was atypical in that it involved a longer segment of the aorta than the usual localized stenosis at the level of the ductus arteriosus. The patient also had other minor physical anomalies, including a high arched palate and small testes, and mental retardation. All these features suggest a generalized dysgenetic disorder. The aortic coarctation in this patient appears to have been part of a more widespread dysgenetic vascular disorder such as FMD. Surgical procedures are often indicated to correct symptomatic vascular lesions like aortic coarctation. In view of this possible association between aortic coarctation and FMD, particularly when the coarctation is atypical, pre-operative investigations should include cerebral angiography to rule out the co-existence of a potentially serious cerebrovascular lesion.

Acknowledgments

We thank Dr. R. Landymore of the Victoria General Hospital, Halifax, Nova Scotia, for referring the case and Dr. Allison McCallum who performed the autopsy.

References

4. Iossie A, Kier EL, Ostraw D: Fibromuscular dysplasia involving the
Cerebral infarction secondary to unsuspected intracranial fibromuscular dysplasia following bypass of aortic coarctation.
D S Malloy, V E Sangalang and G M Fraser

*Stroke*. 1984;15:908-911
doi: 10.1161/01.STR.15.5.908

*Stroke* is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 1984 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/15/5/908

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/