Fibromuscular Hyperplasia of the Carotid Artery Causing Positional Cerebral Ischemia

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The first histologically proven case of fibromuscular hyperplasia of a carotid artery was reported by Connett and Lansche[1] in 1965. Recently, Ehrenfeld *et al.*, reported a second case treated by resection of the affected portion of artery with relief of transient ischemic symptoms.[2] Several examples of arteriographic changes in the carotid vessels suggestive of fibromuscular hyperplasia, but without pathologic confirmation, have been reported by Palubinskas *et al.*[4,5] and Wylie *et al.*[7]

This is a report of a case of histologically proven fibromuscular hyperplasia of the carotid artery causing transient ischemic attacks. In addition to the rarity of the lesion, this case demonstrates the unique feature of intermittent cerebral ischemia occasioned by position.

Case Report

A 30-year-old woman was first seen because of profound transient nocturnal episodes of right hemiparesis for 3 months. At initial examination there were no abnormal pulses or bruits and sequential carotid compression was tolerated without ill effect. There were no signs of residual neurologic deficit. Positional ophthalmodynamometry showed no significant changes in retinal artery pressures.

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Bilateral percutaneous carotid and cerebral arteriography disclosed no abnormality, electroencephalography was normal and the patient was discharged from the hospital. Followup examination because of persistence of the nocturnal episodes of hemiparesis disclosed a loud bruit over the left carotid bifurcation when the patient's head was turned sharply to the right. No bruit was heard with the patient's head in neutral or left lateral positions.

Repeat arteriography performed by percutaneous femoral puncture catheter technic included studies with the patient's head in the neutral and right lateral positions (Fig. 1). Arteriograms showed an essentially normal left carotid artery with the patient's head in neutral position, but a discrete filling defect at the internal carotid origin on the right positional film.

Reconstructive operation was performed under general anesthesia. A temporary internal shunt maintained carotid flow during the time of occlusion. Through a vertical anterior arteriotomy, a firm, discrete ridge was seen traversing the posterior wall of the origin of the internal carotid artery. The ridge was excised transversely (Fig. 2A), and the posterior defect was closed primarily. The anterior arteriotomy was closed with a diamond-shaped prosthetic patch. Postoperatively the patient did well and has been free of symptoms to the present time.

Microscopic examination of hematoxylin-eosin, trichrome, and elastic stain preparations of the specimen showed abundant subintimal and medial fibrosis. Fibrous tissue was interspersed with muscle cells throughout the media. The adventitia was free of excessive fibrous or inflammatory reaction (Figs. 2B and 2C). The diagnosis of fibromuscu-

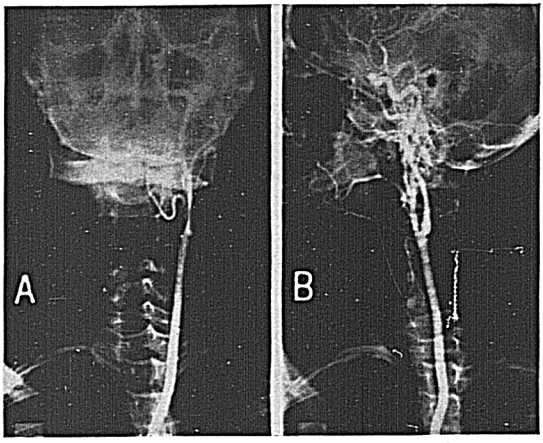

FIG. 1. Left carotid arteriograms taken with the patient's head in neutral (A) and right lateral (B) positions. The discrete defect at the internal carotid origin and post-stenotic dilatation in the positional view are clearly shown.

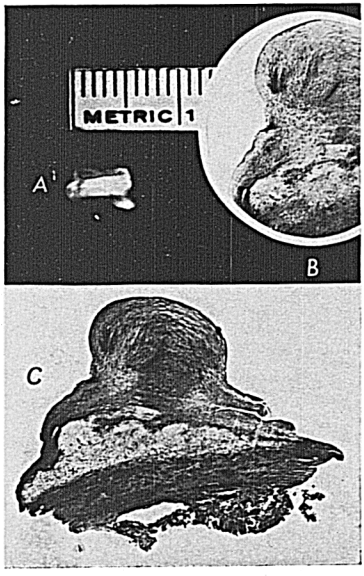

FIG. 2A. Gross photograph of excised lesion. B. Photomicrograph of hematoxylin-eosin preparation of specimen (×100). Fibrous involvement of subintima and media is apparent. Trichrome and elastic tissue stains confirmed fibrous nature of abnormal tissue. C. Lower-power photomicrograph showing full-wall thickness of specimen (×12). Adventitia is uninvolved.

lar hyperplasia was consistent with the criteria of Hunt *et al.*,[3] and Wellington.[4]

Discussion

The patient's symptoms were most likely the result of positional compromise of left carotid flow by the fibromuscular hyperplasia. The discrete lesion is in contrast to the extensive completely occluding lesion described by Connett and Lansche[1] although both were in young women (30 and 34 years of age).

Positional arteriography is essential in establishing an exact diagnosis in patients whose symptoms are positional, although this was not initially appreciated in this case. Selective catheter arteriography from

below is a safe approach for complete study of the extracranial cerebral vessels and is the approach of choice when positional views are indicated. The diagnosis of fibromuscular hyperplasia on arteriographic appearance alone, without histologic proof, is tenuous. We have occasionally seen segmental irregularities on carotid arteriograms that were not present on repeated arteriograms. We assumed that these transient changes were due to irritative spasm caused by the contrast medium. The so-called "stationary wave phenomenon" may be secondary to pressure effect on the arterial wall producing artefactual irregularities and creating difficulty in interpretation.

Summary

1. A case of discrete fibromuscular hyperplasia of the carotid artery causing transient ischemic attacks is reported. Apparently this is the third reported case with histologic documentation.

2. Of added interest is the positional flow-restrictive nature of the lesion in this case.

Acknowledgment

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References

1. Connett, M. C. and Lansche, J. M.: Fibromuscular Hyperplasia of the Internal Carotid Artery. Ann. Surg., 162:59, 1965.
2. Ehrenfeld, W. K., Stoney, R. J. and Wylie, E. J.: Fibromuscular Hyperplasia of the Internal Carotid Artery. Arch. Surg., 95:284, 1967.
3. Hunt, J. C., Harrison, E. G., Kincaid, O. W., Bernatz, P. E. and Davis, G. D.: Idiopathic Fibrous and Fibromuscular Stenosis of the Renal Arteries Associated with Hypertension. Proc. Mayo Clin., 37:181, 1962.
4. Palubinskas, A. J. and Ripley, H. R.: Fibromuscular Hyperplasia in Extrarenal Arteries. Radiology, 82:451, 1964.
5. Palubinskas, A. J., Perloff, D. and Newton, T. H.: Fibromuscular Hyperplasia. Amer. J. Roentgen., 98:907, 1966.
6. Wellington, J. S.: Fibromuscular hyperplasia of Renal Arteries in Hypertension. Amer. J. Path., 43:955, 1963.
7. Wylie, E. J., Binkley, F. M. and Palubinskas, A. J.: Extrarenal Fibromuscular Hyperplasia. Amer. J. Surg., 112:149, 1966.