

SECTION EDITOR: GRACE S. ROZYCKI, MD

Image of the Month

Ruth L. Bush, MD; Charles C. Bianco, MD

A HEALTHY 72-YEAR-OLD woman was referred to a vascular surgeon after a carotid duplex scan demonstrated elevated velocities in her left internal carotid artery, consistent with an 80% to 99% stenosis. Questioning revealed an absence of symptoms such as extremity numbness or tingling, dysarthria, or amaurosis fugax. She was nonhypertensive and had never used tobacco products. Furthermore, her lipid and serum creatinine levels were within normal range, and there was no family history of atherosclerotic disease. The pri-

mary care physician gave her a regimen of one aspirin per day.

Because of the discrepancy between her duplex findings and the lack of atherosclerotic risk factors, a carotid arteriogram was performed (**Figure**).

What Is the Most Appropriate Therapy for This Patient?

- A. Schedule carotid endarterectomy
- B. Continue antiplatelet therapy and observation
- C. Perform percutaneous dilatation of all affected arteries
- D. Perform surgical graduated dilatation of stenotic carotid artery

From the Cardiac and Vascular Surgery Center, Tallahassee Memorial Hospital, Tallahassee, Fla.



Figure.

Answer

Perform Surgical Graduated Dilatation of Stenotic Carotid Artery

Selective angiography of both the right (A) and left (B) internal carotid arteries showing typical "string-of-beads" appearance.

Fibromuscular dysplasia (FMD) of the internal carotid artery (ICA) is a rare condition that may cause transient ischemic attacks, stroke, or even death.^{1,2} Symptoms produced by FMD are generally secondary to associated arterial stenosis and are clinically indistinguishable from those caused by atherosclerotic disease. Traditionally, the diagnosis of FMD has been by means of conventional selective cerebral angiography performed for evaluation of a suspected carotid stenosis.^{3,4}

Medial fibroplasia (the major subgroup of FMD seen in the ICA) of the extracranial ICA occurs most frequently in women (90%) and is recognized at approximately 55 years of age.^{5,6} Other vessels commonly involved with the disease process are the renal, vertebral, subclavian, mesenteric, and iliac arteries. Only 10% of patients with FMD will have complications related to this disease. Mainly, symptoms are due to encroachment on the vessel lumen and a reduction of flow. Additionally, thrombi may form in the areas of mural dilatation from a stagnation of flow, leading to distal embolization. Vascular involvement with FMD tends to be located much higher in the ICA than atherosclerotic lesions — usually at the level of the first through third cervical vertebrae. The ICA may be tortuous, elongated, or kinked. Bilateral involvement occurs in 39% to 86% of cases.

Patients are usually referred for noninvasive studies when either a carotid bruit is auscultated by chance, or when a symptom is the presenting feature. As described herein, FMD lesions tend to be higher in the extracranial segment of the ICA than atherosclerotic lesions, and they may not be readily demonstrated by duplex scan. However, with an experienced technician and a high level of suspicion, we feel the diagnosis may be established by this approach. Doppler examination will demonstrate minimal disease in the carotid bulb, with hemodynamically significant lesions occurring in the intermediate and distal segments of the ICA.⁵ Tandem and perhaps multiple lesions may be present, due to multifocal thickening and alternating areas of thin and dilated wall. Thickening hyperechoic shadowing may be present, suggesting hyperplasia of the arterial wall. In addition, redundancy and kinking of the extracranial ICA may be present. If FMD is suspected on a screening ultrasound, angiographic studies should be performed. The contrast study should include an aortic arch study, carotid injections, intracranial

artery views, and visualization of the renal and external iliac arteries.

Surgical intervention has been favored for symptomatic patients with angiographically proven disease.^{2,7} Owing to the distal location of FMD lesions in the extracranial ICA, resection and repair is not usually feasible. Instead, graduated intraluminal dilatation under direct vision has been used successfully in patients continuing postoperatively on antiplatelet therapy. Patients should be followed up periodically for arterial patency.

Corresponding author: Ruth L. Bush, MD, Cardiac and Vascular Surgery Center, 1405 Centerville Rd, Suite 5000, Tallahassee, FL 32308 (e-mail: rlbush@aol.com).

REFERENCES

1. Stewart MT, Moritz MW, Smith RB III, Fulenwider JT, Perdue GD. The natural history of carotid fibromuscular dysplasia. *J Vasc Surg.* 1986;3:305-310.
2. Damme HV, Sakalihan N, Limet R. Fibromuscular dysplasia of the internal carotid artery: personal experience with 13 cases and literature review. *Acta Chir Belg.* 1999;99:163-168.
3. Schievink W, Bjornsson J. Fibromuscular dysplasia of the internal carotid artery: a clinicopathological study. *Clin Neuropathol.* 1996;15:2-6.
4. Sell J, Seigel R, Orison W, Roberts W. Angiographic pattern change in fibromuscular dysplasia: a case report. *Angiology.* 1995;46:165-168.
5. Schlagenhauff R, Khatri A. Fibromuscular dysplasia of internal carotid arteries: with doppler ultrasonic studies. *N Y State J Med.* 1983;83:234-236.
6. Schievink W, Meyer F, Parisi J, Wijidicks E. Fibromuscular dysplasia of the internal carotid arteries associated with α 1-antitrypsin deficiency. *Neurosurgery.* 1998;43:229-233.
7. Collins G, Rich N, Clagett G, Spebar M, Salander J. Fibromuscular dysplasia of the internal carotid arteries: clinical experience and follow-up. *Ann Surg.* 1981;194:89-96.

Submissions

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