CASE OF THE MONTH

Vascular neck bruit in a teenager

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A healthy 16-year-old female presented to our internal medicine clinic with a 6-month history of dizziness and two fainting attacks within the past month. She mentioned feeling a buzzing noise in the left side of her neck, for which she sought medical advice. Physical examination revealed left carotid bruit but was otherwise unremarkable. Lipid profile and hypercoagulable screen

revealed normal values. Doppler ultrasound examination (Figure 1) and then MR angiography of the neck vessels (Figure 2) were performed.

How would you describe the findings? What are the diagnosis and associated risks?

Is there a differential diagnosis and what would you do next?

(a)

(b)

Figure 1. (a) Axial ultrasound image of the left common carotid artery. (b) Sagittal Doppler ultrasound image of the left common carotid artery.

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(a)

(b)

Figure 2. (a) Axial time-of-flight MR angiographic image of the neck vessels. (b) Three-dimensional projection of the vessels in the left side of the neck.

Figure 3. Intraoperative picture of the left common carotid artery showing a concentric ridge-like lesion in an otherwise smooth internal vessel wall.

Doppler ultrasound of the carotid vessels showed normal vessel wall thickness with no atheromatous plaques, but there was a focal concentric narrowing of the lumen of the left common carotid artery (CCA). This was caused by a circumferential band of tissue (Figure 1a) projecting into the lumen and causing more than 70% stenosis; this was consistent with a congenital carotid web. The colour Doppler ultrasound demonstrated high-flow jet and aliasing in the area of highest velocity, with a significant increase in peak systolic velocity (to 410 cm s^{-1}) and end-diastolic velocity (to 215 cm s^{-1}) (Figure 1b). Time-of-flight (Figure 2a) and intravenous contrast-enhanced (Figure 2b) MR angiography of the neck vessels confirmed the ultrasound findings of a focal CCA web, located 4 cm below the bifurcation.

The patient was referred for vascular surgery, where an endarterectomy and a saphenous vein patch angioplasty were performed. To the naked eye, the intraoperative appearance of the artery suggested focal dissection (Figure 3). This was supported by the patient's sporting history of several years as a practitioner of karate, with possible exposure to focal trauma. However, the histopathological examination of the endarterectomy specimen revealed that the web was covered with intima and composed of benign fibromyxoid tissue with no evidence of dissection, haemorrhage, inflammation or atherosclerosis. The pathology findings are consistent with a congenital anomaly (web) rather than with a post-traumatic event. Follow-up after 6 months revealed a capacious patch angioplasty with no evidence of renewed stenosis.

Discussion

Carotid web has been defined as a diaphragm-like obstruction of the carotid secondary to a developmental fibrous band and is not of atherosclerotic origin [1]. The prevalence of carotid web and the likelihood of subsequent thrombus formation are unknown [2]. It is likely that the intraluminal web produces a low-grade obstruction that may disturb flow and may serve as a focus for thrombus formation, with subsequent embolisation of a thrombus leading to transient ischaemic attack, stroke or even death

[3, 4]. Carotid webs are treated by surgical excision, balloon catheter dilatation or stent grafting [5]. Some surgeons advocate the use of patch angioplasty in addition to endarterectomy to provide additional assurance against recurrence or regrowth of the abnormal tissue [3]. The differential diagnosis of the imaging appearances of a carotid web includes atypical fibromuscular dysplasia, vascular dissection or atherosclerotic disease.

Fibromuscular dysplasia (FMD) is a non-atherosclerotic angiopathy of unknown pathogenesis that affects mainly medium-sized arteries [5]. It occurs in young to middle-aged individuals and is more frequent in females. The most common angiographic appearance of FMD is the classic "string of beads", smooth concentric tubular narrowing is a less common appearance of this angiopathy [3, 5]. Atypical FMD involves only one wall of the vessel and produces a smooth or corrugated mass that projects into the vessel lumen, creating the angiographic appearance of a web [3, 4].

Cranio-cervical artery dissection is considered to be either traumatic or spontaneous in origin. Traumatic dissection is a complication of severe blunt trauma of the head and neck. Spontaneous dissection may be preceded by a trivial trauma (*e.g.* coughing, vomiting, sporting injury or cervical manipulation); such trivial trauma is generally not followed by artery dissection but might simply act as a trigger in a susceptible individual with an underlying arteriopathy [5].

Atherosclerotic plaques can be focal and can even have a web-like appearance [6]. Symptomatic atherosclerotic disease in the carotid artery of a young woman would be unusual, however, except perhaps as a manifestation of a more global systemic disease such as diabetes or hyperlipidaemia, neither of which were present in our patient [3].

The histopathological examination of our patient's tissue showed no evidence of dissection or vascular wall injury. Treatment with elective endarterectomy and saphenous vein patch angioplasty, rather than stenting, was chosen in this case because of the patient's young age. The diagnosis of carotid web should be considered in a young patient presenting with vascular symptoms who is otherwise healthy and has no history of trauma or systemic disease [3].

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