

The web unveiled: A rare case of bilateral carotid web presenting as acute ischemic stroke

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ABSTRACT

Carotid web (CaW) is a focal intimal variant of fibromuscular dysplasia (FMD) that has emerged as an important cause of cryptogenic stroke. Although most commonly reported as unilateral presentation, bilateral CaWs are exceptionally rare and remain poorly documented in existing literature. We report the case of a 58-year-old male presenting with acute-onset right-sided hemiparesis following a transient loss of consciousness. Vascular evaluation using carotid Doppler and magnetic resonance angiography demonstrated bilateral CaW involving the right common carotid artery and left internal carotid artery, causing moderate luminal stenosis. This case highlights the diagnostic challenges associated with a CaW, as the lesion is often subtle and may be overlooked on routine ultrasonography, leading to diagnostic delay. Early recognition and the use of appropriate vascular imaging modalities are crucial for accurate etiological assessment and optimal management of ischemic stroke.

Key words: Carotid web, Fibromuscular dysplasia, Ischemic stroke

Fibromuscular dysplasia (FMD) is a non-atherosclerotic, non-inflammatory vascular disease, resulting in a wide continuum of symptoms, severity, and morbidity. Being predominant in females, it may manifest as stenosis, aneurysm, dissection, occlusion, and arterial tortuosity [1]. Out of its many types, the carotid web (CaW) stands out. A CaW is described as a rare focal intimal variant of FMD and implicated in acute ischemic stroke [2].

Although traditionally considered rare, recent case series and large imaging reviews suggest that CaW may be an important and overlooked cause of recurrent ischemic stroke in young adults [3]. The pathophysiological mechanism is believed to involve altered hemodynamics, which promote thrombus formation even in the absence of significant luminal stenosis [4]. Histopathological analysis further supports the embolic potential of the lesion, demonstrating intimal hyperplasia with organized thrombus adherent to the web surface [5]. While unilateral CaW is more common, bilateral webs have been documented and may carry an even higher risk of recurrent ischemic events due to bilateral sources of emboli [6]. Bilateral carotid webbing demands further reporting and study because it

may carry a significantly higher risk of embolic stroke compared to unilateral lesions, as both carotid arteries can serve as independent sources of thrombus. Despite this potential danger, bilateral webs remain poorly described in current literature, leaving major gaps in understanding their natural history, recurrence rates, and long-term outcomes. Thus, the recognition of bilateral CaW is therefore essential, particularly in patients presenting with recurrent transient ischemic attacks (TIAs) or strokes where conventional vascular risk factors are absent.

Most of the ischemic stroke cases that have been documented are largely attributed to large artery atherosclerosis, cardioembolism, or small vessel disease. Hence, carotid webbing as an etiology for the recurrent ischemic stroke is a very rare case presentation. In addition, the clinical manifestation of recurrent ischemic stroke, despite only moderate stenosis of 50–60% in this patient, makes this case more intriguing and out of the common.

CASE PRESENTATION

A 58-year-old male was admitted with complaints of progressive weakness in the right upper and lower limbs for the past 1 week. He was apparently asymptomatic

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until 1 week ago, when he experienced sudden giddiness while walking on the road, followed by a transient loss of consciousness. He was taken to a nearby clinic, where he regained consciousness but noted a new onset of weakness of the right side of his body. Since the onset of symptoms, he has been unable to lift his right arm above shoulder level, comb his hair, walk without support, squat, or maintain grip with his right foot. There was no history of speech disturbances, facial deviation, seizures, headache, or visual disturbances. His history is significant for Type 2 diabetes mellitus and hypertension for 5 years, for which he is on regular medication. He also has an 8-year history of smoking. There was no history of prior stroke or TIAs.

On general physical examination, he was stable, except for markedly elevated blood pressure. Central nervous system examination revealed normal tone, reflexes, and power (4/5) on the left side. The right upper and lower limbs showed decreased muscle strength (2/5), with no sensory deficits or cranial nerve involvement. Based on the clinical examination, this was suspected to be a case of an ischemic stroke due to embolic obstruction in the cerebral arteries or intercerebral hemorrhage or a probable lacunar infarct of the small vessels in the brain.

As part of the stroke workup, a carotid and vertebral artery Doppler study and magnetic resonance imaging (MRI) of the brain were advised. The Doppler report revealed bilateral right common carotid artery (RCCA) and left internal carotid artery (LICA) atheromatous plaques causing 50–60% luminal stenosis (Fig. 1). Thus, based on the Doppler results and associating it with the clinical manifestations of the patient, the final diagnosis was brought to a conclusion that the cause of the recurrent ischemic stroke was due to bilateral carotid webbing of RCCA and LICA.

DISCUSSION

CaW is a vascular abnormality characterized by a thin, intraluminal projection arising from the posterior wall



Figure 1: Image showing bilateral carotid webbing on the right common carotid artery and the left internal carotid artery

of the carotid bulb. Histologically, it represents an intimal variant of FMD, composed predominantly of fibrous connective tissue rather than any smooth muscle proliferation [7]. Similar to prior reports, the presentation in our patient aligns with the classic embolic mechanism seen in CaW-related strokes, where even moderate luminal narrowing results in significant embolic risk [8].

Unilateral CaW is found to be more predominant in its occurrence compared to bilateral CaW formation, which is quite rare, as mentioned by Sajedi *et al.* [9]. In contrast, our patient demonstrated bilateral involvement with 50–60% stenosis on both sides, placing him at a comparatively higher risk for CaW-induced stroke occurrence. This distinguishes the case from typical presentations and contributes to the limited but growing literature on bilateral CaW [10–13].

In this case, the patient had additional significant risk factors like hypertension, diabetes, and a history of smoking, which may have synergistically worsened web formation and accelerated thrombus formation [10]. A similar case was documented by Sadig *et al.* [14], where a 36-year-old woman presented with seizure-like jerky movements. Computed tomography (CT) angiography and cerebral angiogram revealed bilateral internal carotid artery CaWs, with all the other stroke causes excluded. She underwent staged bilateral carotid endarterectomy with good recovery. Another case, reported by Essibayi *et al.* [15], clearly displays an instance of misdiagnosis of the etiology of recurrent stroke in the patient, where a 51-year-old woman presented with acute aphasia, right hemisensory loss, and visual field defect, and imaging showed a left middle cerebral artery embolic infarct. CT angiography (CTA) and angiography demonstrated bilateral CaWs initially misdiagnosed as dissections. She was managed medically with antiplatelet therapy and remained recurrence-free with good recovery.

Although CaW is increasingly identified as an important cause of ischemic stroke, its diagnosis remains challenging because the lesion is subtle and often overlooked on routine carotid ultrasonography [11]. Thus, diagnostic delay is common in cases of CaWs and might require advanced imaging such as Doppler scan, CTA, or high-resolution MRI for definitive identification.

Management and treatment of the CaW remains debated. While antiplatelet therapy is typically introduced, several studies have shown that patients managed medically have a significant risk of recurrent ischemic stroke due to the persistent embolic source [12]. Interventions such as carotid endarterectomy or stenting have shown favorable outcomes and may be particularly effective in bilateral cases [13].

CONCLUSION

This case highlights the diagnostic challenges associated with a CaW, as the lesion is often subtle and may be overlooked on routine ultrasonography, leading to diagnostic delay. Early recognition and the use of

appropriate vascular imaging modalities are crucial for accurate etiological assessment and optimal management of ischemic stroke.

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