

# Stroke Attributable to a Calcific Embolus From the Brachiocephalic Trunk

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**Background and Purpose**—Calcific brain embolization is a rare event that is usually secondary to cardiac valve calcification. We present a case of stroke caused by embolization of calcific material from the brachiocephalic trunk, probably induced by radiotherapy.

**Summary of Case**—A 56-year-old right-handed female developed left-sided hemiparesis, hemihypesthesia, and sensory inattention. She had a history of right breast carcinoma that was excised 8 years previously followed by radiotherapy. She had no other history of note. Computed tomography of the head and magnetic resonance imaging confirmed a calcific embolus in right middle cerebral artery and an acute infarction in the corresponding territory. Plain chest radiography, carotid ultrasonography, transthoracic and transoesophageal echocardiography failed to demonstrate the source of calcific embolism. Computed tomography of the thorax revealed heavy calcification of the brachiocephalic trunk and the origin of the right common carotid artery.

**Conclusions**—Undertaking a vigilant systematic search for the source in cases of calcific embolization is necessary. The aorta and its main branches are possible, yet unusual, sources of calcific emboli that merit investigation. (*Stroke*. 2006;37:e6-e8.)

**Key Words:** brachiocephalic trunk ■ calcinosis ■ carotid arteries ■ embolism ■ radiotherapy ■ stroke

Embolization of calcific material to the cerebral vessels is a very rare event that often remains asymptomatic.<sup>1</sup> Calcified heart valves are the most common sources of such emboli,<sup>1-4</sup> but a few instances of embolization from atheromatous plaques of the carotid arteries have also been reported.<sup>5,6</sup>

We describe a case of stroke documented *in vivo* to be caused by spontaneous embolization of calcific material from the brachiocephalic trunk to the middle cerebral artery (MCA).

## Case Report

A 56-year-old right-handed female noticed, on awakening in the morning, distal weakness of the left upper and lower limbs with unsteadiness and swaying to the left side. She had a history of grade I right breast ductal carcinoma that was diagnosed and completely excised 8 years previously. Subsequent radiotherapy was given for lymph node spread and the patient has since then only been on tamoxifen. She is not a smoker and had no history of other cardiovascular risk factors and no other relevant past medical history. On examination, her pulse was regular, her blood pressure was 150/80 mm Hg, and her temperature and respiratory rate were normal. Neurological examination showed a left-sided hemiparesis, hemihypesthesia, and sensory inattention. Cognition, language, vision, and cranial nerve examination were normal.

Computed tomography (CT) of the head with and without contrast revealed a right MCA territory infarction, and this was confirmed on magnetic resonance imaging (MRI) (Figure). The CT also showed a calcified high-density rounded mass that appeared to be within the right MCA. CT angiography of the intracranial vessels verified the intravascular location of the calcific mass (Figure, d). Plain chest radiography, carotid ultrasonography, and transthoracic echocardiography did not reveal any abnormalities. Transoesophageal echocardiography demonstrated a patent foramen ovale, normal cardiac valves, and incidentally minor atheroma in the descending thoracic aorta. CT of the thorax revealed heavy calcification of the brachiocephalic trunk and the origin of the right common carotid artery (Figure, e).

The patient was discharged from hospital on aspirin and simvastatin for mildly elevated total serum cholesterol (5.8 mmol/L). She had made an almost complete recovery and has since remained asymptomatic.

## Discussion

To our knowledge, spontaneous embolization of calcific material from the carotid artery to the cerebral circulation was demonstrated only once before.<sup>5</sup> Calcific brain embolization has also been reported after intraoperative manipulation of a heavily calcified carotid artery in one case.<sup>6</sup>

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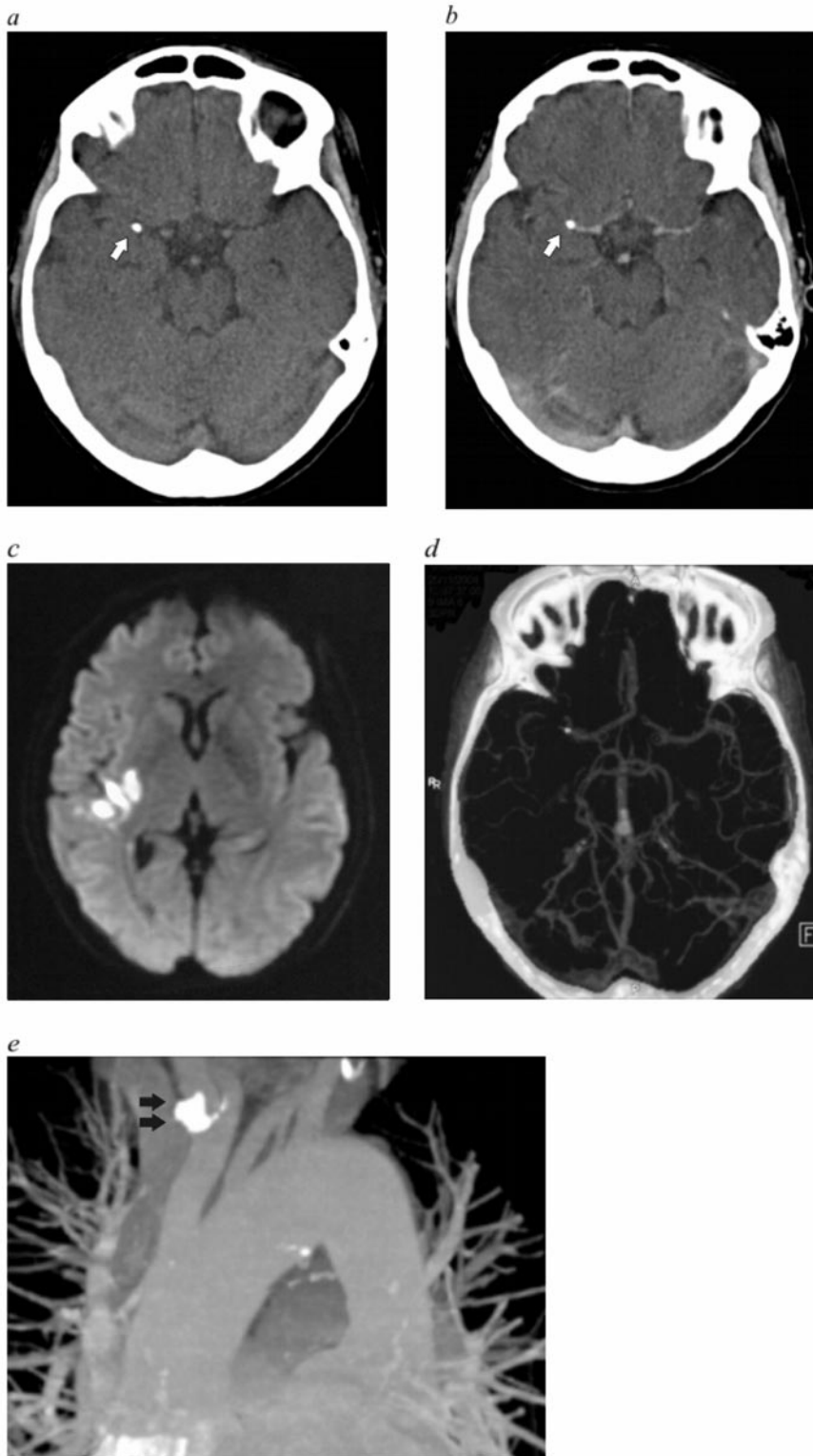
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a and b, CT scan of the head with and without contrast showing a calcified mass (arrows). c, Diffusion-weighted MRI of the head confirming acute ischemia in the corresponding MCA territory. d, CT angiography showing the calcified mass within the right MCA with poor distal flow. e, 3-Dimensional reconstruction of the arch of aorta and the great arteries demonstrating a calcified mass (arrows) in the brachiocephalic trunk, extending into the origin of the right common carotid artery. Also note minor calcific foci in the aortic arch and vertebral artery.

In the case of our patient, it is reasonable to assume that the source of the calcific embolus that caused her stroke is the heavily calcified brachiocephalic trunk. A cardiac source is unlikely in the absence of cardiac valve pathology and the finding of patent foramen ovale is also insignificant because there is no reason to believe that paradoxical calcific embolization from the venous circulation was the mechanism behind her stroke.

It is interesting that conventional chest radiography and transoesophageal echocardiography have both failed to show this patient's remarkable calcification. The choice of CT over MRI was directed by the calcific nature of the embolus and has provided clear findings. The radiotherapy received for treating her right-sided breast malignancy may well be incriminated as the reason behind her pathology. Radiation for breast cancer is a well recognized cause of atherosclerotic disease of the heart, the

aorta, and the great vessels.<sup>7</sup> Although stenotic and occlusive disease of the subclavian arteries represent the majority of postirradiation arterial lesions, calcification and involvement of the brachiocephalic trunk have been rarely observed.<sup>8</sup>

The scarcity of clinical reports of calcific brain embolization, particularly from atherosclerotic sources, may only reflect that they are easily missed on clinical imaging and that identification of the source is often not achieved. This case illustrates the importance of undertaking a vigilant systematic search for the source of embolization and recognizing the aorta and its main branches as a possible, yet unusual, source of calcific emboli that merits investigation.

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