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DOI: 10.4103/bc.bc_71_21

Multiple watershed and cardioembolic strokes in 84-year-old male after cardiac ablation procedure: Case report

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Abstract:

Current guidelines do not include radiologic assessment of the carotid arteries before catheter ablation procedures. There are multiple studies describing the risks of periprocedural cardioembolic strokes during cardiac ablation procedure but none describing the risks of periprocedural watershed strokes due to hypoperfusion during cardiac ablation. It is critically important for neurologists, cardiologists, and all other associated health-care workers to recognize the risks of neurologic complications, such as watershed strokes, before cardiac procedures are performed. We are presenting an 84-year-old male who presented to the emergency room with complaints of vision changes after a cardiac ablation procedure for atrial fibrillation. He described spotty vision with decreased visual acuity in both eyes. Magnetic resonance imaging of the brain showed multiple strokes bilaterally. Based on the radiologic features, all the strokes happened at approximately the same time. Of note, subsequent computed tomography angiography of the head and neck showed 65%–70% bilateral stenosis of the internal carotid arteries.

Keywords:

Cardiac ablation, computed tomography angiogram, diffusion-weighted magnetic resonance, watershed stroke

Introduction

Cerebral watershed strokes involve the junction of two nonanastomosing arterial systems and are hemodynamic zones at risk of hypoperfusion. Strokes occur in 3%–9% of patients who undergo cardiac procedures.[1] Patients with postoperative strokes have up to a tenfold increase in mortality and a threefold increase in the length of hospital stay.[2] The mechanism underlying postcardiac surgery watershed stroke involves a combination of hypoperfusion and embolization,[3] but the role of hypoperfusion has not been well elucidated. Watershed strokes in the general population are usually secondary to global hypoperfusion, such as during cardiac arrest.[3] However, they may also be attributed to stenosis of the carotid artery or other major vessels, leading to local hypoperfusion.[3,4] Catheter ablation is the treatment of choice for atrial fibrillation and is currently one of the most commonly performed electrophysiology procedures in the US.[5] Successful catheter ablation in patients with atrial fibrillation is associated with a decrease in systolic blood pressure.[4] In patients with significant stenosis of major supplying vessels, cerebral blood flow is directly dependent on perfusion pressure as a result of impaired autoregulatory capacity in cerebral circulation,[6] making patients with underlying stenosis of these major blood vessels more sensitive to drops in blood pressure and hypoperfusion.

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Submission: 24-10-2021
Revised: 01-11-2021
Accepted: 19-11-2021
Published: 21-03-2022

How to cite this article: Babici D, Bayas A, Johansen P, Waheed S, Sharma P, Carranza-Renteria O, *et al*. Multiple watershed and cardioembolic strokes in 84-year-old male after cardiac ablation procedure: Case report. Brain Circ 2022;8:61-3.

Case Report

The patient is an 84-year-old male with a past medical history of hypertension, gastrointestinal hemorrhage, coronary artery disease status postcoronary artery bypass graft, and recent cardiac ablation for atrial fibrillation, for which he was on apixaban 5 mg twice daily. Of note, this apixaban dosage was administered both before and after the ablation procedure. He presented to the emergency room with complaints of changes in vision for 5 days, beginning immediately after his cardiac ablation procedure. He denied nausea, vomiting, or vertigo. On physical examination, the patient was found to be alert and oriented to person, place, and time. Cranial nerve examination was significant for spotty vision in the upper visual field of the left eye and decreased visual acuity bilaterally. On finger-to-nose test, the patient became nauseated without vomiting. The remainder of the neurologic examination was intact. Musculoskeletal examination revealed a large right groin hematoma where the access for cardiac ablation was made. Strength of the upper and lower extremities was normal. At the time of assessment, NIH score was 1.

On admission, the patient was mildly hypotensive with a blood pressure of 100/65 mmHg, down from his usual hypertensive range. Other vital signs were within normal ranges. Based on the cardiac ablation anesthesiology report, the patient's blood pressure at the start of the procedure was 170/85. Twenty minutes later, the blood pressure dropped to 90/45 and remained low for the following 15 min. The patient was subsequently given phenylephrine, and the blood pressure rose to 120/80. Near the end of the procedure, the systolic blood pressure again dropped to lower 90s, prompting a second dose of phenylephrine. Based on the patient's chart, his systolic blood pressure was in the lower 100s in the immediate postoperative period.

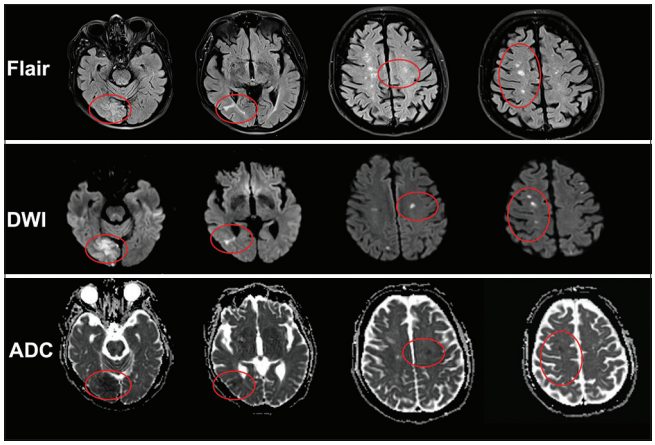

Figure 1: Magnetic resonance imaging of the brain. Multiple subacute watershed strokes bilaterally and a cardioembolic stroke in the distribution of the right posterior cerebral artery

Computed tomography (CT) of the brain was negative for intracranial hemorrhage. Magnetic resonance imaging of the brain showed multiple watershed strokes bilaterally as well as a cardioembolic stroke in the right posterior cerebral artery distribution, which was confirmed on flair, diffusion-weighted imaging, and apparent diffusion coefficient images [Figure 1]. The radiologic features demonstrate that all the strokes happened at approximately the same time. Subsequent CT angiography of the head and neck showed stenosis of the bilateral internal carotid arteries (ICA) as well as the left common carotid artery [Figure 2]. Transthoracic echocardiogram was performed and revealed left ventricular ejection fraction of 55%, moderate dilatation of the left and right atria, and concentric left ventricular hypertrophy. The patient's hospital course was complicated by right groin hematoma expansion at the site of catheter insertion. Anticoagulation was stopped until hospital day 3 when the hematoma resolved. At this time, the patient was discharged on dual antiplatelet therapy and a high-intensity statin with instructions for outpatient neurology follow-up for continued visual symptoms and endovascular neurosurgery evaluation for his ICA stenosis.

Discussion

The mechanism underlying postcardiac surgery watershed stroke involves a combination of hypoperfusion and embolization. A big facilitator of this type of

Figure 2: Computed tomography angiography of the head and neck. (a) Stenosis of the right and left internal carotid arteries (b-d) Significant stenosis of the left common carotid artery at the level of bifurcation (red arrows)

neurologic disease is the prevalence of significant bilateral ICA atherosclerosis. Several pathological reports emphasize the association of watershed infarction with microemboli from carotid plaques or total occlusion of the ICA.[6] Failure to acknowledge these issues can lead to an increased prevalence of postcardiac procedure watershed strokes. The current guidelines do not include radiologic evaluation of the carotid arteries before cardiac ablation. In fact, one study showed that only 8% of patients undergoing urgent cardiac surgery were screened for carotid artery disease.[7] This same study, however, suggests that significant reductions in stroke rates could be achieved by screening the whole cardiac surgical population for carotid artery disease.[7] Although our study is limited to just one case, we suggest screening be performed before cardiac procedures in all patients aged 65 or older, those with a history of stroke or TIA, and those with a carotid bruit. We encourage and recommend further investigation into the matter to aid in decreasing the number of periprocedural watershed strokes.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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