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Post-coronary Angiography Stroke in a High-risk Patient: A Case Report

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Abstract

Stroke, although uncommon, is a serious complication that can occur during cardiac catheterization. It is often caused by emboli, typically from plaques or thrombi dislodged during the procedure. Certain patients, particularly those who are older or have underlying conditions like diabetes and coronary artery disease, may face a higher risk. This case report aims to illustrate post-coronary angiography stroke and highlight the need for swift diagnosis and treatment.

The case involves a 60-year-old male with a history of smoking, hypertension, diabetes, and prior coronary angioplasty, who presented with chest pain. Initial tests, including an EKG and echocardiogram, showed no signs of a heart attack, but further evaluation revealed severe coronary artery disease, leading to a decision for surgery.

The report underscores the importance of recognizing stroke as a potential complication after coronary procedures, especially in patients with multiple risk factors. Early detection and multidisciplinary management are crucial in improving outcomes and reducing complications.

Introduction

Stroke is a rare but significant complication following cardiac catheterization, with reported rates ranging from 0.05% to 0.38% for diagnostic and coronary interventions. Although the overall incidence is low, the high volume of procedures performed annually results in thousands of cases, leading to substantial morbidity and mortality [1]. Stroke following catheterization is primarily attributed to embolic events involving dislodged atheromatous debris, thrombi, or catheter-associated clots [2].

The risk of stroke after coronary angiography is higher in patients with advanced age, vascular comorbidities, and complex cardiac procedures. Invasive approaches, prolonged catheter manipulation, and increased fluoroscopy time further elevate stroke risk. Studies have shown that catheter passage through the aortic arch can dislodge plaques, releasing emboli that may travel to the brain, leading to acute neurological deficits [3,4].

While stroke may present with symptoms during or soon after the procedure, microinfarcts and silent emboli often go undetected without neuroimaging. Evidence suggests that these embolic strokes are responsive to thrombolysis, though its use in this setting remains limited to case reports, with further studies needed to assess safety and efficacy. Identifying embolic sources, such as catheter tips, atherosclerotic plaques, or arrhythmias, is crucial for prevention and management [5].

We report a case of 60-year-old male heavy smoker with a medical history of hypertension, diabetes mellitus (DM), and coronary artery disease (CAD) with prior percutaneous transluminal coronary angioplasty (PTCA) presented with typical angina at rest for two days before admission to assess occurrence of post-coronary angiography stroke in a patient with severe CAD.

Case Presentation

A 60-year-old male heavy smoker with a medical history of hypertension, diabetes mellitus (DM), and coronary artery disease (CAD), with prior percutaneous transluminal coronary angioplasty (PTCA), presented with typical angina at rest for

two days before admission. Upon arrival, his electrocardiogram (EKG) and troponin levels were normal, ruling out acute myocardial infarction. A transthoracic echocardiogram (TTE) showed normal left ventricular ejection fraction (EF) and no heart dilation or significant valvular abnormalities. His aortic size was within normal limits at 37 mm.

This study was approved by the Institutional Review Board (IRB) committee, Central Military Hospital, Beirut, Lebanon (IRB number: 29/2024).

Given his high GRACE score (>140) indicating increased risk for adverse cardiovascular events, the patient was treated with acute coronary syndrome (ACS) therapy and underwent early coronary angiography. The angiography revealed severe triple-vessel disease involving both the right and left coronary systems **(Figure 1)**. Due to the anatomical complexity of the coronary lesions and the patient's diabetes, the heart team decided that coronary artery bypass grafting (CABG) was the optimal management strategy.

Within 30 minutes of being transferred from the catheterization lab to the cardiac floor for monitoring and CABG preparation, the patient suddenly developed blurred vision in the right eye, diplopia, ptosis, and visual impairment. A physical and neurological examination revealed no motor or sensory deficits in the face, mouth, upper or lower extremities. However, third nerve palsy was suspected, raising concerns about a possible stroke.

Initial investigations included an EKG, which showed sinus rhythm without signs of atrial fibrillation (AF). A brain CT scan showed no bleeding or evidence of acute infarction. Carotid and subclavian artery ultrasound revealed only minimal plaques without significant stenosis. A follow-up TTE confirmed normal EF, no valvular disease, no thrombus, and no cardiac masses. Transesophageal echocardiography (TEE) confirmed the absence of any clot or thrombus in the left atrial appendage **(Figure 2)**, ruling out a cardiac embolic source.

An MRI/MRA of the brain revealed microinfarcts in two locations: the posterior aspect of the left cerebral peduncle and the posterior cortical region of the right parietal lobe. These findings were consistent with small embolic strokes. The TEE also revealed mild plaques in the ascending aorta **(Figure 3)**, which were identified as the likely source of emboli that caused the stroke, likely dislodged during catheter manipulation.

The patient was placed on continuous telemetry monitoring for 72 hours to assess for paroxysmal AF, but no arrhythmias were detected. A TEE was performed to rule out a cardioembolic source, which confirmed no cardiac masses or thrombi.

Follow-up and Prognosis

The patient was started on dual antiplatelet therapy and a statin as part of secondary stroke prevention. After multidisciplinary discussions between cardiology and neurology, CABG was deferred, and the patient was managed conservatively for his CAD with optimal medical therapy. He showed gradual improvement in visual symptoms over the next few days, with partial resolution of diplopia and ptosis.

At the 3-month follow-up, the patient had no recurrent neurological events, and his stroke-related symptoms had fully resolved. He remained on secondary prevention medications and was scheduled for a reassessment to determine whether CABG would be feasible after further stabilization of his condition.

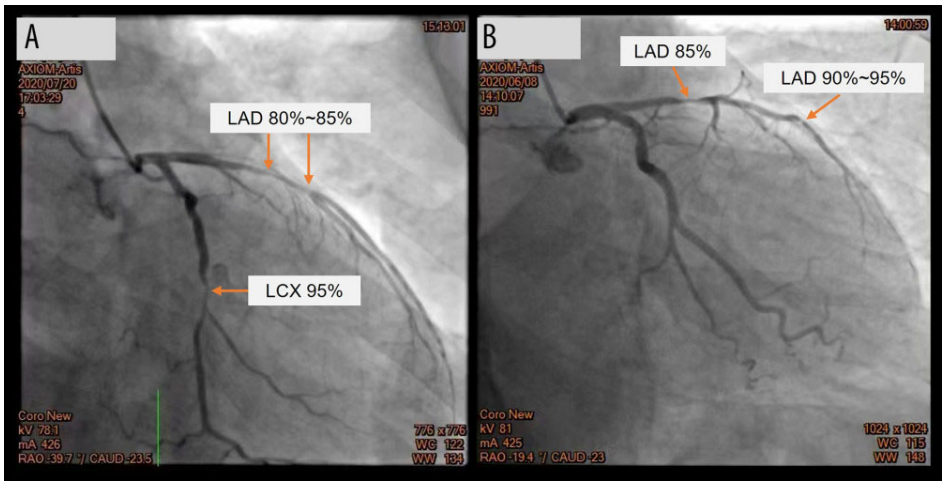

Figure 1: The coronary angiography of the patient revealed triple vessel disease with two significant lesions (greater than 90%) in the left circumflex artery and the mid LAD (see the orange arrows in images A and B).

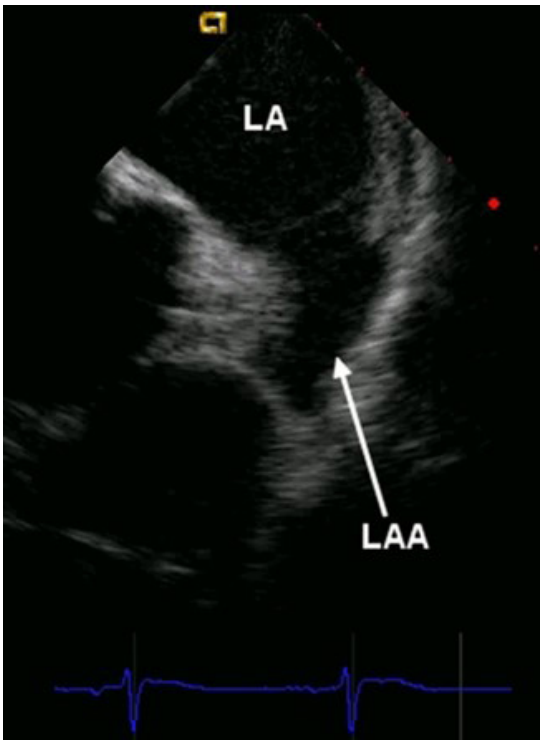

Figure 2. The TEE of the patient revealed a free left atrial appendage without any clot or thrombus mass as a potential cause for the stroke (white arrow).

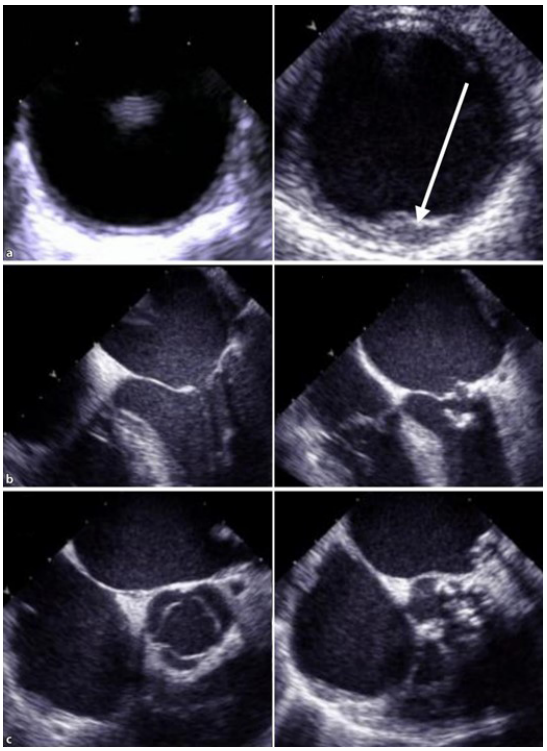

Figure 3. The aortic plaque (white arrow) in the ascending aorta, short axis view of TEE, is likely the cause of the iatrogenic stroke, provoked by catheter manipulation during the coronary procedure.

Discussion

Stroke during cardiac catheterization, while uncommon, presents significant challenges, especially in high-risk patients. As highlighted in previous studies, catheter manipulation near the aortic arch can precipitate embolic events, increasing the likelihood of ischemic strokes[2,4].

Peri-procedural stroke during cardiac catheterization is an uncommon but serious complication, with incidence rates ranging between 0.08% and 0.40% [6,7]. Interestingly, over half of these strokes affect the posterior cerebral circulation or vertebro-basilar arteries, even though these vessels account for only one-third of cerebral blood flow, with the remaining two-thirds supplied by the carotid system [8].

The risk of stroke increases during emergency procedures compared to elective ones [9]. Patients with comorbidities such as diabetes, hypertension, prior stroke, and renal failure are also at higher risk. Additionally, those requiring intra-aortic balloon counterpulsation experience a greater risk of stroke, likely due to hemodynamic compromise. Procedures for these patients are often performed on an urgent basis, further elevating stroke risk [10].

Peri-procedural strokes are generally embolic in nature, with several potential sources. Plaques dislodged during retrograde catheterization near the aortic valve can travel to the brain. Similarly, catheter tips passing through the aortic arch may dislodge atheromatous plaques, leading to embolization. Thrombi forming in situ on catheter tips during procedures also pose an embolic threat [11].

The impact of the access route on stroke risk remains inconclusive, though embolization often occurs during catheter advancement, flushing, or contrast injection. A correlation has also been observed between the volume of contrast used and the number of micro-emboli detected [12]. Patients with atherosclerotic debris or peripheral vascular disease, typically older individuals, are at greater risk of embolic events.

Peri-procedural stroke can occur during or shortly after catheterization. When neurological symptoms appear, it is crucial to exclude reversible causes such as hypoglycemia, seizures, migraines, or drug-induced effects. Sedatives and medications used during the procedure can also impair consciousness or cause respiratory depression if administered in high doses. Once stroke is confirmed, the appropriate treatment strategy must be quickly determined [13,14]. Unfortunately, many patients experience poor outcomes, including moderate disability or coma, particularly those with large-vessel strokes [15,16].

CABG is regarded as a preferred strategy in patients with DM and complex coronary anatomy due to better long-term outcomes, including lower rates of major adverse cardiovascular events (MACE) and reduced need for repeat revascularization. Diabetic patients often have diffuse atherosclerosis and smaller vessels, making PCI less effective. CABG offers more durable revascularization, especially with arterial grafts like the left internal mammary artery, which have superior long-term patency compared to stents [17,18].

For our case, renal function was assessed upon admission, revealing no signs of chronic kidney disease (CKD) or acute renal impairment. Although kidney disease is a recognized risk factor for stroke in coronary interventions, this patient's normal renal function excluded it as a contributing factor to stroke risk.

CKD further exacerbates stroke risk during coronary angiography due to a heightened predisposition to atherosclerosis and increased plaque burden. Although CKD was not present in our patient, its association with peri-procedural stroke remains significant, especially in patients with comorbidities like diabetes and hypertension [19].

Peri-procedural stroke, though iatrogenic, requires rapid recognition and intervention. Early diagnosis ensures shorter event-to-treatment times, improving outcomes. Healthcare facilities offering cardiac catheterization should implement stroke management protocols, and cardiologists must be familiar with these protocols. Stroke teams and neurologists should also be involved early in patient care to facilitate collaborative decision-making.

Conclusions

This case demonstrates the potential risk of stroke following coronary angiography, particularly in patients with multiple comorbidities such as diabetes and coronary artery disease. Early identification of post-procedural neurological symptoms and prompt, coordinated management are crucial for improving outcomes. Establishing clear stroke protocols in catheterization labs and involving neurologists early in the process are key to ensuring timely diagnosis and treatment. Recognizing stroke as a possible complication after coronary interventions can help guide clinical decisions and improve patient safety in similar scenarios.

Conflicts of Interest

The authors declare no conflicts of interest related to this study. The corresponding author confirms this declaration on behalf of all co-authors.

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