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Ischemic Stroke Following Coronary Angiography: A Case Report

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Abstract

This case report presents a 58-year-old male patient who developed an ischemic stroke following an elective coronary angiography at the Beirut Cardiac Center. Although coronary angiography is generally considered a safe procedure, this case highlights the potential for neurovascular complications. The patients had a medical history of hypertension, hyperlipidemia, and type 2 diabetes and developed neurological deficits one-hour post-procedure. Diagnostic imaging confirmed ischemic changes, and treatment focused on conservative management with antiplatelet therapy. This case underscores the importance of vigilant post-procedural monitoring and proactive high risk factor management in patients undergoing coronary interventions, aiming to enhance awareness of stroke risks associated with these procedures.

Keywords

Ischemic Stroke, Coronary Angiography, Neurovascular Complications, Antiplatelet Therapy, Post-Procedural Monitoring

1. Introduction

Coronary angiography is a prevalent invasive procedure employed to diagnose coronary artery diseases. Although it is typically considered safe, it may be linked to certain neurovascular complications, including stroke [1] (de Oliveira Laterza Ribeiro *et al.*, 2023). Previous research showed that strokes, including both ischemic and hemorrhagic types, generally occur within the initial 36 hours following cardiac catheterization. Their incidence varies significantly between 0.07% and 7.0% [2] (Khatri *et al.*, 2008). Hence, despite the apparent decline in the overall incidence of ischemic strokes due to improved preventive methods, their incidence remains notable, ranging between 0.07% and 0.40% [3] [4] (Bay *et al.*, 2022;

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Kwok *et al.*, 2015). Therefore, such types of neurovascular complications are generally associated with increased mortality [5] (Laurent *et al.*, 2024).

Current literature suggests that embolism is the primary cause of ischemic strokes in the context of cardiac catheterization, mainly due to the dislodgement of a blood clot or atheromatous debris from the aortic arch or thrombus formation at the catheter tip [6] (Fonseca, 2023). Therefore, while management of such cases usually follows standard stroke protocols, the use of thrombolysis in this setting remains limited to case reports and series, largely due to the calcified and fibrin-dense nature of dislodged plaques, which reduces their susceptibility to fibrinolysis [7] (Alhazzaa *et al.*, 2013). Additionally, intraoperative hemodynamic fluctuations and cardiac embolism, particularly in valvular procedures, may further contribute to stroke risk [8] (Ferrante *et al.*, 2023).

2. Case Presentation

We present the case of a 58-year-old male patient, with a history of hypertension, hyperlipidemia, and type 2 diabetes mellitus, treated with statin, Dipeptidyl Peptidase IV inhibitors (DPP4), Metformin and Angiotensin Receptor Blockers (ARB). The patient was a former smoker with no previous stroke history or surgical history. As well, the patient had no known allergies to food or drugs.

After his presentation for a symptomatic angina, the patient underwent an elective coronary angiography. Prior to the procedure, the baseline renal function of the patient was assessed, showing a creatinine level of 0.7 mg/dL (normal range: 0.7 - 1.3 mg/dL). The procedure was performed under local anesthesia without prior premedication given. The right radial access was used, and a 5-French catheter was advanced to the coronary arteries, with the administration of 2500 UI of heparin. Angiography revealed triple vessel disease (**Figure 1**), inducing a discussion for future coronary artery bypass grafting (CABG).

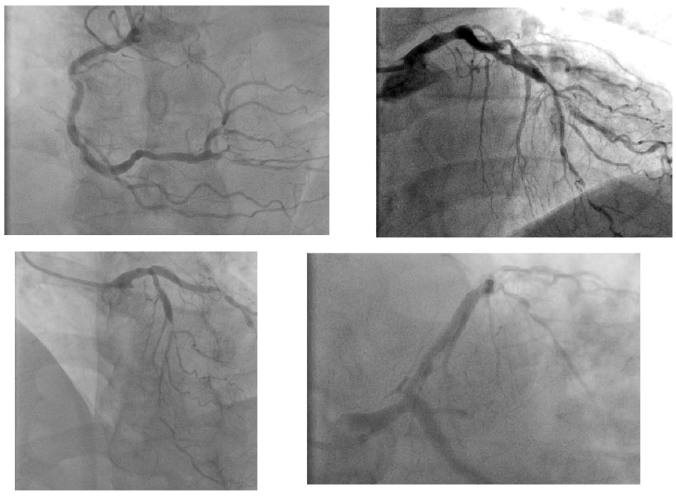

Figure 1. Coronary Angiography results. The figure shows the presence of tight lesions (noted by the absence/haziness/decrease inflow) of contrast in the main coronary vessels involving the right, left anterior descending and circumflex arteries.

Notably, during the procedure, the patient's vital signs were stable, with a blood pressure of 17/90 mmHg, an oxygen saturation over 97%, and a heart rate of 100 beat per minute (BPM). The procedure was complete without the onset of any acute complication.

In the first hour post-procedure, the patient exhibited neurological deficits, noting a sudden onset of blurry vision and left-sided facial weakness. An urgent neurological consultation revealed a right lower facial weakness, a left third cranial nerve palsy with gaze limitation to the right, miosis of the pupil, mild ptosis, absence of light reaction, and diplopia when looking to the right side. Therefore, all the vital signs remained stable, with a blood pressure ranging between 120/80 mmHg and 140/90 mmHg, a respiratory rate of 22 breaths per minute, and oxygen saturation of 99%, and a pulse reaching 80 BPM.

An Electrocardiogram (ECG) perfumed showed normal axis and sinus rhythm. A brain Computed Tomography (CT) scan was done ruling out hemorrhagic stroke. In addition, a brain Magnetic Resonance Imaging (MRI) performed showed recent micro-infarcts in the posterior aspect of the left cerebral peduncle and the cortical posterior region of the right parietal lobe (**Figure 2**).

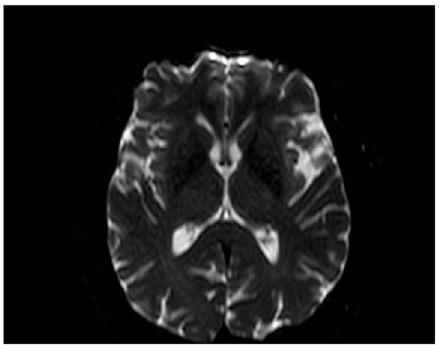

Figure 2. MRI Results. This figure shows the presence of the hyperintense (white) lesions in the left cerebral peduncle and posterior right parietal lobe.

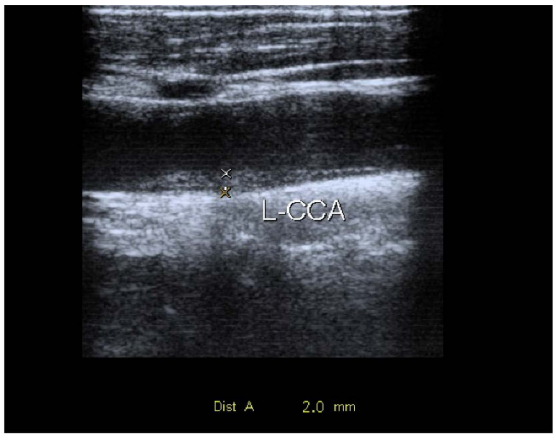

Figure 3. Doppler Echography Result. The marked lesion in the picture highlights the presence of an intimal thickness suggestive of arterial atherosclerosis in the left internal carotid artery.

A subsequent Doppler Echography of the carotid arteries identified several intimal thickening in the left internal carotid artery (**Figure 3**), thus without significant stenosis. Furthermore, a Transthoracic Echocardiogram performed showed the absence of significant cardiac embolic source.

Alongside the imageries, a blood test was performed showing a normocytic anemia, with a hemoglobin Hb of 10.5 g/dL (normal range: 11.6 - 15 g/dL) and MCV of 86 fl (normal range: 80 - 100 fl). As well, for the metabolic assessment, the results showed a high HbA1c level of 7 (normal range: less than 5.7), with lipid panel disturbances: The total cholesterol level was of 242 mg/dL (normal range: less than 220 mg/dL), the LDL of 155 mg/dL (normal range: Less than 100 mg/dL) and the triglycerides of 500 mg/dL (normal range less than 150 mg/dL).

Given the minor nature of the ischemic stroke observed and the small area of infarction, a thrombolysis was not recommended as per current guidelines [9] (Ferrari *et al.*, 2021). Thus, three days prior to the coronary angiography, a dual antiplatelet therapy, noting Aspirin 100 mg and Clopidogrel 75 mg, was initiated, coupled with Atorvastatin 40 mg per day. Notably, after two weeks, the follow-up consultation revealed a clinical amelioration of the patient.

3. Discussion

In patients undergoing coronary angiography and percutaneous coronary interventions (PCI), there exists a heightened risk of peri-procedural stroke [10] (Wexler *et al.*, 2022). This risk is mostly caused by thromboembolism or the dislodgment of atheromatous debris [11] (Boehme *et al.*, 2017). Hence, the transradial technique, which was used in the present case, avoids the descending thoracic and abdominal aorta, which reduces the risk of embolization due to disruption of the aortic plaque [12] (Vatakencherry *et al.*, 2018). Therefore, the dislodgement of the plaque in the ascending aorta, thrombus formation at the catheter tip, or the release of micro-emboli during the procedure are all known as potential etiologies for embolic stroke [7].

Moreover, it remains necessary to choose the appropriate vascular access, and procedural methodology in order to decrease the risk of embolic complications during coronary angiography. Hence, in some instances, the utilization of smaller catheters and the utilization of sensitive navigation through the vasculature are both helpful in reducing the likelihood of plaque disruption and the formation of micro-emboli [13] (Mohan *et al.*, 2023). Furthermore, it is known in the literature that individuals with previous history of hypertension, diabetes, or chronic renal diseases, are at higher risk of manifesting stokes after coronary interventions [14] [15] (Saeed *et al.*, 2023) (Lin *et al.*, 2017).

As previously mentioned, the latest recommendations state that thrombolysis should only be considered for strokes that are more severe and involve thromboembolic complications, yet it is not typically recommended for strokes that are less severe and do not result in a disability [9]. Hence, in the presented case, the infarct region was rather small and the neurological signs were not severe enough

to warrant thrombolytic treatment, the patient was treated with dual antiplatelet therapy and statins, which is considered a conservative approach. This is consistent with the evidence-based strategies for the management of strokes, which are meant to prevent recurring episodes of ischemic stroke while simultaneously minimizing the risk of bleeding [16] (Huang *et al.*, 2021).

Furthermore, the occurrence of stroke following a percutaneous coronary angiography has been widely documented in Western populations, through published case reports [17]-[19]. (Mahajan & Sanghi, 2014; Pong *et al.*, 2024; Wong *et al.*, 2012); however, there is still a lack of evidence of the occurrence of this complications in the Middle Eastern region. Thus, because of the notable prevalence of cardiovascular risk factors within this population [20] (Soleimani *et al.*, 2024), this case launches the need to evaluate the effectiveness of stroke prevention strategies that are tailored to this particular population.

4. Conclusion

Ischemic stroke post-coronary angiography is a complication that should be considered when performing such a procedure among patients having cardiovascular and renal diseases like hypertension and diabetes. The present case illustrates the significant complication of coronary angiography in a patient suffering from atherosclerotic disease. Hence, comprehensive risk stratification and careful monitoring of neurological status in the post-procedure period are essential to minimize the risk of ischemic stroke and improve patient outcomes.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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