



Vasovagal Reflex Shock Following Femoral Artery Cannulation in a Patient with Chronic Heart Failure: A Case Report

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Abstract

Coronary artery disease is a major type of heart disease, and coronary angiography has been widely utilized as a diagnostic method. Percutaneous coronary intervention (PCI) has become an important approach for restoring coronary perfusion. The vasovagal reflex is a common and potentially life-threatening acute complication associated with coronary interventions, which can lead to cardiac arrest in severe cases. This case report describes a patient with coronary heart disease who experienced vasovagal reflex-induced shock during the post-anesthesia care unit (PACU) period following the procedure.

Keywords

Percutaneous Coronary Intervention, Vasovagal Reflex, Vasovagal Syncope, Coronary Angiography, Femoral Catheterization

Introduction

Coronary artery disease (CAD) remains one of the leading causes of morbidity and mortality worldwide, necessitating ongoing advancements in diagnostic and therapeutic interventions. Coronary angiography, coupled with percutaneous coronary intervention (PCI), has become a cornerstone in the management of CAD, offering a minimally invasive approach to restoring coronary perfusion. However, while these procedures are highly effective, they are not without risks. One of the more serious complications is the vasovagal reflex, a sudden drop in heart rate and blood pressure that can lead to syncope or, in severe cases, cardiac arrest.

In this article, we present a case of a 57-year-old male with a complex cardiac history who underwent coronary angiography and PCI. Despite the successful

completion of the procedure, the patient experienced a vasovagal reflex-induced shock during the immediate postoperative period. This case highlights the importance of vigilant monitoring and prompt intervention to manage such complications, especially in patients with compromised cardiac function. By exploring the clinical presentation, management, and outcome of this case, we aim to underscore the need for tailored strategies to mitigate the risks associated with coronary interventions, particularly in high-risk patients.

Case Presentation

The patient is a 57-year-old male with coronary artery disease, scheduled for coronary angiography with local anesthesia and percutaneous coronary intervention (PCI) if necessary. He has a history of

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chronic heart failure and type 2 diabetes mellitus. Preoperative tests indicated a B-type natriuretic peptide precursor (NT-proBNP) level of 347 ng/L and a troponin-T (TPN-T) level of 18.0 ng/L. Cardiac ultrasound revealed reduced wall motion in the left ventricular lateral wall, with essentially no wall motion in the remaining left ventricle, consistent with an old myocardial infarction, and significantly impaired left ventricular systolic function, with a stroke volume (SV) of 58 mL and an ejection fraction (EF) of 23%. The electrocardiogram showed sinus rhythm with abnormal Q waves (II, III, aVF, V1-V6) and ST-T changes. Other laboratory results were unremarkable. The patient's preoperative assessment indicated a New York Heart Association (NYHA) functional classification of III, with a metabolic equivalent (MET) score of <3 METs, indicating he could only perform sedentary work or walk slowly.

Upon admission, the patient underwent monitoring of oxygen saturation, non-invasive blood pressure, and continuous electrocardiogram monitoring. His vital signs were stable, with a sinus rhythm, blood pressure of 142/92 mmHg, and a heart rate of 67 beats per minute. The interventional cardiologist attempted bilateral radial artery cannulation without success and ultimately achieved successful cannulation of the right femoral artery under 2% lidocaine local anesthesia. Subsequently, coronary angiography, intra-aortic balloon pump placement, intravascular ultrasound examination, and coronary balloon angioplasty were performed.

The surgical procedure was completed successfully, lasting approximately 200 minutes. During the operation, sodium heparin was administered for anticoagulation as needed, and nitroglycerin was used to prevent arterial spasm. There were no occurrences of arrhythmias or hypoxemia during the procedure, and the mean arterial pressure (MAP) remained consistently above 110 mmHg. The patient was conscious and did not report any discomfort such as palpitations, chest tightness, or nausea.

At the conclusion of the surgery, the intra-aortic balloon pump was removed, and the right femoral artery cannula was withdrawn, followed by pressure bandaging. Due to concerns about potential bleeding

and hematoma at the right femoral artery site, the interventional cardiologist decided to transfer the patient to the post-anesthesia care unit (PACU) for observation. Upon arrival in the PACU, the patient was alert, with a pressure bandage applied to the right groin area. He reported mild pain at the bilateral radial artery puncture sites and the right femoral artery puncture site (visual analogue scale, VAS score of 1). The right dorsalis pedis artery pulse was not palpable. The patient's heart rate was 71 beats per minute, oxygen saturation (SpO₂) was 99% (with spontaneous breathing, a respiratory rate of 16 breaths per minute, and nasal cannula oxygen concentration of 33%), blood pressure (BP) was 124/85 mmHg, and body temperature was 36.2°C.

Seventeen minutes after admission to the PACU, the patient experienced a sudden drop in blood pressure from 100/60 mmHg to a minimum of 77/44 mmHg (heart rate 109 beats per minute, sinus rhythm, SpO₂ 97%), accompanied by drowsiness, profuse sweating, pale lips, and palpitations. The patient did not report any symptoms of chest pain or discomfort in the precordial area. Upon examination, a hematoma approximately 10 x 10 cm in size was noted at the site of the pressure bandage in the right groin. Metaraminol 0.3 mg was administered intravenously, and fluid resuscitation was accelerated. Twenty-three minutes after admission to the PACU, the patient's blood pressure rose to 113/62 mmHg, heart rate decreased to 97 beats per minute, and the patient regained full consciousness, responding appropriately to questions. Capillary blood glucose was measured at 12.3 mmol/L. Arterial blood gas analysis revealed: pH 7.462, PCO₂ 18.6 mmHg, PO₂ 98.3 mmHg, hematocrit (Hct) 46.4%, total hemoglobin (tHb) 153.9 g/L, potassium (K⁺) 4.45 mmol/L, calcium ion 1.045 mmol/L, and base excess (BE) -7.81. The anesthesiologist performed a bedside ultrasound, which did not show any new signs of myocardial infarction, nor evidence of hematoma or fluid accumulation in the thoracic or abdominal cavities, nor in the retroperitoneal space. The bladder was noted to be underfilled.

The patient exhibited anxiety, respiratory alkalosis, prolonged fasting, and slightly reduced effective circulating blood volume, suggesting the occurrence of

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vasovagal syncope. Symptomatic treatment was initiated, and the interventional cardiologist was consulted to adjust the pressure hemostatic device at the bedside to alleviate local pressure. Intermittent doses of metaraminol were administered to maintain the mean arterial pressure (MAP) above 70 mmHg. After continued observation for one hour, the patient still required ongoing metaraminol infusion to sustain blood pressure, leading to the decision to transfer the patient to the ICU for further monitoring.

Upon admission to the ICU, the patient's vital signs gradually stabilized, and there were no further episodes of vasovagal syncope. The patient was transferred back to the cardiology ward on the second postoperative day and was discharged smoothly on the eighth postoperative day.

Discussion

Vasovagal reflex is a common complication during coronary interventions and procedures. Current research identifies several risk factors, including pain, anxiety, prolonged fasting, and stimulation from the distension of hollow organs. Additionally, some studies [1] suggest that the routine use of sedative and analgesic medications prior to sheath removal in high-risk patients may reduce the incidence of vasovagal reflex. In this case, the patient had poor cardiac contractility preoperatively and was also suffering from chronic heart failure. The interventional cardiologist encountered difficulties during the puncture, which increased the risk of postoperative bleeding. The interplay of these various factors made it challenging to quickly diagnose the patient's hypotensive state and heightened the risk of adverse cardiovascular and cerebrovascular events. Therefore, based on the patient's condition, we recommend that for patients with poor preoperative cardiac function and those at high risk for vasovagal reflex, routine administration of sedative and analgesic medications should be considered prior to sheath removal, and efforts should be made to minimize the duration of fasting.

During the procedure, the patient experienced difficulties with catheterization, leading to attempts at

bilateral radial artery and right femoral artery cannulation. This significantly prolonged the surgical time and increased the patient's anxiety and stress levels. Although some studies [2] suggest that radial artery cannulation may reduce the risk of adverse clinical events, cardiogenic death, and overall mortality in patients undergoing diagnostic coronary angiography (CA) or percutaneous coronary intervention (PCI), we still recommend promptly switching to traditional femoral artery cannulation when conditions for radial artery access are suboptimal.

The patient had poor cardiac contractility preoperatively and was also suffering from chronic heart failure. Postoperatively, the patient experienced vasovagal reflex-induced shock. To ensure the safety of such patients, we recommend the additional use of continuous transthoracic echocardiography (cTTE) for monitoring until the arterial pressure device is removed, allowing for dynamic assessment of the patient's cardiac function.

Conflict of Interest

The author has read and approved the final version of the manuscript. The author has no conflicts of interest to declare.

References

- [1] Kiat Ang C, Leung DY, Lo S, French JK, Juergens CP. Effect of local anesthesia and intravenous sedation on pain perception and vasovagal reactions during femoral arterial sheath removal after percutaneous coronary intervention. *Int J Cardiol.* 2007 Apr 4;116(3):321-26. [PMID: [16904773](#)]
- [2] Kolkailah AA, Alreshq RS, Muhammed AM, Zahrn ME, Anas El-Wegoud M, Nabhan AF. Transradial versus transfemoral approach for diagnostic coronary angiography and percutaneous coronary intervention in people with coronary artery disease. *Cochrane Database Syst Rev.* 2018 Apr 18;4(4):CD012318. [PMID: [29665617](#)]



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