

Case Report

Intraprocedure Type II Kounis Syndrome Secondary to Radioiodine Contrast During Coronary Angiography

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ABSTRACT

An 83-year-old man with a previous right coronary artery (RCA) stent presented to the emergency department with syncope, dynamic lateral ST depression, and a serum troponin of 6148 ng/L (< 17). Coronary angiography revealed a patent proximal RCA stent and significant left-sided disease. The procedure was complicated by inferior ST elevation, urticaria, hypotension, and acute proximal RCA occlusion. This required stenting, which acted as a scaffold to ameliorate subsequent vasospasm that responded to intracoronary glyceryl trinitrate. Serum tryptase postprocedure was markedly elevated at 81.7 $\mu\text{g/L}$ (≤ 11.4) and subsequently normalized. This confirmed a rare presentation of intraprocedural type II Kounis syndrome likely due to radioiodine contrast.

RÉSUMÉ

Un homme de 83 ans ayant déjà une endoprothèse à l'artère coronaire droite (ACD) s'est présenté au service des urgences avec une syncope, une modification dynamique du segment ST sur les dérivations latérales et une concentration sérique de la troponine de 6148 ng/L (< 17). L'angiographie coronarienne a révélé une endoprothèse patente dans le segment proximal de l'ACD et une maladie importante du côté gauche. L'élévation du segment ST, l'urticaire, l'hypotension et l'occlusion aiguë du segment proximal de l'ACD ont compliqué l'intervention. Il a fallu implanter une endoprothèse comme échafaudage pour améliorer le vasospasme subséquent qui a répondu à l'administration du trinitrate de glycérile par voie intracoronarienne. Après l'intervention, la concentration sérique de tryptase a montré une élévation nette, soit 81,7 $\mu\text{g/L}$ ($\leq 11,4$) et est revenue normale par la suite. Ceci a confirmé une manifestation intra-interventionnelle rare du syndrome de Kounis de type II possiblement en raison du produit de contraste à base d'iode radioactif.

Kounis syndrome is a rare clinical entity manifesting with concurrent features of an allergic hypersensitivity reaction with acute coronary syndrome.¹ Traditionally associated with environmental antigens, there have been increasing reports of radioiodine contrast acting as a trigger.^{2,3} We describe a rare case of intraprocedural Kounis syndrome secondary to radioiodine contrast during coronary angiography.

Case Report

An 83-year-old man presented to the emergency department with syncope, dynamic electrocardiogram changes (Fig. 1, A and B), and troponin increase to 6148 ng/L (reference range < 17). His background history included a stent to the right coronary artery (RCA) 17 years prior. He had no known allergies.

Interventions

Coronary angiography was performed via a right radial approach with iohexol (Omnipaque; GE Healthcare, Chicago, IL) radioiodine contrast. An initial contrast injection was required to guide the 5F TIG catheter (Terumo, Tokyo, Japan) through the radial and brachial artery (Fig. 2A). The RCA demonstrated a patent proximal stent (Fig. 2B). There was minor left main disease, a heavily calcified 80% proximal stenosis of the left anterior descending artery with pinching at the origin of the first diagonal branch, and a 90% stenosis in the first marginal branch of the left circumflex.

Subsequently, the patient developed urticaria and hypotension, with new inferior ST elevation and reciprocal anterior ST depression on electrocardiogram (Fig. 1C). The RCA was reengaged and occluded proximally (Fig. 2C). The proximal vessel was predilated with 2-mm and 2.25-mm balloons, restoring sluggish flow into the distal vessel. There was no dissection flap or extraluminal staining to suggest dissection. Intracoronary ultrasound and thrombus aspiration were not considered because of the patient's instability and need for urgent revascularisation. The vessel was stented proximally with a 2.75 $\times$ 28-mm Promus Premier (Boston Scientific,

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See page 1688.e3 for disclosure information.

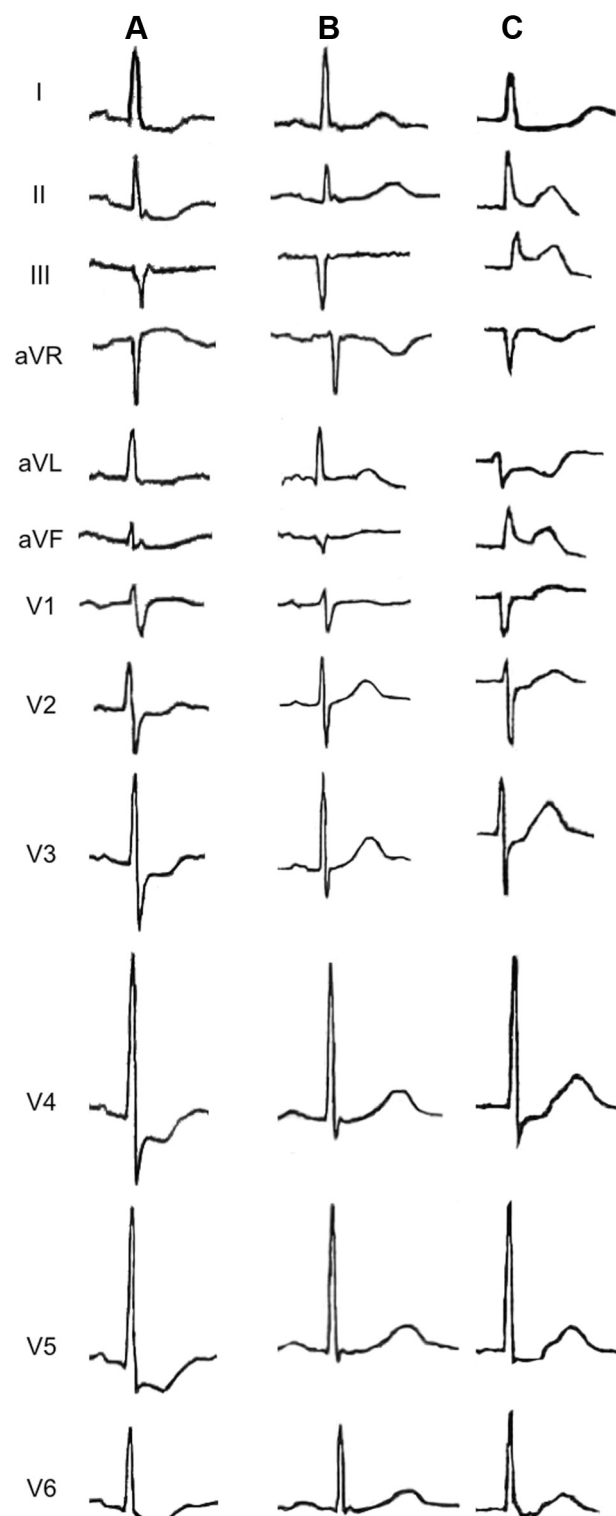


Figure 1. (A) Initial ST depression in V3-V6. (B) Resolution of ST depression after admission. (C) Inferior ST elevation with acutely occluded right coronary artery (RCA) during coronary angiogram.

Marlborough, MA) drug-eluting stent at 12 atmospheres (Fig. 2D).

Persistent hypotension and urticaria raised concerns of anaphylaxis, which was treated with metaraminol,

intravenous adrenaline 0.5 mg, and intravenous hydrocortisone 200 mg. Recurrent inferior ST elevation prompted reevaluation of the RCA, revealing diffuse vasospasm that responded to intracoronary glyceryl trinitrate. Of note, the stented segments acted as a scaffold that prevented proximal progression of the vasospasm (Fig. 2, E and F). The procedure was then terminated because the patient was becoming hemodynamically stable with resolution of ST segments.

Follow-up and outcomes

The patient remained stable over the subsequent 48 hours. A serum tryptase level taken 20 minutes post-procedure was markedly elevated at 81.7 µg/L (reference range ≤ 11.4 µg/L), decreasing to 77.3 µg/L 2 hours later, and normalized at 10.7 µg/L > 72 hours later. Immunology was consulted and suggested formal allergy testing before any further procedures.

Discussion

Although coronary vasospasm in anaphylaxis has been reported, Kounis syndrome as a clinical entity extends beyond this. Exposure to certain allergenic antigens results in direct mast cell degranulation, platelet activation, vasospasm, and activation of matrix metalloproteases, triggering coronary plaque rupture.¹

Three variants of Kounis syndrome have been described. Type 1 involves coronary vasospasm in a patient with normal coronary arteries. Type 2 occurs in patients with underlying coronary disease, who may or may not have been stented previously, with a combination of vasospasm or acute plaque rupture. Type 3 involves stent thrombosis, where aspirated thrombus contains eosinophils and mast cells.

Our patient most likely experienced the dual pathophysiological mechanisms of the type II variant secondary to contrast exposure during his angiogram, with initial coronary plaque rupture followed by diffuse coronary vasospasm. Other possible causative agents include heparin and midazolam. Heparin is less likely given its use without issues preprocedurally. Kounis syndrome has been reported secondary to midazolam;⁴ however, the timeline of events is more suggestive of radioiodine contrast as the causative agent given the onset of acute coronary occlusion *after* selective engagement of the RCA. We theorize that the initial radial contrast injection may have “primed” the patient’s immune system to subsequently react to the second injection of iohexol on selective engagement of the RCA.

Tryptase is unique for its specificity with mast cell degranulation.⁵ In this situation, the acute elevation and subsequent normalization of the serum tryptase level are highly suggestive of an acute reaction to the radiocontrast medium. Persistently elevated levels would suggest differentials such as systemic mastocytosis.

Conclusion

Acute coronary syndrome with features of allergy during coronary angiography may be due to Kounis syndrome secondary to radioiodine contrast. This case highlighted dual

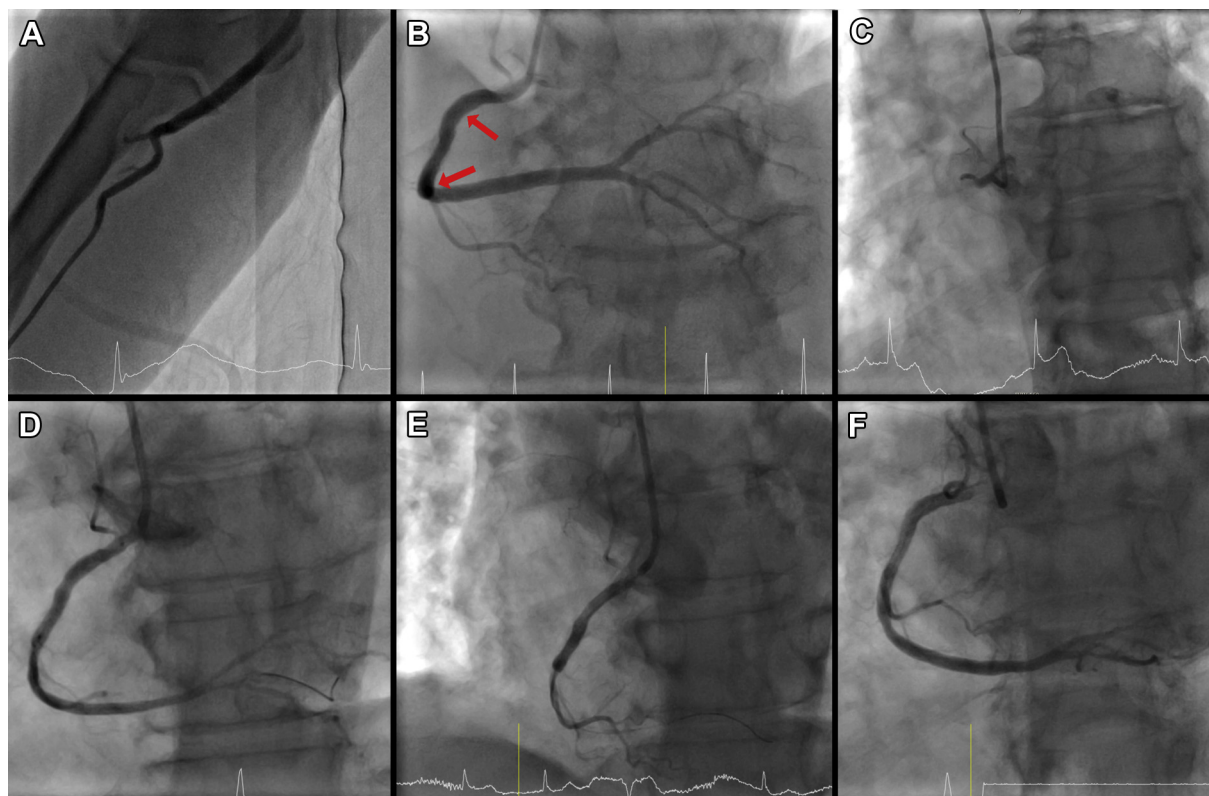


Figure 2. (A) Radial contrast injection. (B) Patent RCA and old stent (red arrows) on initial selective engagement. (C) Acutely occluded RCA. (D) Postdilated RCA after stent deployment. (E) Mid-to-distal RCA vasospasm. (F) Postintracoronary glyceryl trinitrate.

pathophysiological mechanisms of type II Kounis syndrome: plaque rupture and vasospasm. A combination of angioplasty and intracoronary glyceryl trinitrate is the cornerstone of management of Kounis syndrome.

Disclosures

The authors have no conflicts of interest to disclose.

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