Kounis syndrome is characterised by a group of symptoms that manifest as unstable vasospastic or non-vasospastic angina secondary to a hypersensitivity reaction. It was first described by Kounis and Zavras in 1991 as the concurrence of an allergic response with an anaphylactoid or anaphylactic reaction and coronary artery spasm or even myocardial infarction. Since then, this condition has evolved to include a number of mast cell activation disorders associated with acute coronary syndrome. There are many triggering factors, including reactions to multiple medications, exposure to radiological contrast media, poison ivy, bee stings, shellfish and coronary stents. In addition to coronary arterial involvement, Kounis syndrome comprises other arterial systems with similar physiologies, such as mesenteric and cerebral circulation resulting in ischaemia/infarction of the vital organs. The incidence of this condition is difficult to establish owing to the number of potential instigating factors and its relatively infrequent documentation in the literature.

We report the case of an HIV-negative 39-year-old man with no coronary risk factors or family history of premature coronary artery disease, who developed Kounis syndrome after the administration of fluoroquinolone for dysuria. However, to the best of our knowledge, no data on the incidence and prevalence of Kounis syndrome in South Africa have ever been reported in the literature. The recent understanding of Kounis syndrome has led to the condition being classified into three syndrome variants.

CASE REPORT
Kounis syndrome

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We report the case of an HIV-negative 39-year-old man with no coronary risk factors or family history of premature coronary artery disease, who developed Kounis syndrome after the administration of fluoroquinolone for dysuria. However, to the best of our knowledge, no data on the incidence and prevalence of Kounis syndrome in South Africa have ever been reported in the literature. The recent understanding of Kounis syndrome has led to the condition being classified into three syndrome variants.


Fig. 1. ECG demonstrating inferior and posterolateral ST elevation.
elevation in the inferior leads, and a diagnosis of acute coronary syndrome with inferior, posterolateral myocardial infarction was made. He was thrombolysed with tenecteplase, with no resolution of ST segment elevation 1 hour post lysis. The patient was referred to our division for rescue percutaneous coronary intervention (PCI) after stat doses of aspirin, clopidogrel and atenolol. On arrival, on re-taking the history, allergic myocardial infarction was considered a likely diagnosis and blood was sent for determination of troponin, tryptase, and IgE (Table 1).

The clinical examination was unremarkable the patient was normotensive, with a blood pressure of 120/70 mmHg, tachycardia of 108 beats/minute, and tachypnoea of 22 breaths/minute. Cardiovascular examination revealed a loud S1 and no murmurs. Prednisone 1 mg/kg/day, diphenhydramine 50 mg, ranitidine 150 mg, and amiodipine 10 mg were administered orally, with resolution of pain and ECG changes. Administration of aspirin, clopidogrel and a beta-blocker was discontinued. Cardiac catheterisation and a coronary angiogram were performed within 24 hours and showed unobstructed coronary arteries (Figs 2 and 3). On receipt of the blood results, allergologists were consulted. The patient was discharged 3 days later with no resurgence of symptoms; also not at 3 months’ follow-up.

Discussion

Kounis syndrome was described in 1991 as the concurrence of acute coronary events with an allergic or a hypersensitivity response and an anaphylactic or anaphylactoid reaction.[1] Several possible causes of Kounis syndrome have been reported.[1,3,4] The condition has three variants,[1] i.e. type 1 – coronary spasm; type 2 – coronary thrombosis; and type 3 – drug-eluting stent thrombosis. It is important to distinguish the type, as it has management implications. The syndrome is caused by inflammatory mediators released mainly from activated mast cells and via bidirectional inflammatory mediators released mainly from activated mast cells. Histamine released by degranulation of mast cells can also be measured within 5 - 10 minutes, but remains elevated for only 30 - 60 minutes and therefore has very limited value. To date, serum tryptase has been identified as a reliable marker of an anaphylactic reaction. Review of the literature has suggested that serum tryptase may be considered as a new marker of the instability of atheromatous plaque with regard to the existence of mastocytes in heart tissue. Regardless of documented laboratory evidence of anaphylaxis, a diagnosis can still be made based on the clinical presentation and treatment carried out accordingly.[1]

Treatment depends on the syndrome variant.  
- **Type 1 variant**: treatment of the allergic event alone may abolish type 1 variant. Administer corticosteroids, antihistamines, vasodilators (e.g. nitrates), and calcium channel blockers.[3,4]  
- **Type 2 variant**: apply the acute coronary event protocol and administer corticosteroids, antihistamines, vasodilators (e.g. nitrates), and calcium channel blockers when appropriate.

- **Type 3 variant**: the use of mast cell stabilisers in association with steroids and antihistamines is recommended. Harvesting of the intransit thrombus together with histological examination of

### Table 1. Results of investigations

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Result</th>
</tr>
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<tbody>
<tr>
<td>Full blood count</td>
<td>Haemoglobin 13.3 g/dL; white cell count 8.34 × 10⁹/L; platelet count 276 × 10⁹/L; eosinophils 0.017 × 10⁹/L (0.3%)</td>
</tr>
<tr>
<td>Urea and electrolytes</td>
<td>Na 143 mmol/L; K 4.6 mmol/L; urea 3.6 mmol/L; creatinine 77 µmol/L.</td>
</tr>
<tr>
<td>Total IgE</td>
<td>43 kU/L</td>
</tr>
<tr>
<td>Thyroid-stimulating hormone</td>
<td>0.36 mIU/L</td>
</tr>
<tr>
<td>Antinuclear antibodies</td>
<td>0.1 ratio – negative</td>
</tr>
<tr>
<td>Mast cell tryptase</td>
<td>2.5 µg/L</td>
</tr>
<tr>
<td>HIV</td>
<td>Negative</td>
</tr>
<tr>
<td>Lipid profile</td>
<td>Total cholesterol 2.8 mmol/L; triglyceride 0.9 mmol/L; high-density lipoprotein 1 mmol/L; low-density lipoprotein 1.3 mmol/L</td>
</tr>
<tr>
<td>Troponin T</td>
<td>1 001 ng/L</td>
</tr>
<tr>
<td>Diverse cast ciprofloxacin</td>
<td>Positive</td>
</tr>
</tbody>
</table>

![Fig. 2. Unobstructed left coronary artery.](image)

![Fig. 3. Unobstructed right coronary artery.](image)
aspirated material and staining for eosinophils and mast cells should be undertaken.

When allergic symptoms are present after stent implantation, desensitisation measures should be applied; if these fail, the stent should be extracted.

**Conclusion**

There is a paucity of data on the incidence and prevalence of Kounis syndrome in SA; nonetheless, it is important to be aware of the entity. There are no treatment guidelines for patients with this syndrome, and most of the treatment information has been gathered from individual case reports or case series. A diagnosis of Kounis syndrome should be considered in young, healthy patients with no atherosclerotic risk factors when they develop an acute coronary syndrome (especially inferior myocardial infarction) after administration of a potentially allergic agent. These patients need treatment with steroids, antihistamines, fluid resuscitation, possibly adrenaline, oxygen, and antithrombotic agents before transfer to a cardiac catheterisation laboratory. An allergy work-up should include the assessment of allergies to food, insect bites and other environmental agents. Skin tests and food challenges may be useful in identifying the culprit agent.

**References**