CASE REPORT

Spontaneous splenic rupture due to rivaroxaban

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SUMMARY

In the prevention and treatment of thromboembolic disease, novel oral anticoagulants have emerged as alternatives to warfarin. A major challenge continues to be the reversal of their anticoagulant effect in the case of life-threatening haemorrhagic complications. We report a case of spontaneous splenic rupture treated by splenic artery embolisation in a 77-year-old woman who was anticoagulated with rivaroxaban.

BACKGROUND

Rivaroxaban is a novel anticoagulant and factor Xa inhibitor that is commonly used for stroke prophylaxis in non-valvular atrial fibrillation¹ and for the treatment of venous thromboembolism.² When compared with warfarin for the prevention of stroke in the setting of atrial fibrillation, the novel oral anticoagulants have shown significant reductions in stroke, intracranial haemorrhage and mortality, however have an increased incidence of gastrointestinal bleeding.³ We report the fifth case of spontaneous splenic rupture in a patient on rivaroxaban. We wish to highlight this rare event as well as the challenges in managing major bleeds in patients taking novel oral anticoagulants.

CASE PRESENTATION

A 77-year-old woman with symptomatic atrial fibrillation with a CHA2DS2-VASc score of 4 was admitted to our hospital for a transoesophageal echocardiogram-guided direct current cardioversion. Her medical history was significant for major depression, glaucoma, moderate alcohol intake, hypertension and dyslipidaemia. Her medication regimen at the time of admission consisted of metoprolol 25 mg twice daily, atorvastatin 10 mg daily, esomeprazole 20 mg daily, quetiapine 25 mg daily, rivaroxaban 20 mg daily, amiodarone 200 mg daily, lecanidipine 20 mg daily, and eprosartan and latanoprost eye-drops. An ECG performed prior to her cardioversion confirmed atrial fibrillation with rapid ventricular response rate.

INVESTIGATIONS

Her full blood count, creatinine and liver function tests were within normal limits. Transoesophageal echocardiography demonstrated normal left ventricular size with hyperdynamic systolic function, mild left ventricular hypertrophy, mild bi-atrial dilatation, mild mitral and tricuspid regurgitation, and mild pulmonary hypertension. There was no evidence of thrombus in her left atrium or left atrial appendage.

OUTCOME AND FOLLOW-UP

She was successfully cardioverted to sinus rhythm with one 360 J biphasic shock. After the cardioversion, she was noted to have low oxygen saturations on pulse oximetry despite having a clear chest on auscultation. She was admitted to hospital overnight for further investigation of her low oxygen saturation which included a high-resolution CT scan of her chest to rule out amiodarone-induced pulmonary fibrosis. This scan was unremarkable, and importantly, her spleen was architecturally normal (figure 1).

The following day, she had acute abdominal pain. Physical examination revealed facial pallor and tenderness in her left upper quadrant. Her vital signs were consistent with shock with a heart rate of 130 beats per minute (atrial fibrillation), a blood pressure of 60/40 mm Hg, an oxygen saturation of 97% on room air and a respiratory rate of 19 breaths per minute. Her haemoglobin level was 5.8 g/dL and the international normalised ratio was 1.2. An urgent bedside transthoracic echocardiogram was performed and demonstrated a large collection of blood around her spleen. This was confirmed on a CT scan of her abdomen that demonstrated a splenic rupture with active bleeding (figure 2). There was no preceding history of trauma, nor was there evidence of rib fractures on imaging. Given her life-threatening haemorrhage on rivaroxaban, she was administered with prothrombin complex concentrates, intravenous fluid resuscitation (colloids and crystalloids) and metaraminol. She required transfusion of 14 units of packed red blood cells, 4 units of fresh frozen plasma and 4 units of cryoprecipitate. She emergently underwent splenic artery embolisation in order to control the haemorrhage and to improve her haemodynamics. She stabilised after the bleeding was controlled and was discharged 2 weeks after her initial admission, off all anticoagulation. At 24 months after major bleeding, she is doing well and is on the asplenic protocol of vaccinations and prophylactic antibiotics.⁴

DISCUSSION

This is the fifth case report of spontaneous splenic rupture of a patient treated with rivaroxaban.^{5–8} Previously, there have been reports of spontaneous splenic ruptures with apixaban⁹ and dabigatran.¹⁰ In our case, the interaction between amiodarone, a P-glycoprotein inhibitor and rivaroxaban potentially could have increased the activity of rivaroxaban,¹¹ resulting in major bleeding. An interaction between amlodipine and telmisartan/hydrochlorothiazide was reported in a previous case report.⁵ There is a higher risk of bleeding when novel

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Figure 1 CT scan of the abdomen demonstrating normal splenic architecture.

anticoagulants are used in combination with antiplatelet agents, especially in the elderly or those with renal dysfunction.^{12 13} These interactions should be considered before prescribing novel anticoagulants.¹¹ Table 1 summarises the clinical characteristics of cases reported so far.

Resuscitation of major bleeding in a patient with rivaroxaban continues to be a major challenge. Despite the lack of evidence, activated prothrombin concentrate, fresh frozen plasma and recombinant activated factor VII continue to be used in these situations.^{14–16} Recently, idarucizumab,^{17 18} humanised dabigatran-specific antibody fragments have been shown to be efficient in fully reversing dabigatran. Andexanet alfa^{19–22} and ciraparantag^{14 23} are reversal agents for factor Xa inhibitors. This report illustrates the urgent need for such antidotes, despite their likely infrequent utilisation.

Figure 2 Contrast-enhanced CT scan of the abdomen demonstrating contrast extravasation, perisplenic haematoma and intra-abdominal free fluid.

Table 1 Spontaneous splenic rupture on novel anticoagulants

First author	Year	Country	Novel anticoagulant	Patient details	Possible cause of splenic rupture	Outcome
Gonzva <i>et al</i> ⁶	2014	France	Rivaroxaban 15 mg daily for atrial fibrillation	67-year-old man	Amlodipine (CYP3A4 inhibitor) and telmisartan/hydrochlorothiazide	Splenectomy followed multiorgan dysfunction due to ischaemic colitis needing a colectomy
Naseem <i>et al</i> ⁶	2016	Australia	Rivaroxaban 20 mg for atrial fibrillation	68-year-old man	Aspirin 100 mg daily in addition to rivaroxaban 20 mg	Splenectomy
Amin <i>et al</i> ⁶	2015	USA	Rivaroxaban for lower extremity deep vein thrombosis	68-year-old female	Unclear	Splenectomy
Yousef <i>et al</i> ⁷	2015	USA	Rivaroxaban 20 mg for atrial fibrillation	70-year-old female	Unclear, possibly due to acute kidney injury	Splenectomy
Moore <i>et al</i> ¹⁰	2012	USA	Dabigatran 100 mg twice daily for atrial fibrillation	78-year-old female	Unclear	Embolisation and coiling of the splenic artery
Lowry <i>et al</i> ⁹	2016	USA	Apixaban 2.5 mg twice daily for atrial fibrillation	83-year-old white man	Unclear	Splenectomy

Learning points

- ▶ Check for interactions between novel anticoagulants and other drugs.
- ▶ Caution while using novel anticoagulants in renal dysfunction and liver dysfunction.
- ▶ Reversal agents for the novel anticoagulants are the treatment of choice.
- ▶ Splenic artery embolism may be a reasonable alternative to splenectomy in selected cases of splenic rupture in patients on novel anticoagulants.

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