Haemodialysis before emergency surgery in a patient treated with dabigatran


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Novel oral anticoagulants (NOAs) which directly inhibit thrombin (dabigatran) or factor Xa (rivaroxaban and apixaban) have recently been developed. These drugs are not antagonizable, and their activities cannot be quantified in current practice. Here, we report the first case of perioperative management of a patient treated with dabigatran requiring haemodialysis before emergency surgery. A 62-yr-old woman visited the emergency department for a left bi-malleolar ankle fracture; she had a past medical history of severe ischaemic cardiomyopathy, alcoholic cirrhosis Child B, and moderate chronic renal insufficiency. The patient was treated with dabigatran for a left ventricular aneurysm with thrombus. Cutaneous manifestation of a voluminous haematoma required emergency surgery. Blood tests revealed dabigatran anticoagulant activity of 123 ng ml\(^{-1}\) (therapeutic values: 85–200 ng ml\(^{-1}\)), activated partial thromboplastin time of 63 s, and a prothrombin ratio of 68%, indicating that dabigatran disturbed coagulation. We decided to perform emergency haemodialysis before surgery. After 2 h, the anticoagulant activity of dabigatran was 11 ng ml\(^{-1}\), allowing surgery. Surgery proceeded without any problems and the postoperative period was unremarkable. This case highlights the difficulties for the anaesthesiologist regarding emergency perioperative management of patients treated with NOAs and confirms the efficacy of haemodialysis in cases of dabigatran treatment. NOAs should be prescribed with caution, especially for patients with renal or hepatic disease, at least as long as no antagonist is available. In cases of deferred operative urgency in haemodynamically stable patients treated with dabigatran, haemodialysis should be considered to reverse dabigatran's anticoagulant effects.

Keywords: dabigatran; haemodialysis; surgery

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Case report

A 62-yr-old woman visited the emergency department for left ankle trauma during a fall through clumsiness. She had a past medical history of severe ischaemic cardiomyopathy with a left ventricular ejection fraction of 30%, alcoholic cirrhosis Child B with oesophageal varices, a spontaneous prothrombin ratio of 96% (normal values: >70%), and moderate chronic renal insufficiency (creatinine clearance = 39 ml min\(^{-1}\), measured via the Modification of Diet in Renal Disease method). The patient had been treated with dabigatran 110 mg twice daily for 6 months for a left ventricular aneurysm with thrombus. Twelve hours after the last dose of dabigatran, left bi-malleolar ankle fracture was diagnosed.

In accordance with French guidelines, we decided to wait 48 h before surgery. However, 36 h after the last dabigatran dose, cutaneous manifestation of a voluminous haematoma required emergency surgery. At this time, blood dosage revealed a dabigatran anticoagulant activity of 123 ng ml\(^{-1}\) (therapeutic values: 85–200 ng ml\(^{-1}\), an activated partial thromboplastin time (aPTT) of 63 s (normal values: 29–35 s), and a prothrombin ratio of 68%, indicating that dabigatran still disturbed coagulation. Therefore, we decided to perform emergency haemodialysis before surgery.

A venous haemodialysis catheter was inserted in the right femoral vein (Double Lumen Catheter GamCath Dolphin™ 13F, 250 mm, Gambro®, USA). Haemodialysis started 42 h after the last dose of dabigatran, with a blood flow of 500 ml h\(^{-1}\), a dialysate rate of 1000 ml h\(^{-1}\), and without other anticoagulation. The anticoagulant activity of dabigatran and the aPTT were measured hourly (Table 1). After 2 h, the concentration in blood sample was 11 ng ml\(^{-1}\), allowing surgery. No other
procoagulant treatment was administered to correct anticoagulation.

Considering the patient’s past medical history, the anaesthesiologist chose to perform ultrasound-guided combined femoral and sciatic nerve block. Surgery, with tourniquet, proceeded without any problems, without abnormal bleeding, and the postoperative period was unremarkable. After 10 days, the patient was discharged home with a vitamin K antagonist. Dabigatran was stopped because of the history of cirrhosis, which is a contraindication, and of moderate renal insufficiency, which leads to an increase in the dabigatran half-life. Moreover, NOAs are not indicated in France or in the USA for the treatment of left ventricular thrombus.

In France, dabigatran is an orally active direct thrombin inhibitor currently available for prevention of venous thromboembolism after total hip replacement and total knee replacement, for treatment of acute venous thromboembolism, and for prevention of arterial thromboembolism in non-valvular atrial fibrillation. Dabigatran elimination occurs in the kidney, with 80% remaining in an unchanged form. This case highlights the difficulties faced by the anaesthesiologist for emergency perioperative management of patients treated with NOAs. This drug is currently not specifically antagonizable, and no specific surveillance of its anticoagulation activity is currently available. To our knowledge, no case of emergency perioperative management of dabigatran has been reported. Several case reports have addressed the use of prothrombin complex concentrate, fresh frozen plasma, and recombinant activated factor VII to reverse dabigatran anticoagulation, with variable results. However, given this patient’s past medical history of left ventricular thrombus, the risk of systemic embolism made us cautious about the application of powerful procoagulant factors. In theory, dabigatran is dialysable because it is weakly protein bound (15–35%) and has a low molecular weight (627.75 g mol⁻¹). Dialysis seems to be more effective than continuous venovenous haemofiltration. In patients with end-stage renal disease, dabigatran elimination was 62% after 2 h of haemodialysis and 68% after 4 h. In the present case, the elimination rate was 78% after 2 h of haemodialysis, confirming the efficiency of haemodialysis. However, this technique requires haemodynamic stability of the patient, which may be problematic for some patients (e.g. in patients undergoing haemorrhagic shock).

In conclusion, NOAs should be prescribed with caution, especially for patients with renal or hepatic disease, at least as long as no antagonist is available. In cases of deferred operative urgency in haemodynamically stable patients treated with dabigatran, haemodialysis should be considered to reverse the anticoagulant effects of NOAs.

Authors’ contributions
Each of the authors cared for the patient. P.E. and P.E.G. drafted the manuscript. J.C. and P.J.C. looked for research carried out previously related to the manuscript. B.P. revised the manuscript. All authors read and approved the final manuscript.

Declaration of interest
The authors declare no conflicts of interest related to this case report. The patient provided written permission to publish this case.

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