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GRAND ROUNDS

Retroperitoneal haematoma in a postoperative ALIF patient taking rivaroxaban for atrial fibrillation

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Abstract

Background Novel oral anticoagulants (NOACs) are being increasingly used in the secondary prevention of thromboembolic stroke in patients with atrial fibrillation. Patients taking NOACs are difficult to manage perioperatively, and several unexpected complications have been reported in these patients.

Case report We report a case of a rivaroxaban-induced retroperitoneal haematoma in a 72-year-old man who underwent an L5/S1 anterior lumbar interbody fusion (ALIF) for grade 1 spondylolytic spondylolisthesis. The patient suffered from atrial fibrillation and was taking rivaroxaban, a factor Xa inhibitor, for thromboembolic risk reduction. In accordance with perioperative Novel Oral Anticoagulant (NOAC) guidelines, rivaroxaban was stopped 2 days preoperatively and restarted on the third postoperative day. The patient presented on the ninth postoperative day, complaining of severe left iliac fossa pain, nausea, and vomiting, accompanied by swelling and bruising around the surgical site. A computed tomography (CT) scan showed a large expanding retroperitoneal haematoma. The patient was taken back to theatre for an evacuation of the haematoma and subsequently recovered without any further complications.

Conclusion This is the first case of a rivaroxaban-induced retroperitoneal haematoma reported in the literature, secondary to elective spinal surgery. This report adds to the body of evidence on the risk of postoperative bleeding in patients taking NOACs. If patients on NOACs present with abdominal symptoms following anterior approach to the lumbar spine, treating clinicians should have a high index of suspicion for retroperitoneal haematoma.

Keywords Anterior lumbar interbody fusion · Rivaroxaban · Retroperitoneal haematoma

Abbreviations

AF	Atrial fibrillation
NOACs	New oral anticoagulants
ALIF	Anterior lumbar interbody fusion

Case presentation

A 72-year-old man was brought to his local emergency department (ED) following collapse, complaining of severe left iliac fossa pain, 9 days after an anterior lumbar interbody fusion (ALIF). He was nauseous, he

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complained of feeling unsteady on his feet, and he had one episode of non-bilious vomiting in transit. He exhibited pallor, but he was conscious and haemodynamically stable and normal. The surgical wound was clean and there was no dehiscence, but there was significant flank swelling and ecchymosis. His haemoglobin was 101 mg/dl and his international normalised ratio (INR) was 2.5 on admission. The patient's past medical history included hypertension, atrial fibrillation (AF), a 3.5-cm abdominal aortic aneurysm, and bilateral common iliac artery aneurysms. He was taking rivaroxaban (20 mg/day) for thromboembolic risk reduction secondary to AF, and amlodipine, losartan, and bisoprolol for hypertension. Other regular medication included paracetamol and ranitidine. Preoperatively, the patient complained of a 6-year history of severe left sided back and leg pain, which was resistant to non-operative management. Plain radiographs and magnetic resonance imaging (MRI) revealed an L5/S1 spondylolytic spondylolisthesis (Figs. 1, 2) for which he underwent the ALIF procedure. The patient was instructed to stop rivaroxaban two days prior to surgery, and he restarted it on the third postoperative day [1–3]. At the time of his emergency re-admission (9th postoperative day), he had last taken rivaroxaban 24 h previously. Repeated blood tests found haemoglobin of 77 mg/dl, INR of 1.8, and blood gases showed lactic acidosis. A total of 5 units of packed red blood cells and prothrombin complex concentrate (Octaplex) were administered and a decision was made to transfer the patient to our institution, the regional complex spine centre.

Diagnostic imaging

The ED clinician assessing the patient had a high index of suspicion for abdominal haemorrhage, due to the patient's past history of vascular disease, his recent surgery, and his history of taking NOACs, and therefore, a computed tomography (CT) angiogram was requested. This revealed a 25-cm haematoma displacing the left kidney superiorly and extending into the groin inferiorly (Fig. 3).

Fig. 2 Preoperative T2-weighted MRI of our patient showing the lysis in the pars of L5 (*white arrow*)

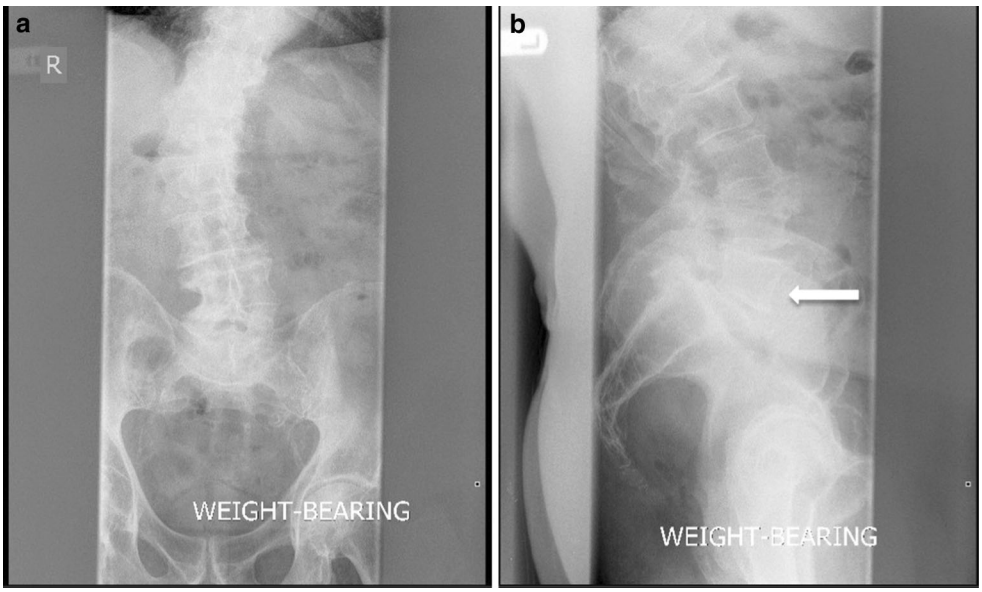

Fig. 1 Preoperative standing **a** anteroposterior (AP) and **b** lateral plain radiographs of our patient. The listhesis of L5 on S1 is indicated by the *white arrow*

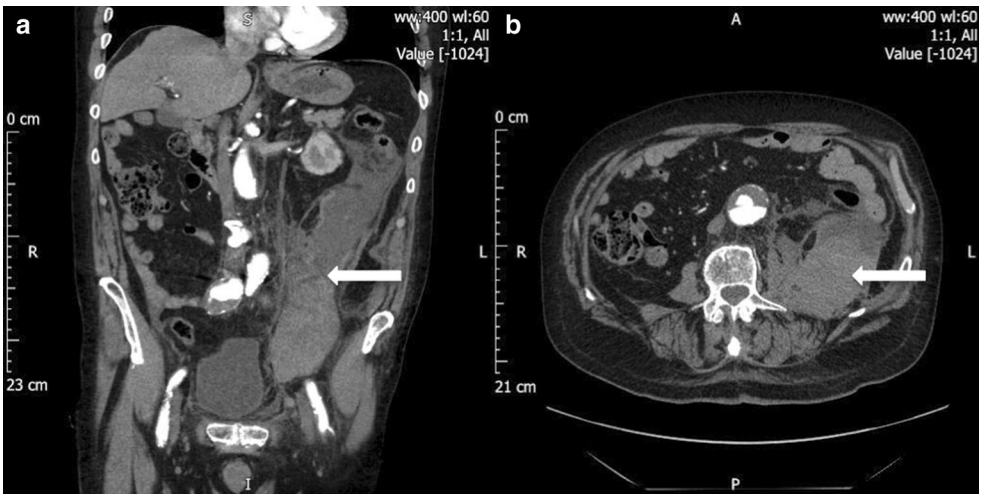

Fig. 3 Coronal (**a**) and axial (**b**) CT angiogram of our patient demonstrating the retroperitoneal haematoma (*white arrows*)

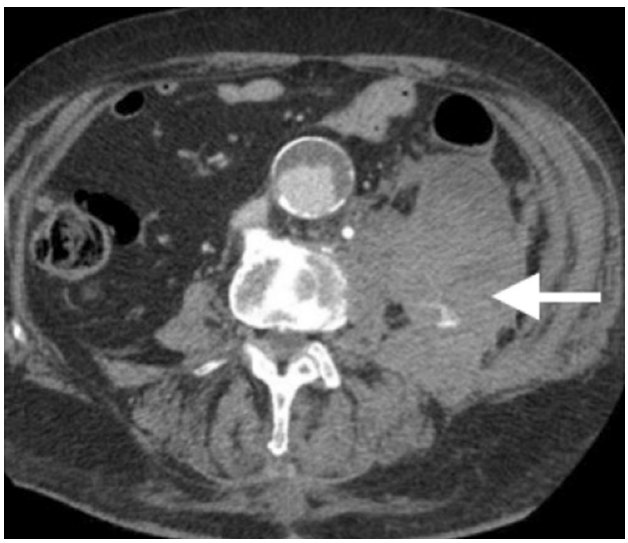

Fig. 4 Axial image from the CT of our patient obtained 24 h after their initial presentation, demonstrating enlargement of the retroperitoneal haematoma (*white arrow*)

Upon arrival at our institution, repeat CT (Fig. 4) showed an enlarging haematoma, extending posteriorly to the left kidney along the left hemi-abdomen to the pelvis, with a diameter of 31 cm. There was no evidence of rupture of his known aneurysms and no discrete bleeding vessel was identified despite contrast and intravascular enhancement. A working diagnosis of a rivaroxaban-induced retroperitoneal haematoma was formulated.

Literature review

To the best of our knowledge, this is the first report of rivaroxaban-induced retroperitoneal haematoma following the anterior approach to the lumbar spine described in the literature.

Retroperitoneal haematoma post-ALIF has previously been reported [4, 5]; however, these were either from an unidentified source of bleeding or due to right and left epigastric artery injury rather than anticoagulant administration. Anticoagulant-induced spontaneous retroperitoneal haematomas have been described [6, 7]; however, these do not include cases caused by NOAC use. In an observational cohort study by Sunga et al. [6], 66.3% of patients who developed a spontaneous retroperitoneal haematoma were on various anticoagulant therapy, including warfarin, heparin, and low molecular weight heparin (LMWH). Several cases of postoperative and spontaneous spinal epidural and subdural haematomas in patients on rivaroxaban have been reported [8], and these events are known complications to occur secondary to concomitant spinal and neuroaxial anaesthesia [9].

Operative vascular injury is a feared complication of the anterior approach to the lumbar spine; however, fortunately most vascular injuries present themselves intraoperatively and hence can be addressed. Occasionally ligatures can loosen and slip off vessels postoperatively and can result in abdominal wall and retroperitoneal haematomas. Exploration in these instances will most often reveal a discrete bleeding vessel that can be controlled. It is important, however, to distinguish haematoma formation as an independent, haemorrhagic risk in patients on NOACs, whereby discrete bleeding vessels may not be encountered on re-exploration.

Rationale for management of orthopaedic patients on rivaroxaban

Guidelines used in our institution have been formulated following consideration of the summary of product characteristics for Xarelto (Rivaroxaban) [2] and NHS Devon

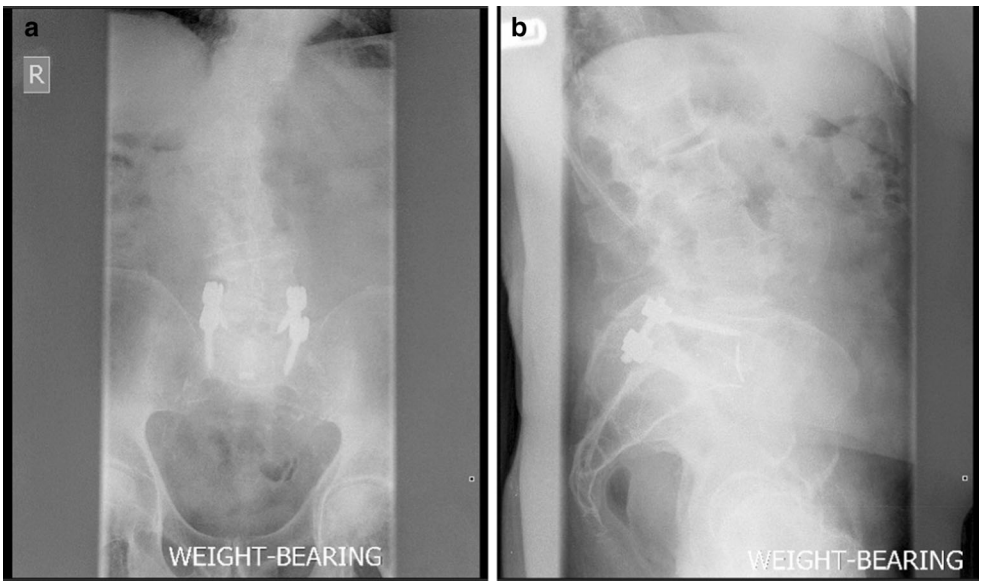

Fig. 5 Postoperative standing **a** anteroposterior (AP) and **b** lateral plain radiographs of our patient

formulary [3]. Despite following the most recent evidence-based guidelines, this patient still developed an anticoagulant-associated complication. There was no element of renal insufficiency in this patient, and no concurrent use of CYP-3A4 or P-glycoprotein inhibitors, which interfere with rivaroxaban elimination. A patient's bleeding risk must be considered on a case-by-case basis, and high-risk procedures may require a longer interruption interval. The rapid onset and relatively short half-life of NOACs, such as rivaroxaban, negates the need for a bridging anticoagulation (such as is required with warfarin). Our patient did not have a particularly high thromboembolic risk; however, use of a bridging anticoagulant for the surgical period may rarely be indicated.

Treatment

Following medical optimisation, the patient was taken to theatre for exploration and evacuation of the retroperitoneal haematoma under general anaesthetic. The original surgical site was reopened through the left retroperitoneal approach. A large partially organised haematoma was found in the retroperitoneal space, extending up to the paracolic gutter and to the presacral space. All clotted blood was removed, and previously, opened tissue planes were explored showing no further discrete active bleeding. One large bore suction drain was placed into the retroperitoneal space, which was washed out with 6 L of normal saline.

Chemical thromboembolic prophylaxis was avoided for 72 h following surgery, which is the standard protocol for the majority of spinal surgeries in our institution, and a cardiology consultation was sought to determine the appropriateness of starting NOACs and anti-embolic prophylaxis in the face of AF. Mechanical thromboembolic prophylaxis was provided by thromboembolic stockings and intermittent pneumatic calf compression. Following cardiology review, and in accordance with the patient's wishes, a decision was made not to restart NOACs. The patient was discharged 2 days following re-exploration and he suffered no further complications.

Outcome and follow-up

At 6-month follow-up, the patient reported complete resolution of his leg and back pain and plain radiographs demonstrated satisfactory implant positioning (Fig. 5). Unfortunately, the patient complained of some residual discomfort in the left iliac fossa and groin area, which may be related to the retroperitoneal haematoma stretching the cutaneous nerves lying in the posterior abdominal wall.

Conclusion

Given the increasingly prevalent use of rivaroxaban in patients with AF, it is important to have a high index of suspicion of haemorrhagic complications when these patients present following surgery. This case highlights the possibility for retroperitoneal haematoma in such patients, in whom a discrete bleeding vessel may not be seen. We recommend the use of a suction drain, placed in the

retroperitoneal space in these patients. Consideration should be given to stopping NOACs for longer than the current guidelines suggest if a patient's thromboembolic risk is judged to be sufficiently low to permit this. Furthermore, reversal agents for NOACs would greatly aid perioperative management of these patients and future research should be directed towards this.

Compliance with ethical standards

Conflict of interest None of the authors have any potential conflict of interest.

Informed consent The patient was informed that data from the case would to be submitted for publication, and gave their consent.

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