Novel treatment (new drug/intervention; established drug/procedure in new situation)

Extensive venous thrombosis in a healthy young man with a short inferior vena cava syndrome treated successfully with rivaroxaban

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Summary

We report a case of an incidental finding of congenital absence of the intrahepatic segment of the inferior vena cava (IVC) complicated by extensive bilateral deep venous thrombosis (DVT) with significant oedema following a long-distance road trip. Initially the patient failed treatment with standard anticoagulation therapy with enoxaparin and warfarin. However, he has responded to the new oral antifactor-Xa anticoagulant (rivaroxaban). Within a few days, rivaroxaban improved the oedema and DVT. The significant features of this case are the unusual presentation, the poor response to initial standard anticoagulation therapy and the beneficial outcomes when managed with the novel new anticoagulant. The patient has continued the new treatment regularly for the last 12 months with good toleration and without side effects. This report presents the findings, management and outcomes in a case of extensive bilateral DVT in a previously healthy young man who was found to have a congenital short IVC.

BACKGROUND

Congenital malformations of the inferior vena cava (IVC) are rare and present in approximately 0.3–0.5% of young adults. Patients are usually asymptomatic and this developmental anomaly is detected incidentally during abdominal surgery or specific radiological evaluation. Rarely patients may present with deep vein thrombosis (DVT). This challenging case report highlights such an anomaly with an extensive thrombotic complication which failed standard anticoagulant therapy. However, when a novel treatment with a new oral antifactor-Xa anticoagulant was started, the patient responded dramatically with improvement of his symptoms and resolution of his DVT.

CASE PRESENTATION

A 20-year-old Caucasian man presented at the local community hospital with an acute onset of bilateral leg swelling and back pain. His recent history was highlighted by a motor vehicle journey across Australia from Melbourne to Perth. He had travelled a distance of 3280.4 km (2038.35 miles) with short intermittent breaks every 4 h. The travel time was approximately 15 h/day for 3 days. At the end of this road trip he developed acute upper lumbar back pain and bilateral leg swelling.

The initial back pain progressed down both legs which on examination were grossly swollen and tender. He was unable to bear his weight. He returned to his home by air travel (more than 5 h) and was reviewed by his primary care practitioner. An abdominal CT scan ordered by his local doctor was reported as showing 'IVC compression'.

He was transferred to Launceston General Hospital (tertiary referral hospital) for further investigation and management.

Initial examination revealed that his left leg was twice the size of his right leg, causing excruciating pain with movement that required large doses of opioid analgesia. He was otherwise fit and healthy and did not have any risk factors for venous thromboembolic disease (VTE). As a child he underwent appendectomy and tonsillectomy without adverse incident.

His mother has antiphospholipid syndrome complicated by postpartum DVT and pulmonary embolism (PE).

INVESTIGATIONS

A contrast CT scan of the neck, chest, abdomen and pelvis revealed congenital absence of the intrahepatic segment of the IVC (figures 1 and 2). This was associated with transdiaphragmatic venous drainage through multiple large upper retroperitoneal collateral vessels (figure 3). This then communicated with a very large azygous system (Figure 3).

An ultrasound and CT scan of both legs showed an extensive occlusive left DVT extending to the left common iliac vein (figure 4). Routine blood tests as well as thrombophilia screen were normal. There were no other prothrombotic abnormalities.

TREATMENT

Initially therapeutic subcutaneous enoxaparin was started at 1 mg/kg body weight (BW) twice a day. The patient was discharged from hospital after 2 weeks of treatment which was overlapped with vitamin K antagonist (warfarin), achieving therapeutic INR between 2 and 3.

However, a week later he represented with worsening symptoms of leg pain and extensive bilateral leg oedema.

Figure 1 . Upper arrow shows right hepatic vein entering patent suprahepatic segment of inferior vena cava (IVC); lower arrow shows an absence of intrahepatic IVC (empty hepatic fissure).

Therapeutic INR suggested adequate warfarin dosage (INR 2.9).

A repeat ultrasound of his lower limbs and pelvis showed extensive bilateral DVT extending to both

Figure 2 . Both arrows show a complex of small collateral renal veins.

Figure 3 . The upper arrow shows missing intrahepatic part of inferior vena cava (IVC) with normal hepatic veins feeding into patent suprahepatic segment of IVC (not shown) and the lower arrow shows a compensatory enlarged azygous vein.

common iliac veins. His warfarin was ceased with the restart of high-dose enoxaparin (1.5 mg/kg BW) subcutaneously twice daily with an antifactor-Xa blood level of 1.2 U/ml.

A vascular surgical opinion was sought. It was advised that reconnection of the major vessels was not feasible and that placement of an IVC filter would increase the risk of thrombosis progression. Furthermore, the patient was not considered to be a suitable candidate for catheter embolectomy due to the high mortality risk. This was mainly due to the associated significant risk of distal embolisation to the pulmonary circulation, especially with the extensive DVT as presented in this case which may have led to a severe postphlebotic syndrome in the lower limbs. Furthermore, development of a postphlebotic syndrome in such a young person would have created a life-long morbidity problem that we had managed to avoid with the anticoagulation therapy.

He was initiated on a therapeutic trial of rivaroxaban (oral antifactor-Xa). It was started at a dose of 15 mg orally twice daily. Thereafter, the patient responded well

Figure 4 . The upper arrows show expanded, thrombosed external iliac veins bilaterally compared with small normal size external iliac arteries above them. The lower arrow shows a thrombosed left internal iliac vein.

to the new treatment with a significant reduction of oedema in both lower limbs.

OUTCOME AND FOLLOW-UP

The patient has continued with oral rivaroxaban for almost 12 months and has resumed his usual daily activity with normalisation of the size of both of his legs. He has remained pain free.

A follow-up ultrasound revealed significant improvement with resolution of the DVT on the right side and a residual small non-occlusive thrombus on the left.

DISCUSSION

Absent IVC is an uncommon but well-recognised anomaly. Anomalies of the IVC have been described more frequently (0.6–2%) in those with other cardiovascular defects¹ and less frequently in otherwise healthy individuals.

The prevalence of congenital absence (agenesis) of the IVC ranges from 0.3% to 0.5% in normal, healthy individuals^{2–3} and is 5.3% in young adults with DVT-associated risk factors.⁴ Ruggari *et al*⁴ presented four cases of agenesis of the IVC (AIVC) over 5 years in young populations. In total 62 cases of AIVC-associated DVT were retrieved from the literature. A search of the non-English literature identified only nine reported cases.⁵

The presentation of congenital absence of the IVC ranges from an incidental finding to a devastating DVT or PE. There is controversy as to whether an absent IVC is a true embryonic anomaly or whether it is the result of perinatal IVC thrombosis causing regression or disappearance of the once present IVC.^{6–7}

The challenging problem remains to identify these patients, and to define the earliest and best specific therapeutic approach (eg thrombolysis^{7–9} or surgery, if necessary^{3–10}), but no clear consensus has been reached on therapeutic strategy, other than long-term anticoagulation and the wearing of elastic stockings.

To date standard treatment of acute VTE is limited to unfractionated or low-molecular-weight heparin initially, with an overlapping administration of a vitamin K antagonist (warfarin). This requires regular laboratory monitoring and dose adjustment, and may be complicated by drug and food interactions.¹¹

The use of the newer anticoagulants remains a challenge. A literature review shows that rivaroxaban, an oral direct factor-Xa inhibitor, is effective in the prevention of venous thromboembolism after orthopaedic surgery. The overall advantage is that it does not require laboratory monitoring. It has no food and only a few drug interactions.^{12–14} This medication profile seemed to make rivaroxaban an ideal therapeutic choice in this case.

The EINSTEIN study demonstrated that oral rivaroxaban was not inferior to warfarin therapy in the treatment of VTE.¹⁵

In addition, we could find no data regarding the use of rivaroxaban in cases of AIVC.

In summary, we found that this novel treatment achieved a significant improvement in the patient's well-being with subsequent reversal of all symptoms associated with his severe and extensive DVT.

Learning points

- ▶ A rare congenital vascular anomaly with thrombotic complication was treated successfully with the new anticoagulant therapy (rivaroxaban).
- ▶ Our case study demonstrates that rivaroxaban alone is as effective as and not inferior to standard anticoagulation therapy.
- ▶ This case report highlights the feasibility of employing a new oral anticoagulant in a rare high-risk thrombotic situation with avoidance of invasive surgical intervention while achieving an overall beneficial outcome.

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Competing interests None.

Patient consent Obtained.

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