Unusual presentation of more common disease/injury

Excessive venous bleeding in a patient with acetabular pelvic fracture secondary to inferior vena cava filter occlusion

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Summary

Inferior vena cava (IVC) filters can be used to prevent pulmonary embolism in cases where anticoagulation is contraindicated. Filter obstruction remains one of the major complications after its insertion. This is the rare case demonstrating excessive venous bleeding during attempted open reduction internal fixation of an acetabular fracture secondary to subcomplete IVC filter thrombosis day 1 postinsertion of the device.¹

BACKGROUND

Acetabular fracture has a mortality of up to 9%, 60% of these accountable to haemorrhage.² Resuscitation is therefore vital in these patients. Other complications include nerve injury, thromboembolic disease, heterotopic ossification, infection and chondrolysis. Deep vein thrombosis (DVT) can occur in up to 19% of patients, and pulmonary embolism (PE) in 2%.³ PE is a cause of death in up to 20% of patients with polytrauma.⁴ Some endorse⁵ the use of prophylactic inferior vena cava (IVC) filters in polytrauma. There are several complications associated with the insertion of this device—most commonly blockage. This is a complication that is very important and must be remembered during pelvic surgery. A blockage in the filter can increase venous pressure distally and thus cause significant venous bleeding during surgery. Basic management advanced trauma and life-support principles must be utilised in these cases. The IVC filter blockage before acetabular fracture open reduction internal fixation is uncommon and has not been found in any further literature searches.

CASE PRESENTATION

A 69-year-old gentleman sustained left acetabulum fracture from a quad bike injury while on holiday in Egypt. He was treated with skin traction for 2 weeks before definitive open reduction internal fixation, which was done in UK. He had a preoperative CT scan which confirmed that the left acetabulum fracture involved both anterior and posterior walls (Letournel⁶ and Judet classification) as well as sustaining bilateral pubic rami fractures (figures 1 and 2). Unfortunately due to the fact he was abroad—he could not have the fracture fixed within the ideal 10 days as per The British Orthopaedic Association Standards for Trauma¹ (BOAST).

Preoperatively, he developed PE as confirmed by CT pulmonary angiogram. He was anticoagulated with heparin and had an infrarenal IVC filter inserted (9Fr sheath, Cook Celect filter, Cook Medical Inc, Bloomington, Illinois, USA) (figures 3 and 4). The heparin was continued but stopped on the day of the operation.

Following the day of IVC filter insertion, the first attempt to fix the pelvis was performed by exposing the left acetabulum through an ilioinguinal approach. Iliopsoas with femoral nerve, femoral vessels and spermatic cord were dissected out and isolated carefully. During the mobilisation of the fracture fragments and attempted reduction, torrential bleeding from the left hemipelvis was noted but no major bleeding vessel was seen. The procedure was shortly abandoned. The left hemipelvis was temporarily packed and the wound was superficially closed. He required 12 units of blood via transfusion intraoperatively due to a 7.5-litre loss. CT angiogram was performed during the postoperative period and confirmed that there were no major arterial or venous bleeding sites—there was no iatrogenic injury to the vascular bundle or pre-existing major vascular injury. The CT scan did, however, show a heterogeneous appearance of distended iliac veins and IVC suggesting venous hypertension (figures 5 and 6 to see

Figure 1 CT showing three-dimensional reconstruction of the acetabular fractures.

Figure 2 CT showing the parasagittal view of both anterior and posterior acetabular wall fracture.

proximal and distal changes in IVC calibre as a result of the blockage). Above the IVC filter the IVC was small in calibre. This would indicate that the IVC filter was blocked. One mechanism whereby this could have happened is as a result venous thromboembolism from the handling of femoral vessels at the beginning of the attempted fixation procedure. The case was discussed with the vascular surgeons, and it was agreed that it would be wise to take no further intervention in order to correct the venous hypertension. Removing the IVC filter at this stage was not an option as it was stopping caudal seeding of thrombi. Anticoagulation was also clearly not an option due to the bleeding.

He was intubated and ventilated before being transferred to intensive therapy unit (ITU). Blue discolouration on both his lower limbs was noted during his stay in ITU, confirming the venous congestion. During his 4 day stay in ITU, he was carefully resuscitated to optimise his renal function after the initial insult caused by hypovolaemia. On day 3 of his stay in ITU, he was stable enough to undergo attempted acetabulum internal fixation again.

During the second attempt to fix his fracture, manipulation of the fragment was very difficult because of contraction and friability of the soft tissues. Further bleeding was encountered during the manipulation and fixation of the fracture. A preliminary fixation was done. Unfortunately during this procedure, a small arterial vessel was damaged deep inside the pelvis. This was packed until the preliminary fixation and acetabular articulation reduction were completed. During the procedure, the patient had lost a total of 6.5 litres of blood because of the persisting venous hypertension. The acetabular articulation reduction was not perfect but was then accepted at this stage after the pelvis and the hip

Figure 3 Schematic drawing of Cook Celect inferior vena cava filter.

joints were found to be stable postfixation (figures 7 and 8 for pelvic inlet and outlet radiographs, respectively). The arterial bleeding was stopped with transfixing sutures. The wound again was left packed with

Figure 4 CT showing the location of inferior vena cava filter.

Figure 5 CT showing abnormal small calibre of inferior vena cava proximal to the filter.

Rifampicin-soaked gauze and closed superficially. Two days later he was taken back to operating theatre where the left ilioinguinal wound was explored. There was no active bleeding and finally the wound was approximated with surgical clips.

Postoperatively, he developed a left femoral nerve neuropraxia with a grade 1 power of the quadriceps muscles group. After consultation with haematologists, he was kept on warfarin for at least 6 months for his PE. The IVC filter was left in situ with the reasoning that he should be given time to establish venous collateral circulation. Subsequently, signs of acute venous congestion on the lower limbs resolved over the next few days. He recovered well and was discharged from the hospital 6 weeks later without further complications.

INVESTIGATIONS

CT of abdomen and pelvis was performed with 0.5 mm×64+C+SS.

Figure 6 CT showing abnormal dilated inferior vena cava distal to the filter.

Figure 7 Plain pelvic inlet view radiograph showing recon plate with screws.

DISCUSSION

This is a case demonstrating acute venous hypertension 1 day post-IVC filter insertion due to almost complete occlusion of the filter with thromboemboli. The IVC filter has been available for over 30 years. Major complications of IVC filters include IVC obstruction, lower-extremity venous insufficiency, recurrent PE, insertion site DVT, migration of the filter and erosion of the filter through IVC wall.⁷

IVC thrombosis is one of the frequent and major complications of filter placement (2–28%).⁷ The intracaval extension of proximal DVT is thought to be the main cause of early thrombosis. However, the thrombogenic potential of each filter device is different. Despite a large number of publications on experience with IVC filters, many doubts remain concerning the effectiveness and safety, in the absence of controlled trials.^{4 8} It is suggested that concomitant anticoagulation after filter placement is desirable when there are no contraindications, in order to prevent early IVC and filter thrombosis. This, however, was not an option in the case presented due to the contraindication of surgery. It remains debatable as to whether

Figure 8 Plain pelvic outlet view radiograph showing recon plate with screws.

one should consider delaying operative intervention post-IVC filter insertion to allow the establishment of new peripheral diversion away from the thrombosed venous system.

This case report demonstrates that by handling the femoral vessels intraoperatively, there is a potential risk of causing further thromboembolism and blocking the newly inserted IVC filter. This leads to the potential risk of venous hypertension and excessive venous bleeding.

The obstruction acts as a tourniquet effect, causing venous congestion and bleeding through intramedullary vessels of bones.⁸ If one encounters excessive venous bleeding during the attempted fixation of the pelvic fracture, it could be a life-saving decision to pack and resuscitate the patient. The operation should then be deferred until the patient is stable before undergoing the delayed open reduction internal fixation as per the BOAST guidelines.¹ In such a case of delayed surgery, it is debatable as to whether an IVC filter should be utilised as a prophylaxis for PE.

Learning points

- ▶ It is essential to manage acetabular fractures early.
- ▶ Management of venous thromboembolism is with anticoagulation unless contraindicated—in which case inferior vena cava (IVC) filter should be used.
- ▶ Use IVC filters cautiously in pelvis fracture.
- ▶ Femoral vessels should be handled minimally during hip surgery in order to lower the risk of dislodgment of any potential venous thrombus.
- ▶ If excessive bleeding is experienced during hip surgery, resuscitation of the patient is the priority.

Competing interests None.

Patient consent Obtained.

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