CASE REPORT

Iliac vein perforation caused by dialysis catheterisation: A case report

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Abstract

In the context of haemodialysis for patients with end-stage renal failure, central venous catheterisation is often required to establish a vascular access route. However, procedural complications, including acute vascular rupture and haemorrhage may occur. Although rare, these complications pose significant management challenges, high treatment costs and substantial patient trauma, with some cases progressing to life-threatening emergencies. Notably, there are no previously reported cases of iliac vein perforation secondary to haemodialysis catheterisation. We present a case of right common iliac vein (CIV) perforation by a haemodialysis catheter extending into the psoas muscle, resulting in a massive retroperitoneal haematoma and haemorrhagic shock (HS).

Keywords: Chronic kidney disease, Haemodialysis, Internal jugular vein, Central venous stenosis.

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Introduction

Patients with chronic renal failure frequently require central venous catheter (CVC) placement for temporary or long-term haemodialysis. Venous puncture carries risks of local injury, haematoma formation and arteriovenous fistula development.[1] While central venous perforation remains uncommon, existing literature predominantly describes brachiocephalic trunk and superior vena cava injuries.[2] Current management strategies include open surgical repair and endovascular stent grafting.[3] This report details a novel case of right common iliac vein perforation causing retroperitoneal haematoma with haemodynamic instability. Through 14-days conservative management with retained catheter and targetted anti-shock therapy, followed by successful catheter removal under digital subtraction angiography (DSA), we demonstrate an effective treatment approach.

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Case Report

A 61-year-old man presented to Jinhua People's Hospital (jinhua, Zhejiang) with a two week history of progressive chest tightness and generalised oedema. He was diagnosed with acute renal failure complicated by acute heart failure. A temporary haemodialysis catheter was inserted into the right common femoral vein (CFV) using the Seldinger technique under local anaesthesia.

During guidewire insertion (approximately 20 cm), procedural resistance and subsequent lower back pain were noted. After the procedure, blood aspiration was unsuccessful, and the patient developed rapidly worsening lumbar pain, along with palpitations and diaphoresis. Emergency lower limb computed tomography (CT) angiography revealed right psoas haematoma suggestive of venous rupture (Figure 1).

The patient was transferred to our institution in a haemodynamically unstable condition (heart rate 121 bpm【normal 60-100 beats per minute】), blood pressure 81/45 mmHg【normal 90-139/60-89mmHg】) with severe anaemia (haemoglobin 52 g/L【normal 130-175 g/L】). Repeat abdominal computed tomography (CT) revealed an

Figure-1: The enhanced computed tomography angiography (CTA) of the lower extremities. The enhanced computed tomography angiography (CTA) of the lower extremities conducted at the local hospital indicated the formation of a haematoma in the patient's right psoas major muscle, as marked by the yellow arrow, with venous rupture and haemorrhage being considered as the cause.

Figure-2: The enhanced abdominal computed tomography angiography (CTA). The enhanced abdominal computed tomography angiography (CTA) revealed that the haematoma had significantly increased in size compared to previous scans. It is considered that the haemodialysis catheter perforated through the right common iliac vein (CIV) and entered the psoas major muscle, resulting in a retroperitoneal hematoma. No extravasation of contrast agent was observed (Figure 2a-b).

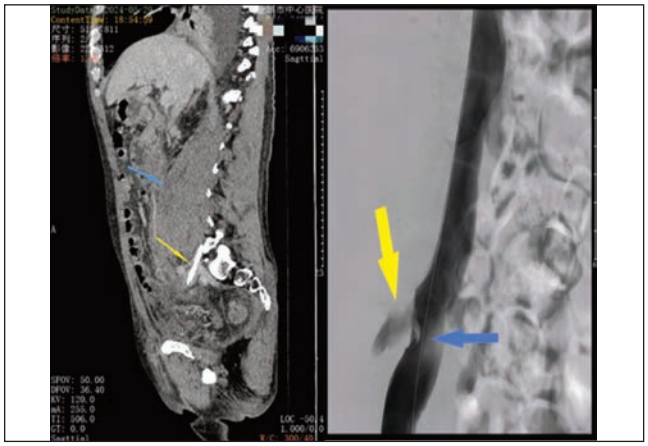

Figure-3: The anteroposterior and lateral angiograms. The anteroposterior and lateral angiograms demonstrate that the right common iliac vein (CIV) is patent, with a fistula tract formed between the vessel wall at the rupture site and the surrounding tissues. No leakage of contrast agent is observed.

expanding haematoma secondary to CIV perforation by the dialysis catheter (Figure 2a-b). Based on these symptoms and findings, the patient was diagnosed with acute renal failure, acute heart failure, central venous perforation, and shock. Immediate anti-shock treatment was initiated, including intravenous infusion and blood transfusion. A total of 4 units of packed red blood cells and 800 ml of fresh frozen plasma were transfused. After treatment, the patient's blood pressure remained stable at 80-90/50-60 mmHg (normal 90-139/60-89mmHg), and his heart rate decreased to 100-110 beats per minute. (normal 60-100 beats per minute) His red blood cell count increased slightly to 1.91×10^{12}/L (normal $4.3\text{-}5.8\times10^{12}$/L), and his haemoglobin level rose to 58 g/l (normal range: 130-175 g/L), indicating a slight improvement.

A multidisciplinary team opted for conservative management due to the absence of contrast extravasation on computed tomography angiography (CTA) and the post-transfusion haemoglobin improvement (52 → 58 g/L【normal 130-175 g/L】).

The dialysis catheter was retained to tamponade the rupture, with surgical intervention reserved for any future hypotensive episodes.

The patient remained haemodynamically stable (BP: 90–100/50–60 mmHg【normal 90-139/60-89mmHg】; HR: 100–110 bpm【normal 60-100 beats per minute】), and haemoglobin continued to rise (up to 68 g/L【normal 130-175 g/L】). He was monitored in the intensive care unit (ICU), and right internal jugular access was established for continuous renal replacement therapy (CRRT) after obtaining informed consent.

On the 14th day of conservative treatment, the haemodialysis catheter was removed under digital subtraction angiography (DSA) guidance. A guidewire was inserted through the catheter, which was then removed. A 10F catheter sheath was then implanted in the vein. Both anteroposterior and lateral angiography showed that the right common iliac vein (CIV) was patent, and a fistula had formed between the vessel wall at the rupture site and the surrounding tissues (Figure 3). No leakage of contrast agent was observed. Two days later, the patient was discharged from the hospital in good condition.

Discussion

During the placement of a central venous catheter (CVC) in patients with chronic renal failure, iatrogenic injury is a potential risk that is often closely related to the choice of surgical approach. According to reported cases, perforations of the brachiocephalic trunk and superior vena cava are relatively common iatrogenic injuries.

Notably, despite the widespread use of the femoral vein approach, there have been no reports of this technique causing injuries to the iliac veins or inferior vena cava.[2,4] Furthermore, the anatomical course of the blood vessels is also an important factor influencing the occurrence of complications.[4,5] Equally important is the experience of the physician, which plays a crucial role in avoiding iatrogenic injuries. Senior physicians, with their extensive experience and superb skills, are often able to make more accurate judgments and perform more precise manipulations during the catheterization process, thereby effectively avoiding unnecessary complications.[6,7]

To minimize the occurrence of central venous perforations, during the puncture process, we should utilize imaging tools such as ultrasound, X-ray, and digital subtraction angiography (DSA) for assistance. This allows us to observe more details, enabling more precise operations.[6,7] The guidewire inside the dialysis catheter tends to be soft, while the dilator is relatively stiff, increasing the risk of guidewire breakage during puncture. To prevent deformation or fracture, a more supportive (rigid) guidewire should be used during intubation. This ensures more stable positioning of the dialysis catheter within the iliac vein.

Especially when the catheter has difficulty navigating around vascular bends, inserting the rigid guidewire into both catheter lumens can increase support. After a central venous perforation occurs, the catheter should not be removed blindly, as doing so may worsen bleeding and lead to further complications.[8-10]

In this case, the patient was in a state of acute heart failure and haemorrhagic shock, making major surgery a non-preferred option. After blood transfusion, the patient's haemoglobin level showed improvement, and an enhanced abdominal computed tomography angiography (CTA) revealed no evidence of contrast leakage. Due to the lower pressure in veins compared to arteries, combined with the small volume of the retroperitoneum, in the event of massive haemorrhage, the large haematoma and the catheter at the site of the vascular rupture can actually serve to compress and stop the bleeding. At this point, removing the haemodialysis catheter could exacerbate the bleeding. Although stent implantation could be performed after catheter removal to treat vascular injury and stop bleeding, the surgical risk under these conditions was deemed high. Additionally, the common iliac vein is close to the inferior vena cava, and placing a covered stent could impair venous return from the left lower limb. Therefore, it was decided to temporarily retain the haemodialysis catheter and continue anti-shock treatment. To our knowledge, no previous cases have been reported of haemodialysis catheters perforating veins and causing retroperitoneal haematoma. In this case, we chose to retain the haemodialysis catheter while continuing anti-shock treatment, and to remove the catheter only when a fistulous tract had formed between the site of vascular rupture and the surrounding tissues. This approach not only reduced the need for emergency surgery but also lessened the patient's overall medical burden.

Conclusion

In summary, vascular perforation is a rare complication of central venous catheter (CVC) placement. Iliac vein perforation caused by catheter-related issues and leading to retroperitoneal haematoma is even more uncommon. When emergency cases involving catheter-related venous perforation rupture are encountered, certain patients may present a dilemma regarding whether to proceed with emergency surgery or whether delaying intervention might result in missed optimal surgical opportunities. We propose a new, safe, and effective treatment approach for managing retroperitoneal rupture and bleeding caused by CVC placement.

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Conflict of interest: None.

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Author Contribution:

PZ: Concept, case collection and original draft writing.
XW: Concept, original draft writing, review, editing and final approval.