

CASE REPORT

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Perioperative management of patient with pre-existing deep vein thrombosis for laparoscopic peritoneal dialysis catheter insertion: a case report

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Abstract

Background A patient with chronic kidney disease and recurrent catheter-related thrombosis.

Case presentation The patient had femoral vein thrombosis and was scheduled for laparoscopically assisted continuous ambulatory peritoneal dialysis catheter insertion. The chief concerns during the perioperative period were the risk of pulmonary thromboembolism, limited venous access, and risk of bleeding as the patient was on anticoagulation therapy. Meticulous attention was paid to history, clinical examination, and to the ongoing treatment with regard to risk of systemic thrombosis.

Conclusions Management was tailored according to risk of thrombosis and bleeding during perioperative period along with identification adverse events associated with anticoagulation and preparedness for management of pulmonary embolism.

Keywords Chronic kidney disease, Perioperative complications, Deep vein thrombosis

Background

Patients with chronic kidney disease (CKD) commonly present for surgery for a number of indications. Patients with CKD may have multiple pre-existing comorbid conditions like diabetes mellitus, hypertension, coronary artery disease, anemia, and platelet dysfunction. The risk of adverse cardiac events, renal compromise, and anesthetic complications in these patients is higher compared to the general population (Craig and Hunter 2008). These patients also have a very high risk of venous thromboembolism (Hodzic et al. 2014). We describe the case report

of a patient with CKD, who had pre-existing deep vein thrombosis (DVT), posted for laparoscopically assisted continuous ambulatory peritoneal dialysis (CAPD) catheter insertion. The anesthetic challenge was to minimize the risk of DVT embolization without delaying the catheter insertion. Written and informed consent was obtained from the patient for the publication of this case report.

Case presentation

A 64-year-old obese female patient, a known case of diabetes mellitus and hypertension for the past 20 years and CKD stage IV for the past 1.5 years, was on maintenance hemodialysis three times a week. She had failure of arteriovenous fistula (AVF) created at multiple sites over the course of one and a half year. Following this, hemodialysis was being performed via dialysis catheters. However, she had thrombosis at all the catheter insertion sites

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following hemodialysis, viz. right internal jugular vein, left internal jugular vein, and left femoral vein; hence, a diagnosis of catheter-related vascular access thrombosis was made. Unfractionated heparin (UFH) in therapeutic dose of 25,000 U/day was initiated. The bilateral internal jugular vein thromboses resolved after 2 weeks; however, left femoral vein thrombosis persisted, as assessed with compression ultrasound. A hematological workup did not reveal the presence of any hypercoagulable disorder. In view of multiple AVF failures and vascular access thromboses, the nephrologist and urologist arrived at a decision to insert a CAPD catheter for dialysis. The patient was morbidly obese and had a history multiple gynecological surgery. In anticipation of bowel and peritoneal adhesions, the urologist was in favor of laparoscopic insertion of the catheter for its successful placement.

A pre-anesthetic evaluation revealed the following concerns: obesity, diabetes mellitus, hypertension, difficult intravenous access, and unresolved femoral venous thrombosis. The vascular surgeon advised against pre-operative inferior vena cava filter insertion. A 2D echocardiography was done to rule out the presence of clot/thrombus in the cardiac chambers. UFH was stopped 24 h prior to the surgery. A repeat compression ultrasound showed no evidence of further progression of existing DVT or development of thromboses at other sites.

On the day of surgery, the patient was taken in the operation theater. Standard monitoring including ECG, non-invasive blood pressure, and pulse oximeter was established. Attempts at peripheral intravenous access were unsuccessful. A 16 G intravenous cannula access was successfully inserted in the left external jugular vein under ultrasound guidance. After an uneventful standard anesthetic induction and endotracheal intubation, an arterial line was secured in the right radial artery. Anesthesia was maintained with isoflurane in an oxygen-nitrous oxide mixture. The surgeon gradually insufflated the abdomen with carbon dioxide gas, with intraabdominal pressures maintained below 10 mm Hg. The surgery lasted for 1.5 h with successful placement of the peritoneal catheter. The intraoperative vitals were stable. The neuromuscular blockade was reversed and trachea extubated. The patient was followed up for 2 days postoperatively, and no complications were reported. She was also followed up after a month, the CAPD catheter was fully functional, and she was undergoing dialysis every 72 h. She reported a better functional status and successful resolution of left femoral vein DVT with UFH 3 weeks postoperatively. The patient was discharged and advised to continue peritoneal dialysis at home with regular hospital follow-up.

Discussion

In the dialysis, dependent patient establishing a constant patent vascular access for hemodialysis may be challenging. The source of vascular access for dialysis in most CKD patients is native AVF, which serves as a permanent access. But patients in whom there is difficulty with formation or functioning of an AVF require temporary vascular access via a central venous catheter (CVC). CVC is accompanied by both immediate complications like bleeding, hematoma formation, arterial puncture, and pneumothorax, as well as long-term complications like infection, thrombosis, and venous stenosis (Wattanakit and Cushman 2009).

CKD patients have higher incidence of catheter-related thrombosis due to enhanced platelet aggregation, decreased anticoagulant factors, and increased pro-coagulant factors such as fibrinogen, factors VII and VIII, and Von-Willebrand factor, which contributes to enhanced prothrombotic state and thereby increased risk of thrombosis (Hodzic et al. 2014). Venous thrombosis is accompanied with the risk of the dreaded complication of pulmonary embolism (PE). Wiesholzer et al. suggested that venous thromboembolism in dialysis patients is relatively common and reported prevalence of PE in 12.5% post mortem examinations in chronic dialysis patients who were hospitalized (Wiesholzer et al. 1999).

The treatment of DVT includes anticoagulation, thrombolysis, and inferior vena cava (IVC) filter placement. In most patients with proximal DVT, anticoagulation therapy alone is preferred over combination of thrombolytic and anticoagulation (Ortel et al. 2020). Thrombolysis may be considered in patients with limb-threatening DVT (phlegmasia cerulea dolens) and in selected younger patients at low risk for bleeding with symptomatic DVT involving the iliac and common femoral veins (higher risk for more severe post-thrombotic syndrome). Thrombolytic therapy is mainly recommended in patients with PE accompanied with hemodynamic compromise (Ortel et al. 2020). IVC filters may be beneficial in patients with proximal DVT and significant cardiopulmonary disease, as well as for patients with PE and hemodynamic compromise, who have contraindications to anticoagulant therapy.

The case in discussion was a particularly challenging one for the surgical and anesthesia team. A waiting period of 3 to 6 months for the primary treatment and resolution of DVT would have delayed the peritoneal dialysis catheter insertion. The patient would have to undergo hemodialysis during this time period. The hemodialysis would require catheter insertion, which would increase the risk of further progression as well as newer episodes of DVT. The other alternative would

have been to insert a fresh dialysis catheter for each session of hemodialysis in order to prevent development of thromboses. But the latter approach would have been very inconvenient as well as costly for the patient and a labor-intensive exercise for the health care workers. Hence, a multidisciplinary team consisting of the surgeon, nephrologist, anesthetist, and pulmonary medicine physician arrived at a decision to proceed with this urgent surgery.

A meticulous perioperative approach was adopted for the successful conduct of anesthesia. A preoperative repeat compression ultrasound was done to rule out further progression of the existing DVT as well as development of new thromboses. The therapeutic dosage of anticoagulation was continued up to 24 h prior to surgery to minimize the risk of thrombosis as well as bleeding. The platelet count and coagulation profile was closely monitored in the preoperative period. The patient had difficult peripheral intravenous access due to obesity and prolonged hospitalization. Owing to the history of repeated episodes of catheter-related thrombosis, we favored the avoidance of a CVC insertion. Instead, intravenous access was secured in the external jugular vein for perioperative purpose. The surgeon preferred laparoscopic approach as it conferred the advantages of less postoperative pain and early wound healing and would promote early ambulation of the patient which is highly beneficial in a patient already at risk of systemic thrombosis. The surgeon employed an intraabdominal pressure as low as reasonable to aid the surgical procedure but at the same time prevent hemodynamic instability. In order to avoid abdominal organ injury, the surgery was performed by a highly experienced laparoscopic surgeon. The surgeon employed an intraabdominal pressure as low as reasonably to aid the surgical procedure but at the same time prevent hemodynamic instability. Provision and preparedness for identification and treatment of critical event like PE was made with adequate monitoring including an invasive arterial line and by keeping emergency drugs and equipment at hand. The risk of postoperative DVT and PE was also taken care of by continuing the patient on therapeutic dose of UFH along with monitoring of platelet count and coagulation status.

Limitations

The major limitation was the absence of intraoperative ultrasound cardiac examination (TEE or trans-thoracic) for early detection of PE. The decisions made for patient management were based on the clinical scenario more as compared to evidence from

literature. Evidence-based management was done for DVT although.

Conclusions

An emergent or urgent surgery may routinely be required in patients with pre-existing DVT. A careful risk–benefit assessment must be done in such cases by a multidisciplinary team involved in patient care. Strict vigilance and monitoring of the patient's clinical condition should be continued throughout the perioperative period for prompt reorganization and treatment of PE.

Abbreviations

DVT	Deep vein thrombosis
CVC	Central venous catheter
CAPD	Continuous peritoneal dialysis
PE	Pulmonary embolism
IVC	Inferior vena cava

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Authors' contributions

A.G: formulation manuscript and editing. D.D: data collection and manuscript writing. All authors have read and approved the manuscript.

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Availability of data and materials

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Declarations

Ethics approval and consent to participate

Not required as per institutional protocol.

Consent for publication

Written and informed consent was obtained from the patient for the publication of this case report.

Competing interests

The authors declare that they have no competing interests.

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