



Acute Lower Extremity Arterial Occlusion during Surgery in a Patient Undergoing Robot-Assisted Radical Cystectomy with Intracorporeal Urinary Diversion: A Case Report

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Abstract

Lower extremity arterial occlusion is a significantly rare but serious complication of various surgeries. A 77-year-old Asian man with a history of atrial fibrillation, cerebral infarction, and liver cirrhosis arrived in the recovery room after undergoing robot-assisted radical cystectomy with intracorporeal urinary diversion. The patient suddenly complained of severe pain in the left lower extremity. Pain in the lower extremities, femoral pulses, and popliteal pulses were not palpable, and acute lower extremity arterial occlusion was suspected because of paresthetic symptoms, such as leg numbness. Bedside two-dimensional Doppler ultrasonography was performed, and no left arterial flow was observed; therefore, acute superior femoral arterial occlusion was suspected. After the patient's lower extremity perfusion was safely recovered, he was discharged from the intensive care unit.

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Keywords: Cystectomy; Bedside sonography; Acute embolic occlusion

Introduction

Lower extremity arterial occlusion is a rare but serious complication of various surgeries [1]. Here, we present the case of a patient who was asymptomatic during urological surgery and developed severe pain and paresthesia in the lower extremities immediately after arriving in the recovery room. Lower extremity pain and abnormal sensation were caused by arterial occlusion, and femoral artery Two-Dimensional (2D) Doppler ultrasonography was immediately performed for putative diagnosis.

Case Presentation

This case was approved by the Institutional Review Board (no. KUGH 2021-08-029). A 77-year-old Asian man who was diagnosed with bladder cancer in 2011 underwent transurethral resection of bladder tumor surgery three times and was followed up for chemotherapy at our institution. Massive hematuria was repeated a month previously and did not improve even after chemotherapy and surgery. Thus, Robot-Assisted Radical Cystectomy (RARC) with Intracorporeal Urinary Diversion (ICUD) was scheduled. The patient had a history of hypertension and diabetes. The patient had cirrhosis caused by hepatitis C infection. The patient underwent jugular intrahepatic portosystemic shunt in 2016 for esophageal and gastric varices. In 2019, the patient was treated for pons infarction and was prescribed apixaban. Preoperative electrocardiogram showed atrial fibrillation, and the patient's ventricular rate was 96 beats per minute (bpm). QTc was extended to 485 ms. Preoperative echocardiogram indicated septal hypertrophy with a normal cardiac chamber and trivial aortic regurgitation, and no other abnormal findings were observed. Chest radiography and pulmonary function testing revealed no abnormal findings. Based on the patient's blood test result, Prothrombin Time (PT) and International Normalized Ratio (INR) were slightly elevated to 15.9 s and 1.27, respectively. Based on the results of preoperative tests, apixaban administration was stopped 2 days before surgery after consultation with cardiologists, gastroenterologists, and neurologists. Blood pressure, heart rate, and oxygen saturation before anesthesia induction were 140/80 mmHg, 90 bpm, and 100%, respectively. Venous and arterial catheters were secured prior to the surgery. Standard procedures were followed for regular monitoring. End-tidal carbon

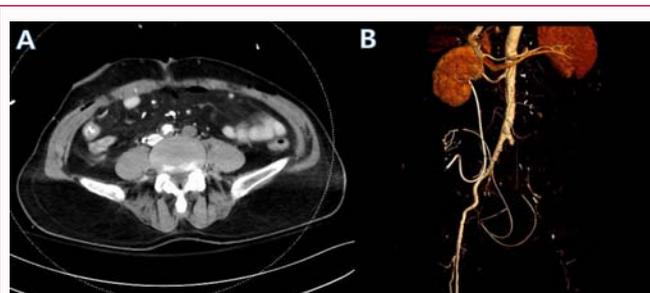


Figure 1: Primary computed tomography angiography after cystectomy showing total proximal left common iliac arterial occlusion. (A) Axial image. (b) Three-dimensional multiplanar reformation image.



Figure 2: Postoperative conventional angiography image after percutaneous thrombectomy.

dioxide monitoring and esophageal auscultation were performed, and the body temperature was measured. To induce anesthesia, glycopyrrolate (0.2 mg), propofol (100 mg), and remifentanyl (80 μ g) were administered intravenously, followed by rocuronium (50 μ g). A central venous catheter was inserted into the right internal jugular vein. The patient was placed in the supine position and maintained a slight Trendelenburg position during the surgery. Anesthesia was maintained using desflurane and remifentanyl with 40% oxygen while maintaining mechanical ventilation. The surgery was prolonged because of adhesions with the previous surgery. Approximately 1000 mL of blood was lost, and 2 units of red blood cells were transfused 5 h after the start of the surgery. There were no significant changes in end-tidal carbon dioxide, central venous pressure, heart rate, or blood pressure during surgery. The patient's systolic blood pressure and heart rate were maintained within a range of 100 mmHg to 140 mmHg and 80 to 110 beats/min, respectively. The maximum airway pressure was maintained at < 25 cmH₂O during surgery. Oxygen saturation and end-tidal carbon dioxide were maintained at 100% and 35%, respectively, throughout the surgery. A total of 2,100 mL of balanced crystalloid was administered. All hemodynamic monitoring findings were stable during the surgery. The surgery was performed for 8 h and 30 min. The neuromuscular block was reversed using sugammadex 200 mg, the patient was transferred to the anesthesia recovery room after spontaneous breathing, and complete recovery

of responses to commands was confirmed. The patient complained of numbness and pain in the left lower extremity immediately after arrival in the recovery room. Upon arrival at the recovery room, blood pressure, heart rate, and oxygen saturation were 126/75 mmHg, 87 bpm, and 100%, respectively. The patient was able to move to the left lower extremity; however, movement seemed limited. Although complaints of acute pain after surgery are common, acute lower extremity obstruction was suspected due to pain unrelated to the surgical site. The patient's left femoral pulse and ipsilateral popliteal and dorsalis pulses were not palpable. Left femoral 2D Doppler ultrasonography was performed using ultrasound; however, no arterial flow was observed. Thus, upper femoral arterial occlusion was suspected. Muscle weakness could not be evaluated because the patient was in severe pain. Low extremity Computed Tomography Angiography (CTA) was performed 30 min after the patient arrived in the recovery room, and the patient was diagnosed with total left common iliac arterial occlusion (Figure 1). Heparin could not be administered as the patient underwent surgery. Based on the CTA results, we decided to perform emergency surgery after consulting an urologist and a vascular surgeon. After explaining the situation to the patient and his family, at 1 h and 20 min after arriving in the recovery room, percutaneous thrombectomy was performed. Thrombectomy was successfully performed for 1 h and 30 min, and the patient was transferred to the Intensive Care Unit (ICU) (Figure 2). The patient developed delirium in the ICU, which was controlled by administering Ativan and haloperidol. The patient's pain and sensation in the lower extremities improved. On day 1 after surgery, his creatinine level was elevated to 1.48 mg/dL, and acute kidney injury, accompanied by metabolic acidosis (blood pH 7.28, partial Pressure of Carbon Dioxide [PCO₂] 30.4 mmHg, Bicarbonate [HCO₃] 13.8 mmol/L, partial Pressure of Oxygen [PO₂] 89.9 mmHg, and base excess -11.8 mmol/L), was observed. The patient underwent Continuous Renal Replacement Therapy (CRRT). His platelet count was reduced to 69,000 count/ μ L, whereas his INR increased to 1.87. Antithrombin III level was reduced to 49%, D-dimer level increased to 14,790 μ g/L, and Fibrinogen Degradation Product (FDP) level increased to 63.63 μ g/mL, indicating Disseminated Intravascular Coagulation (DIC). Echocardiography in the ICU revealed that the left ventricular systolic function was reduced to 37.2%. Moderate hypokinesia was observed in the inferior and anterior septum; however, no residual thrombus was observed. Ventricular Fibrillation (VF) occurred on the second day after surgery, and defibrillation was performed. Norepinephrine and vasopressin were administered to treat the lowered blood pressure accompanied by acidosis. However, despite continued CRRT, acidosis did not improve. On the third day after surgery, DIC was aggravated and could not be controlled (PT 41.4 s, INR 4.45, D-dimer 20,000 μ g/L, and antithrombin III 24%). Additionally, acidosis aggravated (blood pH 7.11, PCO₂ 36.1 mmHg, HCO₃ 11.2, PO₂ 82.4 mmHg, base excess -17.4 mmol/L). After cardiopulmonary resuscitation was performed three times because of repeated VF, the patient died.

Discussion

Radical cystectomy is the most effective treatment for invasive bladder cancer without metastasis; however, the procedure is highly invasive and risky [2]. RARC with ICUD is a surgical procedure with various complications due to its complexity and long surgery time [3]. It can cause mild complications, such as ileus and bleeding, after surgery and severe complications, such as infection, occlusion of the anastomotic site, heart failure, and death [2]. However, acute lower

extremity arterial occlusion during surgery has not been reported in previous studies; here, we report a case of lower extremity arterial occlusion during surgery for the first time. Acute arterial occlusion causes ischemia of tissues in the area supplied with blood by the relevant artery. A lack of sufficient collateral circulation leads to irreversible ischemia after 6 h [4]. Clinical symptoms include pain, paralysis, paresthesia, pulselessness, pallor, and poikilothermia. Among these, paresthesia and paralysis are important symptoms in evaluating the severity of occlusion. The patient's history and clinical symptoms are fundamental for diagnosis, and arteriography or CTA can be performed for a more accurate diagnosis [5,6]. In our case, acute arterial occlusion was suspected as the patient complained of symptoms in the recovery room immediately after full recovery from anesthesia. However, the exact time of occlusion onset was unknown. Since there are no objective indicators during general anesthesia that can suspect arterial occlusion, it is essential to take preventive measures, such as anticoagulation treatment and risk assessment, before surgery. Rapid conventional angiography or CTA is ideal when acute arterial occlusion is suspected; however, these tests require a significant amount of time. Thus, bedside sonography, which is readily accessible, may be helpful in rapid clinical assessment [7]. Herein, we observed femoral artery and femoral vein flow using 2D Doppler sonography as soon as arterial occlusion was suspected. Most anesthesiologists can easily identify the femoral artery using ultrasonography. The Department of Critical Care Medicine also recommends conducting bedside sonography to confirm deep vein thrombosis at the femoral level [8]. The ultrasound is an essential tool for diagnosis in perioperative emergency situations. Arterial embolism can be divided into two types: Embolism caused by large internal diameter vessels, such as the femoral artery or cardiac origin, and small blood vessel atheroemboli caused by plaque or thrombus in proximal blood vessels. Patients with atrial fibrillation, myocardial infarction, and heart valve disease have a high risk of developing cardiac embolism. Embolisms occur in the lower extremities, upper extremities, and cerebrum in 70%, 3%, and 10% of cases, respectively, and are most commonly observed in the branches of the abdominal aorta, common iliac artery, femoral artery, and popliteal artery [4,9]. In this case, the patient had atrial fibrillation, and it is likely that the common iliac arterial occlusion was caused by cardiac emboli. However, considering atherosclerotic changes in the abdominal aorta and right common iliac artery observed on angio-CT, there is a high chance that atherosclerotic changes of the left common iliac artery may have been accompanied by left side occlusion, affecting acute occlusion. Arterial occlusion despite sufficient preoperative tests and early detection may be attributed to liver dysfunction and diabetes in the patient. An increase in PT/INT is not necessarily associated with an increased risk of bleeding in patients with liver dysfunction. Patients with liver dysfunction are hypercoagulable, with an inherent

risk of thrombosis. Therefore, thromboprophylaxis should be considered for patients with liver dysfunction [10,11]. In this case report, the patient stopped anti-coagulant treatment, which may have increased coagulation tendency. In patients with moderate to severe liver dysfunction, in addition to atrial fibrillation, it is essential to evaluate and prepare for hypercoagulation, and correction must be carefully conducted before surgery.

Conclusion

The incidence of peripheral arterial occlusion during surgery is low; however, it is fatal. Thus, risk factors need to be carefully assessed before surgery, and complications must be closely observed during surgery. Hypercoagulation must be actively considered in patients with liver disease. Additionally, bedside ultrasonography can be helpful for the rapid implementation of medical protocols.

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