

Early Detection of Pulmonary Thromboemboli during Nephrectomy Using Transesophageal Echocardiography

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Abstract

Early detection and management of pulmonary embolism would ameliorate survival chances. Here, we report the case of a patient who was scheduled for a renal carcinoma and inferior vena cava thrombectomy wherein suddenly the thrombus migrated to the pulmonary artery. The problem was rapidly recognized by transesophageal echocardiography and before a fatal hemodynamic instability cardiopulmonary bypass was instituted and the thrombosis was extracted. The patient was discharged a week after the surgery without any complication.

Keywords: Nephrectomy, pulmonary emboli, transesophageal echocardiography

INTRODUCTION

Among the vascular causes of death, after myocardial infarction and stroke, pulmonary embolism (PE) is the most prevailing cause of mortality that can be prevented more easily than the other causes.^[1] Early recognition and management of PE would reduce the mortality rate. Here, we report the case of a patient who was scheduled for a renal carcinoma and inferior vena cava (IVC) thrombectomy wherein suddenly the thrombus migrated to the pulmonary artery (PA). This case highlights the details of an early detection of PE during a nephrectomy operation using transesophageal echocardiography (TEE). A written consent was obtained from the patient. Early understanding of the problem helped a more rapid cardiopulmonary bypass (CPB) commencement and less hemodynamic instability. The patient was discharged from the hospital on the 7th postoperative day without any sequelae.

CASE REPORT

A 67-year-old woman was admitted to the hospital with abdominal pain and bilateral lower limb deep vein thrombosis (DVT). A renal cell carcinoma in the right kidney and an IVC thrombosis was diagnosed using computed tomography (CT) angiography. A transthoracic echocardiography (TTE) was done with 50% ejection fraction (EF), mild mitral regurgitation (MR), mild tricuspid valve regurgitation (TR),

and normal pulmonary artery pressure (PAP). The patient was scheduled to have a right nephrectomy and IVC thrombectomy with a urologist and cardiac surgical team.

In the operating room (OR), basic monitors such as a 5-lead precordial electrocardiogram (EKG) and a pulse oximeter were attached to the patient. A right internal jugular central venous line and a right arterial catheter were inserted with local anesthetics to monitor central venous pressure (CVP) and invasive blood pressure (IBP). The patient was then anesthetized and intubated without any complication and a capnography was installed on the endotracheal tube (ETT) to monitor the end-tidal CO₂ (ETCO₂). A TEE probe was inserted just before the incision, and there were no other detections other than those viewed on the preoperative TTE. The TEE demonstrated an IVC thrombosis under the right hepatic vein [Figure 1], however, because the patient had a laparotomy procedure and the sternum was not opened, looping the IVC could not be done. During the last step of the nephrectomy procedure, the IVC tumor disappeared from the position and

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a mid-esophageal ascending aorta short axis viewed the tumor in the PA [Figure 2]. Following this, there was a hemodynamic change (CVP 8 to 16; HR 65 to 120; IBP 110/70 to 60/25), and the capnography indicated a diminution from 29 to 17. The cardiac surgical team was informed, and after sternotomy, cannulation of aorta, superior and inferior vena cava, CPB with normothermia was instituted; because the position of the PE was assured with TEE and sternotomy was done on time, a total circulatory arrest (TCA) and cardioplegia was avoided. A 7.5 cm embolus [Figure 3] was extracted from the PA, and the hemodynamic and ETCO_2 were changed to normal. The patient was transferred to the ICU and after 6 hours was weaned off the anesthesia. Two days later she went to the ward, and after 5 days of hospital stay she was discharged without any sequelae.

DISCUSSION

An analysis of the findings of the Los Angeles University, California, on tumor embolization during nephrectomy concluded that the occurrence is scarce but if occurs the mortality is high.^[2] The incidence of PE during urologic surgeries has been reported to be 0.9–1.1%,^[3] and embolization of the thrombosis into the PA is fatal in more than 70% of the patients.^[4] All these statistics indicate that an early recognition of the thromboemboli into the PA would be necessary to avoid expiration of the patient. We present a rare case of TEE capturing the emboli while migrating to the PA; following this, the hemodynamics gradually began to change. Published literature recommend two different strategies in such a situation, staged and simultaneous resection of the thrombus after the nephrectomy. Fortunately, in our case, the migration of the thrombosis was at the last stages of the nephrectomy operation and we did not require to wait for that. The arterial blood gas (ABG) test indicated only a slight change and no inotrope and/or electrolyte was needed. Furthermore, early visualization of the thrombosis gave us enough time to prime the CPB, and within 30 minutes, the thromboemboli was extracted successfully.

Tsubo *et al.* reported the utilization of TEE as a diagnostic tool for PE detection; however, in their report, the patient experienced a catastrophic hemodynamic change, and after angiography was initiated, they started thoracotomy while a large dose of catecholamines was administered for preserving the hemodynamics.^[5] Lee *et al.* visualized a thromboembolus but could not find it in the PA.^[6] The problem with their work was a delayed understanding of PE after dramatic hemodynamic changes which could be fatal. Some other cases reported even CPR course and an Advanced Cardiac Life Support (ACLS) protocol for pulselessness after a PE.^[7] We believe that an early detection of PE and a more rapid action would be necessary to increase the survival rate. A guideline for the use of echocardiography suggests that, although the TEE is not the gold standard for PE diagnosis, it has a vital role in risk stratification, especially in patients with massive emboli and hypotension.



Figure 1: The TEE demonstrated an IVC thrombosis under the right hepatic vein

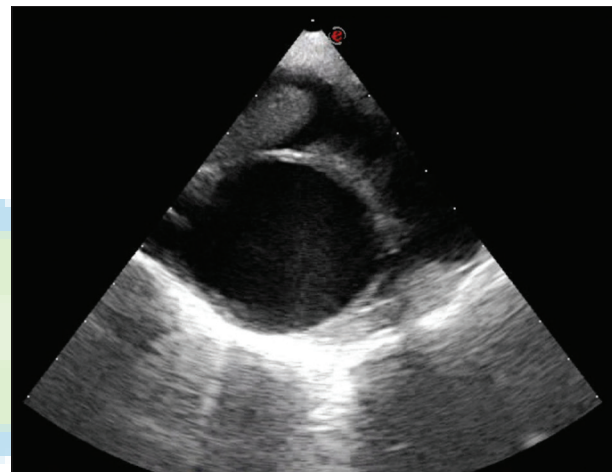


Figure 2: A mid-esophageal ascending aorta short axis viewed the tumor in the PA

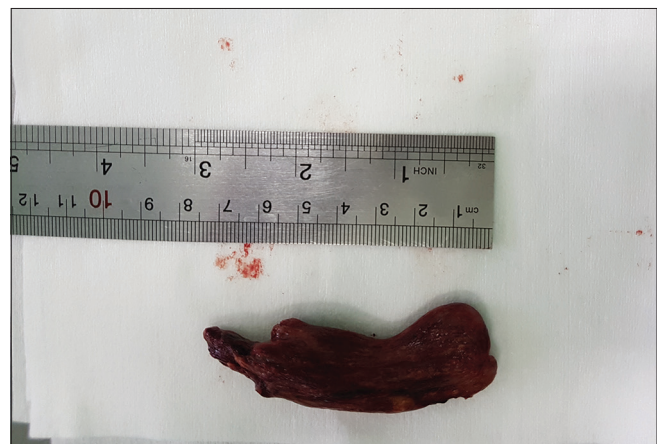


Figure 3: A 7.5 cm embolus which was extracted from the PA

In summary, TEE provided us useful information for the early detection of PE during a noncardiac operation. We have presented a TEE image captured during right nephrectomy procedure, which led to an on-time priming of CPB and survival

of the patient without any sequelae. Therefore, intraoperative TEE can be a fast and effective technique for early recognition of PE, even though other standard monitors can indicate the same.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that name and initial will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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