

Case Report

Acute Aortic Thromboembolism after Right Middle and Lower Bilobectomy for Metastatic High-Grade Sarcoma

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Abstract

Aortic thromboembolism is a rare, yet devastating complication in cancer patients, particularly in those with no prior history of atherosclerotic disease. Thrombotic events have been widely reported in cancer patients, especially within the venous system, and have been suggested to be a result of the hypercoagulable state of cancer patients. However, arterial thrombotic events are much more uncommon, yet present an emergency situation with dangerous consequences. It is critical to recognize and treat an occlusion of the aorta in a timely manner to avoid irreversible injuries or death.

We present a case of acute aortic thromboembolism following bilobectomy for metastatic sarcoma from an anterior thigh primary. To the best of our knowledge, this is a unique clinical presentation and has not been previously reported in the literature. The bilobectomy was uneventful, and the patient began showing symptoms of the lower extremities while recovering in the post-anesthesia care unit. The overall status of the patient regressed following the initial intervention for the aortic thromboembolism, and additional embolic events were observed. We report possible etiologic factors and compare management options through a review of the current literature. It is important for clinicians to recognize an aortic occlusion accurately. Mistaking a vascular event for a neurological event may delay treatment and cause further harm to the patient.

Keywords: Aortic; Thromboembolism; Lobectomy; Metastatic; Sarcoma

Introduction

Metastatic cancer presents complications that are often unpredictable and problematic, even after treatment has been initiated. The vasculature is commonly affected with large masses that compress surrounding tissues, or with malignant tumors that cause injury to distant structures.

Thrombotic events in cancer patients have been widely reported within the venous system. Venous thromboembolism has been discovered in at least 50% of cancer patients upon autopsy, and patients with malignant pathology carry a seven-fold higher risk of venous

thrombosis than non-malignant pathology [1]. However, there have not been many reports of acute aortic thrombosis in cancer patients. It has been estimated that between 1.5% and 3.1% of cancer patients develop an arterial thromboembolic complication [2]. This estimate may be inaccurate due to the limited number of reports available.

An occlusion within the thoracic or abdominal aorta should be treated as an emergency, and caution should be taken to minimize ischemic effects. Circulation may be compromised, leading to ischemia of limbs, vital organs, or the spinal cord through the artery of Adamkiewicz. In chronic atherosclerotic patients, a collateral blood supply may salvage an incompletely occluded aorta. However, with acute abdominal thromboembolic events, blood supply is abruptly arrested to the lower limbs, and mortality following lower limb ischemia is high, especially if immediate intervention is not provided [3-6].

In this report, we present a case of infrarenal abdominal aortic thromboembolism after right lung bilobectomy following metastasis of an anterior thigh soft tissue sarcoma. To the best of our knowledge, this is the first case report of acute aortic thromboembolism following this series of events. The purpose of this report is to present a novel case relating to cancer and thromboembolic complications, while discussing appropriate etiologies and management recommendations.

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Case Presentation

The patient is a 58-year-old man with history of a 15-cm left anterior thigh pleomorphic sarcoma diagnosed 8 months previously. His primary tumor was treated with neoadjuvant radiation therapy, followed by radical resection 3 months after initial presentation. On a surveillance CT scan obtained 3 months later, the patient was found to have a 4.4-cm right lower lobe lung mass, a 3.8-cm left upper lobe lung mass, and a 1.8-cm left apical lung nodule. He was started on doxorubicin chemotherapy and was offered staged bilateral pulmonary metastasectomies, with the right middle and lower bilobectomy scheduled first and subsequent left lung sublobar resections planned for 1 to 2 months later.

After an epidural catheter was placed, he was placed under general anesthesia and underwent right latissimus and serratus muscle-sparing posterolateral thoracotomy and right middle and lower bilobectomy, with lymphadenectomy, in left lateral decubitus position, with the operating table flexed. He had received 5,000 units of subcutaneous heparin within 1 hour preoperatively and had bilateral lower extremity sequential compression devices intraoperatively. He had 228 min of general anesthesia and 173 min operative time, with 800 mL estimated blood loss and 1 unit packed red blood cell transfusion. His Systolic Blood Pressure (SBP) ranged from 90 mmHg to 160 mmHg, with mean arterial pressure ranging from 70 mmHg to 120 mmHg throughout the procedure.

In the post-anesthesia care unit, the patient was noted to have normal bilateral upper extremity movement, but no bilateral lower extremity movement, with loss of sensation. He was noted to have normal pedal pulses bilaterally, and, thus, an epidural hematoma was suspected. His epidural catheter was removed, and a MRI of the thoracic and lumbar spine was ordered, which revealed no evidence of epidural hematoma.

The patient subsequently developed malignant hypertension, with SBP 230 mmHg to 240 mmHg, but with concomitant loss of lower extremity pulses and development of cold feet and bilateral foot drop. The patient was started on esmolol intravenous infusion to keep his SBP 160 mmHg to 185 mmHg. A CT angiogram of the thorax, abdomen, and pelvis revealed interval development of occlusion of the distal abdominal aorta and common iliac arteries, dissection within the proximal Superior Mesenteric Artery (SMA) with distal occlusion also identified, with interval development of renal and splenic infarction as well as new low-attenuation regions within the liver suggestive of small regions of new infarction. There was no definite evidence of bowel ischemia at that time, and the celiac artery appeared widely patent, but the superior mesenteric artery was occluded distally, and the inferior mesenteric artery also appeared occluded, placing the patient at risk for bowel ischemia (Figure 1 and 2).

He was emergently transferred to a tertiary care facility, where he emergently underwent laparotomy, embolectomy of the SMA, aortoiliac thromboembolectomy with aortic patch angioplasty, and fasciotomies. Immediately following the procedure, the patient lost his distal arterial pulses, and he was emergently taken back for intraoperative angiogram with thrombectomy of his popliteal and tibial arteries. During a second-look laparotomy the following day, the patient was found to have a large segment of ischemic bowel, which was resected.

His postoperative course was complicated by cerebellar infarctions



Figure 1: Sagittal (left panel) and axial (right panel) images from thoracolumbar Magnetic Resonance Imaging (MRI), which was taken after patient complained of bilateral lower extremity paresthesia and paraplegia, while recovering in the post-anesthesia care unit after having undergone right middle and lower bilobectomy for metastatic high-grade sarcoma, and which reveals no evidence of spinal cord injury.

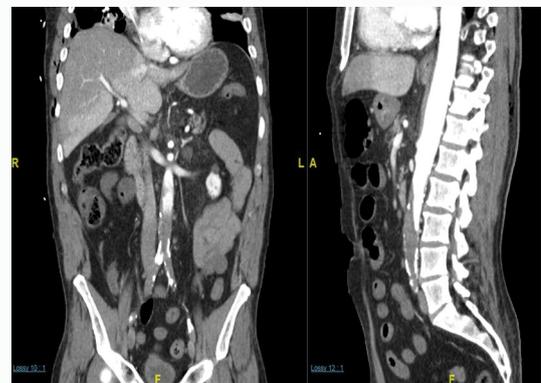


Figure 2: Coronal (left panel) and sagittal (right panel) images from Computerized Tomography (CT) angiogram, which was taken after an episode of malignant hypertension, with systolic blood pressures of 230 mmHg - 240 mmHg, and loss of pedal pulses and which reveals abdominal aortobiliac thrombotic occlusion, proximal superior mesenteric artery dissection with distal occlusion, and renal and splenic infarction.

and possible pulmonary embolism. The family subsequently requested comfort measures only, and the patient expired on postoperative day #3.

Discussion

Although thromboembolic events are the second most common cause of death in cancer patients [2], aortic thromboembolism in cancer patients is under-reported in the literature. We present a complex case of an infrarenal abdominal aortic thromboembolism after right lung bilobectomy following metastasis of an anterior thigh soft tissue sarcoma.

Lower limb ischemia due to occlusion of the aorta or one of its main branches often presents with pain, pulselessness, pallor, paresthesia, and paralysis. Paraplegia may result from spinal cord ischemia due to interruption of the aortic supply through the artery of Adamkiewicz [3,4]. For this reason, acute lower limb paraplegia can present a diagnostic dilemma, and it is critical to distinguish the injury as neurological or vascular. Aortic thromboembolism may present as a neurological injury, and a neurology consultation can result in a diagnostic delay, possibly leading to irreversible neurological injury [3]. Outcomes are greatly improved with immediate intervention, and

revascularization after 8 hours offers poor prognosis [4]. Reperfusion injury may present additional complications to ischemic patients, especially with a delay in treatment. Time should be conserved and caution should be taken to preserve vascular and neurological function.

Although definite pathophysiological mechanisms for acute aortic thromboembolism in cancer patients have not been elucidated, several etiologies have been suggested for arterial thromboembolism in cancer patients, including cancer-induced hypercoagulability, antiphospholipid antibody syndrome, tumor embolism, endothelial damage by chemotherapeutic agents, radiation therapy, and blood transfusions [1,2,5]. Cancer procoagulant is a factor expressed by malignant tumors, and its activation of factor X and the coagulation cascade, along with the tumor cells' impairment of endothelial structure through the release of inflammatory cytokines may lead to the hypercoagulability seen in this population.

Chemotherapeutic agents present an additional risk for thrombosis in cancer patients, which may be due to drug interactions with the endothelium and the coagulation cascade [2]. Cisplatin, a chemotherapeutic drug used to treat a variety of cancer types, has been studied in its relationship to thrombotic complications. One report mentions a 6-fold increase in risk for cancer patients receiving chemotherapy, and suggests cisplatin increases risk of acute aortic thrombosis in patients without vascular disease or relevant risk factors [7].

Physicians should assess femoral pulses in order, to determine if the cause is neurological or vascular and guide management decisions accordingly [4,6]. However, distal pulses may be intact with proximal occlusion, and vascular symptoms may present hours after onset [5]. Computed tomography is often used to determine the location and severity of an aortic or arterial occlusion, as well as for detecting presence of an aortic aneurysm or atherosclerotic plaque.

Options for treatment of a thromboembolic blood vessel include surgical or non-surgical therapy, although prognosis is generally poor in cancer patients [1,2]. Thrombectomy or embolectomy can be performed to clear an occluded vessel, although this option carries risks such as releasing downstream emboli upon removal, endothelial damage from catheterization, and revascularization injury. Surgical intervention to remove an arterial occlusion has demonstrated poor outcomes and high mortality in malignant cancer patients [1]. Clinicians should use appropriate judgment to determine if the embolus or thrombus is significant enough for immediate operation or can be managed without surgery.

For cancer patients in poor condition and who may be unable to tolerate surgery, non-surgical therapy is recommended. Unfractionated heparin anticoagulation therapy should be administered immediately to prevent distal embolization [2,6,7]. Anticoagulation therapy has shown to improve ischemic symptoms and stabilize or even resolve an aortic thrombus in cancer patients [4,8]. Conservative management may provide a safer option for this patient population, due to the high rate of vascular complications and poor outcomes with surgery.

Conclusions

Acute aortic thromboembolism in cancer patients is a rare occurrence, but can lead to catastrophic ischemic injury to the lower limbs or vital organs. The patient in this report presented with bilateral lower limb sensorimotor deficit and malignant hypertension following

right lung bilobectomy, attributed to occlusion of the abdominal aorta and branching arteries. Signs of lower limb ischemia may be misinterpreted as a neurologic etiology and delay management of acute aortic thromboembolism. Lower limb pulses should be assessed bilaterally, followed by CT imaging to determine etiology. Non-surgical management is recommended in malignant patients due to poor overall condition, although thromboembolic complications in cancer patients are generally associated with increased mortality.

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Informed consent

Permission was obtained from the patient for publication of this case report and any accompanying images for education purposes as part of our institutional surgical informed consent. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

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