Anesthetic management of a patient with an infected thoracic endovascular stent graft and sepsis requiring emergent graft explant and circulatory arrest

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Background:
Anesthetic management of emergent aortic surgeries is challenging and involves intense collaborative efforts with planning and communication between the anesthesiology, surgical, perfusion and critical care teams all functioning as a single entity. It also entails a sound understanding of the vascular anatomy, surgical approach, perfusion strategy, principles of hypothermic circulatory arrest, optimal pharmacologic management, advanced application of transesophageal echocardiogram (TEE) and coagulation management. We present a challenging anesthetic management of a septic patient presenting for emergent repair and explantation of bleeding endovascular thoracic aortic graft requiring one lung isolation and hypothermic circulatory arrest.

Case Description:
A 21-year-old male with past medical history of traumatic thoracic-aorta pseudoaneurysm secondary to a motor vehicle accident (3 months ago) and status post thoracic endovascular aortic repair (TEVAR) presented to the hospital with complaints of upper back pain, fever and shortness of breath. He underwent CTA chest on admission to rule out pulmonary embolism and was found to have prevascular soft tissue thickening representing reactive lymph nodes along with a small left pleural effusion. He was admitted to medical service, started on broad spectrum IV antibiotics (Vancomycin and Cefepime) and blood cultures were obtained which were positive for Methicillin sensitive Staphylococcus aureus (MSSA). A trans-thoracic-echocardiogram showed normal left ventricular size and function, absent vegetations and LVEF of 60%.

Over the next 4-5 days, he developed increasing shortness of breath associated with tachycardia, hypotension, continuing leukocytosis despite antibiotics (23,000) and XR-chest showed increased left-sided pleural effusion. Thoracentesis was done draining 700-ml of cloudy yellow-colored fluid. A CT-chest scan revealed multiple focal areas of high density attenuation anterior to the descending thoracic aorta likely due to extraluminal hemorrhage with adjacent hematoma formation along with complete collapse of the left mainstem bronchus, complete atelectasis of the left lung, left-sided pleural effusion and pneumothorax. A TEE was concerning for TEVAR-stent extravasation and an emergent thoracic aortogram demonstrated leak around the proximal TEVAR-graft not amendable to endovascular intervention. Cardio-thoracic surgery was consulted for the infected, bleeding thoracic-aorta endograft and patient was scheduled for an emergent cardiac surgery to repair the bleeding endograft.
The patient was brought emergently to the operating room for thoracic aorta repair requiring cardiopulmonary bypass and circulatory arrest. Surgical approach mandated left lung isolation. With standard ASA monitors, cerebral oximetry and BIS monitoring, the patient underwent IV induction with fentanyl, lidocaine, propofol and rocuronium. A 39-Fr left-sided double lumen tube was attempted but even with the fiberoptic assistance, the left main bronchus could not be negotiated due to complete collapse of the left lung. Instead, a Univent endotracheal tube with bronchial blocker (size # 28) was inserted and left lung was isolated. Post-induction, a right-sided radial arterial line was placed along with US-guided right-sided internal jugular vein cannulation with 9-Fr introducer and double-lumen central venous catheter (7-Fr). After placement of a TEE probe, patient was placed in left thoracotomy position and left lung was isolated with the bronchial blocker. Anesthesia was maintained on sevoflurane, fentanyl and rocuronium was used for skeletal muscle paralysis. A loading dose of aminocaproic acid (5gm) followed by an infusion of 1gm/hr was used throughout the case.

Cardio-pulmonary bypass was initiated using a right femoral vein and left femoral artery cannulation. A large amount of turbid fluid was found in the left chest cavity with complete collapse of left lung and purulent material oozing from the distal aortic arch. The entire distal aortic arch and proximal descending aorta were destroyed with infection. Patient was cooled to 180 C for circulatory arrest and ice packs were placed around the head. Almost the entire aortic arch and descending aorta to just above the diaphragm was replaced with a Dacron graft. Total circulatory arrest time was 56-min.

The patient was weaned off bypass with low dose norepinephrine, and he received a total of 3-liters crystalloids, 600ml cell saver blood, 1-unit packed red cell, 2-units platelets, 1-unit of FFP. Patient was transferred intubated to the surgical ICU postoperatively and was extubated the following day. The patient underwent a re-exploration of the left thoracotomy with wound lavage and debridement after a couple of days. Patient had an uneventful postoperative course and he responded well with improving leukocytosis and negative blood cultures. The aortic-tissue culture was positive for MSSA. He was placed on life-long antibiotic therapy with sulfamethoxazole and trimethoprim and was discharged home 2-weeks postoperatively.

Discussion:

Endograft-related infections after TEVAR, although infrequent, can be devastating and are associated with high morbidity and mortality. Major complications of these vascular graft infections include sepsis, disruption of infected anastomotic suture line with rupture or pseudoaneurysm formation, embolization of infected thrombi, reinfection, bacteremic spread and death.

This case highlights the importance of planning and communication at all phases from preoperative evaluation to intraoperative management to postoperative care. The emergent nature of this case provided minimal time for anesthesia preparation and it necessitated swift and dynamic strategic planning. Particularly challenging aspects of this case were lung isolation, patient positioning, prolonged circulatory arrest time, hemodynamic optimization and coagulopathy.

A multidisciplinary approach that includes specialists in anesthesiology, vascular and cardiovascular surgery, interventional radiology, cardiology and infectious diseases is recommended for the successful management of such cases.
References:


