Endovascular Repair of an Ascending Aortic Pseudoaneurysm

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Introduction: Pseudoaneurysm of the ascending aorta is a serious complication of cardiac surgery(1,2). Endovascular repair has become increasingly attractive because surgical mortality may approach 60%(3), but intraoperative care can be complicated if the device is malpositioned.

Case Presentation: A 70-year-old man with a history of prior aortocoronary bypass grafting presented for staging of Hodgkins Lymphoma. A pseudoaneurysm of the ascending aorta (Img. 1) was noted incidentally, and an endovascular exclusion was planned because of concern for poor wound healing after future radiation therapy. A radial artery catheter and transesophageal echocardiography (TEE) probe were placed, and a transvenous pacemaker and a TandemHeart percutaneous ventricular assist device (pVAD-CardiacAssist Inc., Pittsburgh, PA) were inserted. The femoral artery was accessed and a stent was aligned along the pseudoaneurysm. The pacemaker was activated at a rate of 220 beats/minute and pVAD flow was increased. The stent was deployed in a completely motionless field. TEE and angiography identified an endoleak (Img. 2) proximal to the graft, and this sequence was repeated for the deployment of a second stent graft and a ventricular septal defect closure device. Repeat TEE evaluation revealed a trivial endoleak through the VSD closure device and worsened aortic insufficiency (Img. 3). He remained hemodynamically stable and was extubated that night.

Discussion: Due to the proximity of the aortic valve, coronary ostia, and innominate artery, deployment of intravascular devices risks aortic insufficiency and myocardial/cerebral ischemia. Anesthesia for endovascular repair of ascending aortic pathology necessitates the ability to detect these complications should they occur. A right arterial catheter facilitates smooth hemodynamics and monitors innominate artery patency. TEE monitoring is essential for pre-procedural evaluation of cardiac structures, for device deployment, for postoperative assessment, and may decrease exposure to ionizing radiation and radiocontrast dye.

Rapid pacing mimicks pulseless ventricular tachycardia and has been described as a method of maximizing operative success(4), but the safe duration of this intervention is unknown. This case illustrates the novel use of pVAD circulatory support to provide continuous perfusion during rapid pacing.

Conclusion: Endovascular techniques are evolving to minimize the high operative mortality associated with repair of the ascending aorta. Physicians must be equipped with knowledge of the unique physiologic changes induced to facilitate operative success, including the potential for rapid ventricular pacing and circulatory support. TEE is vital for pre-operative assessment, facilitation of device deployment, and post-operative evaluation.

Image 1. Preoperative TEE examination of pseudoaneurysm.

Image 2. A. Fluoroscopic view of endoleak around proximal aspect of ascending aortic stent graft (white arrow). B. Simultaneous TEE examination detected the same leak. Low velocity swirling blood was also apparent.