Thoracic Endovascular Aortic Repair of Iatrogenic Arch Rupture after Intra-Aortic Balloon Pump Insertion

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Introduction

- For patients in cardiogenic shock who suffer from intra-aortic balloon bump (IABP)-induced aortic injury, diagnosis may be challenging due to the patient's already complex clinical status
- Prompt identification is crucial to facilitate removal of the device along with surgical intervention
- This prevents further aortic damage and deterioration of the patient
- The purpose of this report is to present a case of aortic rupture secondary to IABP insertion, highlighting both the steps to diagnosis of the injury as well as the expeditious surgical management with thoracic endovascular aortic repair (TEVAR).

Patient Presentation

- **Prior History:**
  - The patient is a 76-year-old male with a history of hypertension and coronary artery disease.
  - He presented to an outside hospital with a non-ST segment elevation myocardial infarction, requiring percutaneous coronary intervention of the right coronary artery.
  - The procedure was complicated by cardiogenic shock necessitating insertion of an IABP and transfer to our institution for consideration of advanced mechanical circulatory support.
- **Current Presentation:**
  - On arrival, the patient was intubated and sedated, on continuous inotrope infusion.
  - Bedside transthoracic echocardiogram demonstrated a linear artifact in the ascending aorta, prompting CT angiogram.
  - CT angiogram revealed an area of extravasation from the proximal descending thoracic aorta with surrounding intramural hematoma, consistent with a contained rupture (**figure 1a, b, c**).

Disclosures

- NDD is a consultant for Gore Medical, Terumo Aortic, and Edwards Lifesciences.
- No other relevant financial disclosures.

Pre-Operative Imaging

Figure 1. CT angiogram demonstrating extravasation from the proximal DTA with surrounding intramural hematoma, suggesting contained aortic rupture (yellow arrow), visualized in the sagittal (a, b) and axial (c) planes.

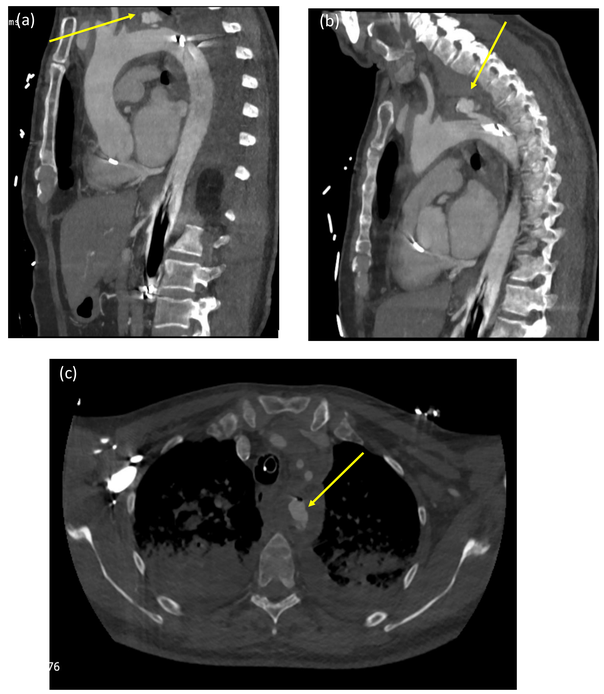

Figure 2. Aortogram performed before TEVAR insertion demonstrating area of rupture in the distal aortic arch (yellow arrow).

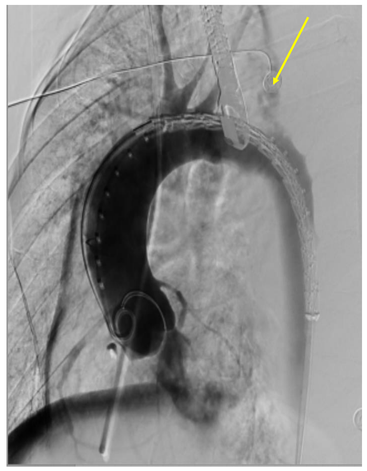

Figure 3. Gore cTAG thoracic endovascular aortic stent graft.

Post-Operative Imaging

Figure 4. Aortogram performed after TEVAR insertion demonstrating successfully sealed area of rupture and absent extravasation.

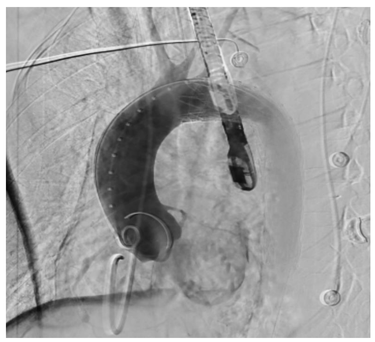

Figure 5. Follow-up CT angiogram demonstrating intact TEVAR repair without evidence of stent migration or endoleak.

Surgical Management

- **Initial Management**
  - Multidisciplinary conversation held between cardiothoracic surgery and vascular surgery, and decision was made to take the patient to the operating room for emergent TEVAR.
- **TEVAR Surgical Management:**
  - Following induction, the patient went into cardiac arrest requiring cardiopulmonary resuscitation, and transesophageal echogram demonstrated free aortic rupture with active exsanguination into the left chest.
  - The chest and groins were rapidly prepped, and the IABP was turned off and removed over a wire, and replaced with a DrySeal Sheath (W.L. Gore, Newark, DE).
  - Groin access was obtained for pigtail insertion, and aortogram demonstrated the area of rupture (**figure 2**).
  - A 34mm x 15mm Gore conformable thoracic aortic stent graft (cTAG) was advanced through the sheath and deployed without difficulty distal to the left subclavian artery (**figure 3**).
  - Completion aortogram demonstrated the area of rupture was successfully sealed (**figure 4**).
  - Chest tube insertion was performed for decompression of the left hemothorax, and return of spontaneous circulation was obtained.
- **Patient Outcome:**
  - The patient's hospital stay was complicated by prolonged intubation and difficulty swallowing requiring PEG tube placement. He was ultimately discharged on postoperative day 21.
  - On follow-up 2 months later he had significantly recovered, ambulating independently and eating without difficulty. CTA at that time demonstrated intact repair without evidence of endoleak (**figure 5**).

Conclusions

This case underscores two key principles of the management of iatrogenic aortic injury:

1. After aortic instrumentation, maintenance of a high index of suspicion in the setting of new abnormal clinical or imaging findings can lead to prompt diagnosis and treatment.
2. TEVAR insertion can be performed safely and rapidly in a clinically unstable patient with aortic rupture as a life-saving procedure.