Recurrent Bleeding of Innominate Artery Treated with Covered Stent in a Patient with Tracheoesophageal Fistula

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Background

- Tracheoinnominate fistula (TIF) is a rare but potentially life-threatening complication that can arise following tracheostomy (5). It is an abnormal communication between the trachea and the innominate artery.
- Early signs include recurrent episodes of bleeding from the tracheostomy site, coughing, or a pulsatile mass.
- Surgical repair options for TIF includes ligation of the innominate artery, interposition grafting, or endovascular embolization and innominate artery covered stenting (3,4).

Objective

- To evaluate complications of innominate artery stenting in the setting of tracheoinnominate fistula and discuss endovascular interventions done for bleeding control.

Case Presentation

- **Patient**: 72-year-old female with a history of thyroid cancer, median sternotomy, and multiple chest wall debridements underwent tracheostomy placement 20 years ago. On evaluation, there was a palpable subcutaneous hematoma of the surrounding neck but no active bleeding.
- Patient presented to an outside hospital two weeks ago with profuse bleeding from the tracheostomy site and a right brachiocephalic artery stent was placed. CT angiography of the neck and chest (Figure 1) revealed a small vessel arising from right distal brachiocephalic artery concerning of an erosion through the previously placed stent.
- With a history of chest wall reconstruction, the patient was not a candidate for open ligation and underwent an endoembolization of the right brachiocephalic artery and left to right subclavian artery bypass. The subclavian arteries were identified and exposed.
- A 6mm graft was tunneled above the sternum. The initial angiogram was obtained and revealed intermittent bleeding through the brachiocephalic stent (Figure 2).
- A plug was placed proximal to the takeoff of the internal mammary and vertebral artery. A repeat angiogram confirmed patency of the bypass graft (Figure 3).

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Imaging

Figure 1. Coronal view of CT angiogram of the chest and neck revealing active bleeding through stented brachiocephalic artery. I: innominate artery, T: trachea with tracheostomy, A: aorta

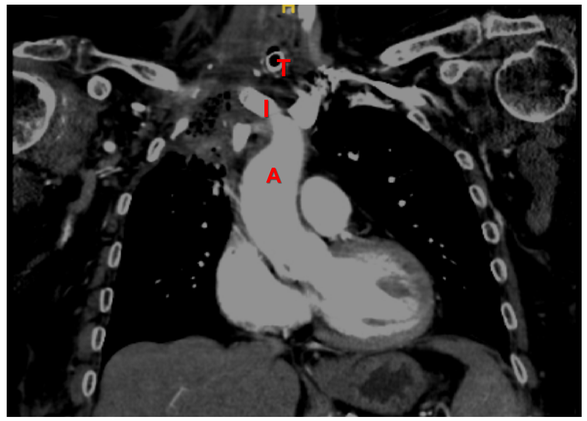


Figure 2. Angiogram of the innominate artery revealing a vessel branch distal brachiocephalic/proximal subclavian artery ascending along the tracheostomy with intermittent blush (arrow).

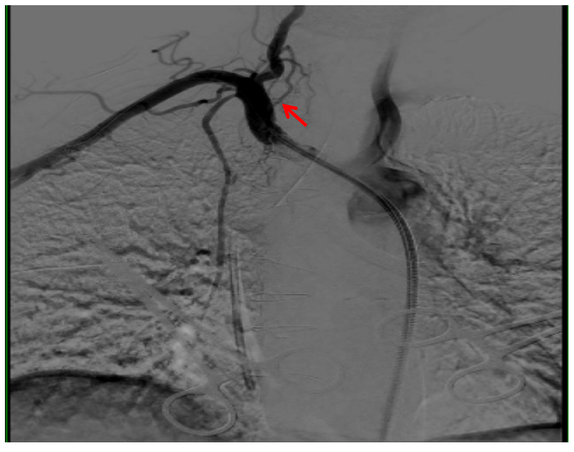
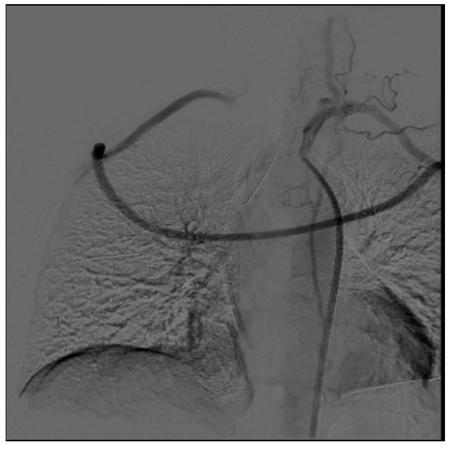


Figure 3. Angiography post embolization showing patency of the bypass graft with filling of the vertebral artery and complete occlusion of the innominate artery



Discussion

- Tracheoinnominate artery fistula (TIF) is a life-threatening complication associated with prolonged tracheostomy placement. (1). Risk factors for TIF include long-term tracheostomy, high cuff pressures, and incorrect tube size.
- The clinical presentation of TIF is characterized by a sudden and profuse bleeding from the tracheostomy site.
  - Immediate stabilization and diagnostic imaging such as computed tomography angiography are used to confirm the diagnosis.
  - Stent placement offers a therapeutic option for management of hemorrhage (2). In cases where direct repair is not feasible, extra-anatomic bypass grafting may be considered (3).
- In our case, the patient faced a complication of brachiocephalic artery stenting. Challenges including multiple debridements of the chest wall and high stroke risk without revascularization of the right vertebral artery.
- A subclavian bypass was performed with complete embolization of the innominate artery performed as well with care to preserve the vertebral artery and internal mammary artery takeoff. The patient had resolution of bleeding and was monitored closely to assess long-term outcomes from bypass procedure.

Conclusion

- Innominate artery embolization and graft bypass can be utilized to manage complications of stenting in patients with TIFs.
- Studies need to be conducted to assess the long term complications and rate of bleeding of innominate artery treated with covered stent in TIFs.

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