Complex Intrathoracic Tracheal Injury

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Figure 1. Computed tomography of the tracheal injury. (A) Axial view of the proximal trachea (*dashed red line*) with air seen in the mediastinum, most notably surrounding the right common carotid artery. (B) Axial view of tracheal avulsion site. Note the proximal end of the tracheal avulsion in the midline (*dashed red line*) with the distal end of the tracheal avulsion rotated approximately 90° counterclockwise (*dashed yellow line*). This radiographic finding is pathognomonic for a complete tracheal avulsion.

Figure 2. Preoperative fiberoptic bronchoscopy showing the view from the proximal end of the tracheal avulsion. The carina is noted by the *solid white arrow*. The *dashed white arrow* points to the right side of a tracheal ring on tracheal segment just distal to the avulsion. The innominate artery can be seen bronchoscopically through the tracheal disruption (*black arrow*).

A 21-year-old man presented with blunt chest trauma and T4 spinal paraplegia. The patient reported no respiratory symptoms. Vital signs were normal, and physical examination revealed subcutaneous emphysema in the neck. Chest computed tomography demonstrated a 90° counterclockwise rotation of the distal trachea suggestive of tracheal avulsion (Figure 1), as well as innominate artery pseudoaneurysm. Awake fiberoptic bronchoscopy confirmed tracheal transection with the innominate artery visualized from within the lumen (Figure 2). Longitudinal tears extending into the right main bronchus were present in both the membranous and cartilaginous portions of the distal tracheal segment. Under bronchoscopic guidance, an endotracheal tube was advanced into the left main bronchus, and general anesthesia was initiated. Cardiopulmonary bypass was made immediately available in case the intubation failed. After

sternotomy, the trachea was repaired first (Figure 3). However, the endotracheal tube had to be removed to access the tracheal lumen and perform the repair. Therefore, femorofemoral cardiopulmonary bypass was initiated, and the patient was extubated. After

Figure 3. Postoperative fiberoptic bronchoscopy. (A) View of the reconstructed carina with primarily repaired membranous and cartilaginous airway injuries. (B) View of end-to-end anastomosis of the proximal and distal segments.

tracheal repair, the endotracheal tube was replaced and positioned just proximal to the anastomosis. Subsequently, innominate artery resection and creation of ascending aorta to distal innominate bypass was performed using a rifampin-soaked polyester graft. A vascularized pedicled flap of pericardium with accompanying fat pad was interposed.

Tracheobronchial injuries are rare but life-threatening injuries in blunt trauma (1). Approximately 90% are intrathoracic and occur in the distal trachea or mainstem bronchi within 2.5 cm of the carina (2). Signs and symptoms of tracheobronchial injury include subcutaneous emphysema, dyspnea, hemoptysis, pneumomediastinum, and pneumothorax (2). Presentation ranges from asymptomatic, as observed in this case, to severe respiratory distress or death. Securing an airway in the setting of tracheobronchial injury is challenging but of utmost importance. Intubation should be performed under bronchoscopic guidance to minimize additional airway damage. If possible, the patient should be awake, and neuromuscular blockade should be avoided. Cardiopulmonary bypass can be life saving if difficulty is encountered in securing the airway (3) and extremely valuable in the surgical repair of complex tracheobronchial injuries (4). Treatment options include surveillance, bronchoscopic stenting, t-tube placement, primary repair, and tracheal resection (5, 6). In cases of complete disruption, as illustrated here, debridement of devascularized edges with end-to-end anastomosis is preferred (5). Nonoperative management is reserved for asymptomatic patients with injuries limited to less than one-third of the trachea (7). ■

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