



H112 Deaths Due to Post-Intubation Tracheal Stenosis: A Clinical History and Autopsy Findings in Three Cases

*Heather I. Chen, BA**, Western Michigan University, SOM, 300 Portage Street, Kalamazoo, MI 49007; *Brandy Shattuck, MD*, Western Michigan Homer Stryker MD, School of Medicine, 1000 Oakland Drive, Kalamazoo, MI 49008; and *Joyce L. deJong, DO*, WMU Homer Stryker MD School of Medicine, Dept of Pathology, 1000 Oakland Drive, Kalamazoo, MI 49008

The goals of this presentation are to: (1) recognize how tracheostomies can lead to tracheal stenosis; (2) illustrate gross findings and histologic findings of tracheal stenosis; and, (3) identify clinical history features of tracheal stenosis.

This presentation will impact the forensic science community by reviewing multiple cases, including the literature, which will provide awareness to pathologists and forensic pathologists regarding characteristic history and autopsy findings in post-intubation tracheal stenosis.

Tracheal stenosis is a potentially fatal late complication of a tracheostomy or intubation that is occasionally missed, occasionally mismanaged, and potentially fatal in emergent situations if not diagnosed early in the course of airway management. To diagnose tracheal stenosis while alive requires a high index of suspicion and laryngoscopy. After death, the forensic pathologist should consider the potential for this complication in patients with tracheostomies within the past weeks to months and suggestive clinical histories. Keep this information in mind when deciding to perform an autopsy and during the exam while paying particular attention to the upper airways.

A 26-year-old woman with epilepsy was intubated because of airway management difficulties during her seizures. She ultimately required a tracheostomy. With the tracheostomy, she experienced difficulty breathing, and was believed to be experiencing panic attacks. While at home with family, her breathing difficulties increased and she began having a seizure. Emergency Medical Services (EMS) responded and was not able to establish an airway. At autopsy, she was found to have severe tracheal stenosis, just distal to her tracheostomy tube. A 23-year-old man with Down's Syndrome required a tracheostomy during a hospitalization for pneumonia. Following the removal of his tracheostomy, he was found to have subglottic stenosis. He underwent surgical balloon dilation and was sent home. He developed increasing difficulty breathing and presented to an emergency department with stridor. He could not be intubated and emergent tracheostomy attempts failed. At autopsy, he was found to have severe tracheal stenosis, just proximal to the tracheal bifurcation. A 42-year-old woman underwent a surgical procedure for an abdominal abscess. She required a tracheostomy while hospitalized. Following removal of the tracheostomy, she developed tracheal stenosis. She underwent tracheal balloon dilation, but refused surgical intervention and repeat tracheostomy placement. She died hours following the balloon dilation. At autopsy, she was found to have severe narrowing of her trachea at the presumed tracheostomy site.

Tracheal stenosis is a late complication of a tracheostomy. The incidence has been reported to be anywhere between 0.6% to 21%.¹ Typically, the stenosis is at the level of the stoma, but can be proximal or distal. Clinically significant stenosis occurs when the tracheal lumen is narrowed 50%-60%.² Common signs of clinically significant stenosis are a persistent cough, retained secretions, and progressive dyspnea. Stenosis may follow a chronic inflammatory response and the development of excessive granulation tissue after decannulation.² A study by Welkoborsky et al. of biopsy samples from 18 patients with tracheal stenosis who underwent tracheal reconstruction



Pathology/Biology - 2017

demonstrated the most consistent findings were fibrosis and scar formation in all tissue layers and ossific metaplasia of cartilage.³ Inflammatory findings were typically limited to the mucosa and the inner submucosa³.

Tracheal stenosis following tracheostomies can lead to death if not recognized by clinicians. Awareness of the condition and the clinical presentation, typically in individuals with significant medical histories, may cause the forensic pathologist to perform an autopsy and direct their examination to a careful evaluation of the upper airways. Identifying tracheal stenosis allows for education of clinicians and the prevention of future deaths.

Reference(s):

1. Sarper A. Tracheal Stenosis after Tracheostomy or Intubation. *Texas Heart Institute Journal*. 2005;32: 154-158.
 2. Greenwood J.C., Winters M.E. Tracheostomy Care. In: *Roberts and Hedges' Clinical Procedures in Emergency Medicine*. 6th ed. Elsevier; 2014:134-151.
 3. Welkoborsky H., Hinni M.L., Moebius H., Bauer L., Ostertag H. Microscopic examination of Iatrogenic Subglottic Tracheal Stenosis: Observations that May Elucidate its Histopathologic origin. *Annals of Otolaryngology & Laryngology*. 2014;123(1):25-31.
-

Tracheal Stenosis, Intubation, Tracheostomy