

DISCLAIMER: These guidelines were prepared by the Department of Surgical Education, Orlando Regional Medical Center. They are intended to serve as a general statement regarding appropriate patient care practices based upon the available medical literature and clinical expertise at the time of development. They should not be considered to be accepted protocol or policy, nor are intended to replace clinical judgment or dictate care of individual patients.

POST TRACHEOSTOMY HEMORRHAGE

SUMMARY

Post-tracheostomy hemorrhage may be classified into two broad categories: early and late. In the first few hours after tracheostomy, inadequate surgical hemostasis and/or coagulopathy are the most common causes of hemorrhage from the tracheostomy wound. The most feared cause of late hemorrhage is tracheal innominate artery fistula (TIF), the hallmark of which is massive arterial bleeding either via or around the tracheostomy. Prompt surgical attention is the key to managing this often fatal process.

RECOMMENDATIONS

- **Level 1**
 - **None**
- **Level 2**
 - **None**
- **Level 3**
 - **Hemorrhage in the first 24 hours post-tracheostomy is often due to inadequate surgical hemostasis or preexisting coagulopathy and should be treated as such.**
 - **Arterial bleeding from or around a tracheostomy site several days to months following tracheostomy should be considered to be a tracheal-innominate artery fistula (TIF) until proven otherwise.**
 - **Suspected TIF should receive immediate surgical attention. Bronchoscopy (rigid/flexible) is the diagnostic tool of choice. This should be performed in the operating room with appropriate sub-specialty support (thoracic surgery).**

INTRODUCTION

Post-operative hemorrhage is a potential complication associated with any surgical procedure. In the first few hours to days post-tracheostomy, peristomal bleeding can usually be attributed to surgical site oozing, but hemorrhage from larger arteries and veins, as well as the thyroid gland, should always be considered based upon the technical difficulty associated with the procedure. Late hemorrhage also has multiple causes including infection, granulation tissue formation, coagulopathy, tumor invasion, pulmonary artery rupture and most notably TIF. Over 75% of TIF's occur in the first three weeks after tracheostomy and are often heralded by a self-limited so-called "sentinel bleed" from either the tracheostomy tube itself or around the tracheostomy site in the hours to day prior to the exsanguinating hemorrhage.

EVIDENCE DEFINITIONS

- **Class I:** Prospective randomized controlled trial.
- **Class II:** Prospective clinical study or retrospective analysis of reliable data. Includes observational, cohort, prevalence, or case control studies.
- **Class III:** Retrospective study. Includes database or registry reviews, large series of case reports, expert opinion.
- **Technology assessment:** A technology study which does not lend itself to classification in the above-mentioned format. Devices are evaluated in terms of their accuracy, reliability, therapeutic potential, or cost effectiveness.

LEVEL OF RECOMMENDATION DEFINITIONS

- **Level 1:** Convincingly justifiable based on available scientific information alone. Usually based on Class I data or strong Class II evidence if randomized testing is inappropriate. Conversely, low quality or contradictory Class I data may be insufficient to support a Level I recommendation.
- **Level 2:** Reasonably justifiable based on available scientific evidence and strongly supported by expert opinion. Usually supported by Class II data or a preponderance of Class III evidence.
- **Level 3:** Supported by available data, but scientific evidence is lacking. Generally supported by Class III data. Useful for educational purposes and in guiding future clinical research.

Prompt surgical attention, performed in the operating room, is the key to patient survival from TIF. Personnel with skills in urgent airway management and the ability to correct the fistula are fundamental. Simple maneuvers can maintain the airway and control bleeding until definitive diagnosis/repair is complete.

LITERATURE REVIEW

The overall incidence of TIF has been reported to be 0.3-0.7%. Jones et al, in 1976, reported a case series of 10 patients over 12 years at a large teaching hospital (1). They also reviewed the literature available at that time, for a total of 137 patients. Factors thought to contribute to TIF were: high pressure tracheostomy cuffs (as opposed to the current utilized low pressure cuffs), low placed tracheostomy (4th tracheal ring or below), abnormally high innominate artery, and excessive head movements. In their review, nearly 50% of patients that had bleeding greater than 48 hours after tracheostomy had a TIF.

Cameron et al also reviewed the emergency management of TIF. Besides over inflation of the tracheostomy cuff (successful in over 80% of cases, Figure 1), they also suggested that reintubation orally with manual compression of the innominate artery against the sternum may aid in controlling the hemorrhage until definitive care is achieved. This can be accomplished by either bluntly dissecting in the pre-tracheal space to compress the artery, or placing a finger in the trachea adjacent to the endotracheal tube in an effort to tamponade the hemorrhage (2,3) (Figure 2).

Once the patient is in the operating room with the appropriate personnel, a fiberoptic bronchoscope should be used to inspect the distal airways to rule out other causes for the bleeding (i.e., infection, granulation tissue, tumor invasion, necrotizing pneumonias, pulmonary artery rupture, etc.). The next step is to slowly remove the tracheostomy tube while inspecting the anterior trachea for signs of blood clot or active bleeding. Alternatively, a rigid bronchoscope may be used to achieve the same goal. In, either case, the operating room is the best place to perform these procedures (4) (Figure 3).

It should be noted that the literature on this subject is minimal over the past 20 years. Most reports are reviews and reference the paper by Jones et al noted above (1). There are no reported cases of TIF with percutaneous tracheostomies nor have are there any current case series concerning this rare complication.

REFERENCES

1. Jones JW, Reynolds M, Hewitt RL, Drapanas T. Tracheo-innominate artery erosion: successful management of a devastating complication. *Ann Surg* 1976; 184(2):194-204.
2. Allan JS, Wright CD. Tracheoinnominate fistula: diagnosis and management. *Chest Surg Clin NA*. 2003;13(2):331-41.
3. Wright, CD. Management of tracheoinnominate artery fistula. *Chest Surg Clin NA* 1996; 6(4):865-73.
4. Kapural L, Sprung J, Gluncic I. Tracheo-innominate artery fistula after tracheostomy. *Anesth & Analg* 1999; 88(4):777-800.

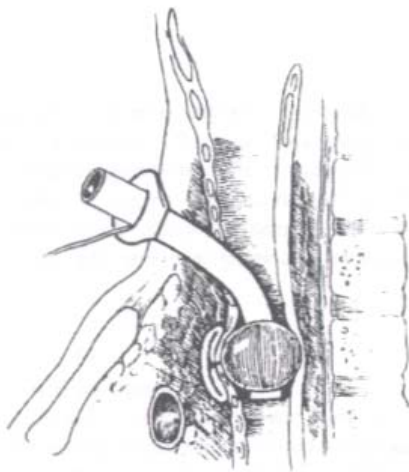


Figure 1: Overinflation of balloon

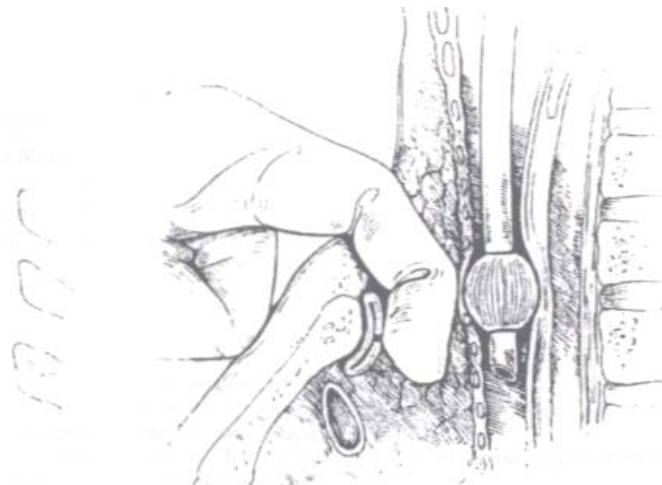


Figure 2: Manual compression of fistula

Figure 3.

