MANAGEMENT OF SUPRASTOMAL AND TRACHEAL GRANULOMAS: AN UPDATE

Shraddha Mukerji, MD

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The University of Texas Medical Branch
Department of Otolaryngology
Overview

• Etiology
• Incidence
• Indications for treatment
• Techniques for treatment
• Algorithm
Incidence

- Suprastomal granulomas (SG): 4%-80% after pediatric tracheostomies
- Site: Anterior tracheal wall just above the level of the stoma
Incidence contd

• <3 months: soft and friable, >6 months firm and fibrous

• Increased incidence with use of endoscopy to evaluate the trachea

• Incidence increased with use of modern circular curve shaped tracheostomy tubes

• Increased incidence with inappropriate sized tubes, cuffed tubes

Etiology of SG

- Frictional trauma of the tube
- Exposure of the stoma to the environment
- Secondary infection
- Stasis of secretions at the entry site of the tracheotomy tube
Etiology of tracheal granulomas

• Mucosal injury and necrosis from suction tips

• Frictional trauma from the tip of the tube
When to treat?

- Majority of SG are **asymptomatic** and do not require treatment
- Treatment is indicated if SG and tracheal granulomas are associated with
  - **Bleeding**
  - **Airway Obstruction**
  - **Dysphonia, Aphonia**
  - **Prior to decannulation**
Techniques available

- **Endoscopic techniques**
  - Hook eversion
  - Sphenoid punch
  - Optical forceps
  - Endoscopic laser
  - Electrocautery
  - Microdebrider
  - Coblation

- **Open techniques**
  - Tracheostomaplasty
  - Laryngeotraceoeplasty (LTP)
Endoscopic techniques

- Laryngeal suspension

- Ventilating bronchoscope or Rigid 0 degree Hopkins telescope
Hook-eversion technique

- First described by Reilly and Myer
- Direct visualization
- The skin hook is introduced through the stoma to evert the granuloma
- The granuloma is then grasped by hemostat and excised using tenotomy scissors

Reilly et al. Excision of suprastomal granulation tissue, Laryngoscope, 1985
Hook eversion technique

- Indicated for small, pedunculated, granulomas

- Disadvantages:
  - Exposure limited for large granulomas
  - Additional trained assistant is required
Sphenoid punch technique

- First described by Prescott
- Direct visualization of granuloma
- Punch forceps introduced through the stoma to grasp and cut the tissue
Sphenoid punch

- Advantages: Curve allows easy introduction, easy removal, minimal bleeding

- Used primarily for fibrous granulomas

- Disadvantage: Cannot be used for large, obstructing granulomas: difficult to bypass the mass

Optical Forceps

- Cupped optical forceps
- Used with a rigid Hopkins system
- Indicated for small friable granulomas
- Can cause bleeding due to piecemeal granuloma removal
Electrocautery

- It consists of a long skinny wire passed through the endoscopic bronchoscope
- The tip of the wire cauterizes the tissue with minimal bleeding
- Advantages: Direct delivery of energy, minimal bleeding
- Disadvantages: Learning curve, scarring
Granulomas amenable to cold techniques
Endoscopic laser

- CO2 laser is considered to be the work horse of pediatric airway surgery
- The pediatric airway is smaller and has less tissue as compared to an adult larynx.
- This precludes widespread use of KTP laser as it has deeper penetrating properties
- CO2 laser: Shallow depth of penetration and minimal non-specific thermal affect
CO2 laser fiber

- This device delivers CO2 laser energy to target tissue through a hollow, flexible wire

- The flexible wire can be introduced through the ventilating bronchoscope or through custom designed hand pieces
CO2 laser fiber
CO2 laser Fiber
CO2 laser Fiber

- Advantages:
  - CO2 laser properties are maintained
  - Ease of use
  - Direct delivery of energy to difficult to reach anatomical areas such as distal trachea
  - The tip of the carrier can be used for dissection
  - Cumbersome, articulated line of sight CO2 delivery systems are avoided
Tip of CO2 fiber
Case

- 4 yo s/p tracheostomy for Arnold Chiari Malformation, hemifacial hypertrophy, tongue hypertrophy

- Lost to f/u for more than a year following Ike

- Presented with inability to tolerate Passy Muir Valve
LARGE SG/TRACHEAL GRANULOMA
Tracheal Granuloma: CO2 laser fiber
Microdebrider

- Can use a tricut or a skimmer blade
- Usually indicated for small fibrous tracheal granulomas
- Can be introduced through the stoma to reach distal granulomas
- Disadvantage: Bleeding
Laryngeal coblation

- This consists of using a laryngeal coblation wand for suprastomal and tracheal granuloma removal

- Only a few case reports have been published in the literature showing good results

*Kitsko et al. Coblation removal of large suprastomal tracheal granulomas*  
*Laryngoscope 2009*
Advantages of laryngeal coblation

- Less bleeding as compared to hook-eversion and optical forceps technique
- Has a suction port, so less chances of loss of granuloma into the distal airway
- Direct visualization and ease of use
- Laser precautions are avoided, external scars for open procedures are avoided
Laryngeal coblation technique

- Suspension of the larynx
- Introduction of an appropriate sized bronchoscope into the larynx just above the stoma
- The coblation wand is slightly bent and introduced through the tracheostoma
- Coblation is carried out at a setting of 7
- The shape of the wand, electrodes and suction prevent injury to posterior and lateral tracheal walls.
Laryngeal coblation wand

PROcise LW triple active electrode tip
Outer diameter at tip 3.8mm
Coblation
Indications for Open Procedures

• Large, broad-based obstructing granulomas especially if planning for decannulation

• Associated anterior tracheal wall collapse

• Failure of Endoscopic Management

Stoma and fibrous tract dissected into anterior tracheal wall

Tract excised in continuity with intraluminal granuloma
Open procedure technique

• If there is associated anterior tracheal wall collapse, the trachea may be hitched forward and sutured to the strap muscles on either side.

• Closure of the tracheal opening with PDS suture

• Post-operative ICU monitoring for 48 hours (patient remains intubated)

• Steroids and antibiotics

*Al-Saati et al. Surgical decannulation of children with tracheostomy, Journal of Laryngology and Otology, 1993*
Algorithm

Small, moderate asymptomatic SG: Conservative, f/u endoscopy

Symptomatic SG: Trial of endoscopic techniques unless very large

Large, obstructing SG: Open procedures

Prior decannulation
Suprastomal granulomas occur very commonly after pediatric tracheotomies.

Majority are asymptomatic and do not require treatment.

Endoscopic excision should be tried first for small or moderate sized granulomas.

Open procedures should be carried out as a last resort for specific indications.