Collapsing Trachea: Handling an Uncooperative Airway
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Lecture Outline
- Etiology of tracheal collapse
- Diagnosis of tracheal collapse
- Medical management of tracheal collapse
- Surgical management of tracheal collapse
- Management of tracheal collapse with interventional radiology

Tracheal collapse etiology
- Tracheobronchial malacia—degenerative condition in which the tracheal and bronchial cartilages lose cellularity and have deficient glycoprotein and glycosaminoglycan content
- Predisposed breeds are generally toy breeds: Yorkshire Terrier, Pomeranian, Miniature Poodle, Toy Poodle, Chihuahua, Pug
- Average age at diagnosis is 7 years
- Clinical signs: “goose honking” cough, stridor, exercise intolerance, respiratory distress due to airway obstruction
Grading of tracheal collapse

- Grade 1—Minimal collapse encompassing about 25% of the airway diameter
- Grade 2—Moderate collapse encompassing about 50% of the airway diameter
- Grade 3—Severe collapse encompassing about 75% of the airway diameter
- Grade 4—Complete collapse (no visible airway remaining)

Medical management of tracheal collapse

- Medical management is effective in about 70% of cases
  - Cough suppressants:
    - Hydrocodone 0.25 mg/kg BID-TID
    - Butorphanol 0.1-0.3 mg/kg PO BID-TID
    - Difenoxylate/atropine (Lomotil) 0.2-0.5 mg/kg PO BID-TID
  - Anti-inflammatories:
    - Prednisone 0.25-0.5 mg/kg PO BID
  - Sedatives:
    - Acepromazine 0.5-2 mg/kg PO BID-TID (use sparingly!)
  - Weight Loss
  - Use of a harness rather than a neck lead
  - Bronchodilators (questionable efficacy)
    - Theophylline/aminophylline 10 mg/kg PO BID
    - Terbutaline 1.25-5 mg PO BID-TID

Surgical management of tracheal collapse

- Extraluminal tracheal rings
- Surgical placement of extraluminal tracheal rings
Surgical management of tracheal collapse

- **Pros**
  - No risk of fracture
  - Long-lasting
  - Minimal risk of granulation tissue formation

- **Cons**
  - Only addresses cervical and possibly thoracic inlet tracheal collapse
  - Requires surgical intervention with potential complications
  - Potential damage to blood vessels and nerves (e.g., recurrent laryngeal nerve)
  - Significant risk of laryngeal paralysis approximately 20% of cases

Intraluminal tracheal stent placement

- **Types of tracheal stents**
  - Self-expanding
    - Stainless steel withstands 0.3% deformation
    - Nitinol withstands 10% deformation
  - Balloon expandable—no longer used due to stent migration (resulting from stent recoil following balloon deflation)
  - Imaging during stent deployment
    - Fluoroscopy
    - Bronchoscopy
    - Digital radiography

- **Pros**
  - Minimally invasive
  - Rapid placement with minimal anesthetic time
  - 95% immediate improvement in clinical signs, 90% long-term improvement in clinical signs
  - No risk of laryngeal paralysis

- **Cons**
  - Potential for stent migration (if size chosen is too small)
  - Potential for stent fracture, particularly if patient continues to cough post-stent placement
  - Potential for granulation tissue formation

Trachoscopy of a patient with granulation tissue formation following tracheal stent placement
Intraluminal tracheal stent placement

  – Survival times ranged from 1 to >48 months (study end)
  – 75% of patients lived >1 year post-stent
  – 58.3% of patients lived >2 years post-stent
  – Encountered complications in a significant number of patients
    • 7/12 bacterial tracheitis
    • 5/12 stent fracture
    • 2/12 granulation tissue formation
    • 1/12 stent migration
  – Of the 9 patients that died within the study period, 5 died of causes related to tracheal collapse

Tracheal collapse: One clinician’s thoughts

• ALWAYS attempt medical management prior to considering tracheal stent placement or placement of extraluminal rings
• Stent placement and extraluminal ring placement DO NOT remove the need for medications
• Mainstem bronchial collapse is not treated with a stent. Therefore, if bronchoscopy reveals bronchial collapse that is worse than the tracheal collapse, stent/ring placement should be questioned
• Attempt to clear pneumonia (especially if severe) prior to placement of a tracheal stent or extraluminal rings
• Tracheal collapse is a progressive disease, and patients need to be monitored carefully.
• Disease progression can be very rapid in some patients.
• Given that the disease is progressive, extraluminal ring placement (which only addresses cervical disease) may not be a good long-term treatment option.
Questions???