Special Situations in Management of Tonsil and Adenoid Disorders

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Anatomy
Anatomy

**Blood supply - Tonsils**

- Facial a.
  - Tonsillar branch → Tonsil (main branch)
  - Ascending palatine → Tonsil

- Lingual a. → Dorsal lingual → Tonsil

- Ascending pharyngeal → Tonsil

- Maxillary → Lesser descending palatine → Tonsil
Anatomy

Ascending Pharyngeal a.
Lesser palantine a.
Tonsillar branch of lesser palantine
Tonsillar branch of ascending Pharyngeal a.
Tonsillar branch of ascending palatine a.
Tonsillar branch of facial a.
Tonsillar branch of dorsal lingual a.
Anatomy

Blood supply – Adenoids

- Ascending palatine branch of facial a.
- Ascending pharyngeal a.
- Pharyngeal branch of IMAX.
- Ascending cervical branch of thyrocervical trunk.
Grading the Size of Tonsils

Grading system:
A.  0 – tonsils in fossa
B.  +1 – tonsils less than 25%
C.  +2 – tonsils less than 50%
D.  +3 – tonsils less than 75%
E.  +4 – tonsils greater than 75%
Tonsil Positions

A-C, - Tonsils may be bi-lobed with extension into the hypopharynx, or more rarely into the nasopharynx. Inferior extension is seen with a history of obstruction and relatively normal appearing tonsils.
Overview

- Peritonsillar abscess
- Unilateral tonsillar enlargement
- Hemorrhagic tonsils
- Lingual tonsils
- Down’s Syndrome
- Cleft palate
- Indications, Contraindications & Complications
Peritonsillar Abscess
Peritonsillar Abscess

- Incidence: estimated 30 cases per 100,000 in US.
- Diagnosis is usually by physical exam but other modalities have been used such as US and CT.
- Widely accepted that *Staphylococcus aureus* is the most common organism causing the infection and origin is usually from the superior pole of the tonsil (from minor salivary gland - AKA: Weber gland).
- Clinical presentation:
  - Dysphagia, odynophagia
  - Muffled voice
  - Trismus
  - Inability to swallow with drooling.
Peritonsillar Abscess

► Differential diagnosis:
  - hypertrophic tonsillitis
  - infectious mononucleosis
  - tubercular granuloma
  - diphtheria
  - deep space infections of the neck
  - cervical adenitis
  - congenital or traumatic internal carotid artery aneurysms
  - foreign bodies
  - neoplasms
Peritonsillar Abscess

Initial treatment centers around needle aspiration vs. incision and drainage.

- I&D has slightly higher success rate than needle asp, but more painful with NNT (number needed to treat) of 48 after aspiration.
- Hydration – possible admission for IVFL if patient is unable to tolerate PO
- Antibiotics – Clindamycin (For infants/children: 25-40mg/kg IV/IM divided q6-8 or 10-30 mg/kg PO daily divided q6-8).
- Steroids (Dexamethasone 0.5 mg/kg)
Peritonsillar Abscess

► Use of steroids: Ozbek et al. 2004 studied the use of steroids for PTA in a randomized trial.

- Patients received either intramuscular steroids or placebo, along with abscess drainage by needle aspiration and intravenous antibiotics which were continued at least 2 days and until the patient improved.
- All patients were hospitalized.
- The authors found a statistically significant difference favoring the use of steroids for several outcomes.
  - 12 h 70% of the steroid group were able to swallow water without pain, whereas only 18% of the placebo group could
  - Presence of fever at 24 h (28% and 86%)
  - The steroid group also did not have any increased frequency of complications.
Peritonsillar Abscess

- **Quinsy tonsillectomy vs. Interval tonsillectomy**
  - Quinsy tonsillectomy can be a treatment option in pediatric patients too young to withstand bedside aspiration or I&D for recurrent PTA.
  - Quinsy tonsillectomy can be surgically easier than interval tonsillectomy as fibrosis has not had time to set into the tonsillar capsule.
  - Review by Johnson, discussed interval tonsillectomy for recurrent PTA with prevalence of 10%.
  - Interval tonsillectomy can be considered after successful abscess drainage, usually from recurrent PTA after 6 weeks.
Unilateral Tonsil Enlargement
Unilateral Tonsillar Enlargement

- Most often due to asymmetric anatomic position of “same-sized.” tonsils.
- Can be from unusual infections such as atypical mycobacteria, fungi or actinomycosis.
- Neoplastic process must be ruled-out.
Unilateral Tonsillar Enlargement

- Clinical presentation can be insidious
  - Change in voice
  - New-onset snoring
  - Possible neck mass in physical exam
  - Appearance of the tonsil may differ from the contralateral side
Unilateral Tonsillar Enlargement

Excisional biopsy

- CT or MRI can be helpful to see any extension beyond the tonsillar capsule.
- Cultures for aerobic, anaerobic and fungal elements can be sent
- Consult for oncologist if malignancy is highly suspected for possible bone marrow biopsy while child is under anesthesia.
Hemorrhagic tonsillitis

- Recurrent bleeding from prominent vessels in chronic tonsillitis but can also be diffuse parenchymal bleeding.
- Can be controlled locally in most patients
- Most younger patients usually taken to OR because of poor cooperation
- Tonsillectomy is indicated if bleeding is resistant to local medical management, recurrent, or marked reduction of hemoglobin or hematocrit is noted.
Lingual Tonsils
Lingual Tonsils

- Hyperplasia is the most common abnormality of the lingual tonsil.
- Lingual tonsils sit on the base of the tongue and extend to the vallecula and do not have a capsule.
- Can be visualized by indirect mirror or flexible laryngoscopy
- Clinically, infection is marked by erythema and enlargement of tonsillar tissue.
- Suspension microlaryngoscopy with removal by CO$_2$ laser, sharp dissection or hot knife cautery are some of the treatments available.
Lingual Tonsil

History and Physical:

- Sore throat
- Globus sensation
- Speech change
- Dysphagia
- Obstructive sleep apnea in adults
- Pediatric airway obstruction
- Often discovered incidentally during intubation in preparation for surgery that is unrelated to the ear, nose, and throat.
Lingual Tonsils

- Differential diagnosis
  - lingual thyroid tissue
  - thyroglossal duct cyst
  - dermoid cyst
  - lymphangioma
  - angioma
  - adenoma
  - fibroma
  - papilloma
  - lymphoma
  - squamous cell carcinoma
  - minor salivary gland tumors on the base of the tongue
Mamede et al. reported hypertrophy of lingual tonsils in 62% of persons with laryngoscopic signs of reflux and in 75% of persons with pharyngolaryngeal symptoms of LPR.

Although the lymphoid tissue in Waldeyer's ring tends to decrease with advancing age, the lingual tonsil may increase in size. Research has shown that the most important cause of lingual tonsil hypertrophy is the occurrence of compensatory hyperplasia following adenotonsillectomy.
Lingual Tonsils
**Down’s Syndrome**

► **Trisomy of chromosome 21 (95%) with 3-4% have unbalanced translocation**

► **Characterized by:**
  - Mental retardation, microbrachycephaly, flat occiput, short neck, oblique palpebral fissures, epicanthal folds, flat nasal dorsum, small low-set auricles, stenotic ear canals, prominent furrowed tongue & microdontia with fused teeth.

► **Predisposing factors for OSA are:**
  - Midfacial hypoplasia; micrognathia; narrow nasopharynx; small oral cavity; macroglossia; relative tonsil and adenoid hyperplasia; increased secretions; hypotonia of the palatal, lingual, and pharyngeal muscles; laryngotracheal abnormalities; and obesity. There is an increased incidence of chronic rhinosinusitis and tonsillitis in children with Down syndrome.
Down’s Syndrome

- Tonsillectomy and adenoidectomy may be required in children with Down syndrome for treatment of upper-airway obstruction, OSAS, recurrent or chronic tonsillitis, recurrent peritonsillar abscesses, dentofacial abnormalities, and, rarely, for malignant neoplasms, spontaneous tonsil hemorrhage, and refractory halitosis
## Down’s Syndrome


<table>
<thead>
<tr>
<th></th>
<th>Group 1 (n=87)</th>
<th>Group 2 (n=64)</th>
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<tbody>
<tr>
<td><strong>Intraoperative period</strong></td>
<td></td>
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<tr>
<td>Operative time, mean±SD, median (range), min</td>
<td>39.8±19.0, 35.0 (6.0-120.0)</td>
<td>37.1±14.7, 34.0 (9.0-86.0)</td>
<td>.72</td>
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<tr>
<td>Anesthesia time, mean±SD, median (range), min</td>
<td>72.9±22.5, 65.0 (35.0-155.0)</td>
<td>67.9±18.6, 65.0 (35.0-130.0)</td>
<td>.28</td>
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<td>Anesthetic complications, No. (%)</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Postextubation stridor</td>
<td>4 (5)</td>
<td>0</td>
<td>.11</td>
</tr>
<tr>
<td>Upper-airway obstruction</td>
<td>2 (2)</td>
<td>0</td>
<td>.33</td>
</tr>
<tr>
<td>Laryngospasm</td>
<td>1 (1)</td>
<td>0</td>
<td>.58</td>
</tr>
<tr>
<td>Apnea</td>
<td>1 (1)</td>
<td>0</td>
<td>.58</td>
</tr>
<tr>
<td>Total†</td>
<td>7 (8)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Estimated blood loss, mean±SD, median (range), mL</td>
<td>31.9±30.3, 20.0 (0.0-150.0)</td>
<td>54.8±54.2, 40.0 (0.0-225)</td>
<td>.02</td>
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<tr>
<td><strong>Hospital stay</strong></td>
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<tr>
<td>Length of hospital stay, mean±SD, median (range), d</td>
<td>1.6±1.5, 1.0 (0.0-10.0)</td>
<td>0.80±0.88, 1.0 (0.0-6.0)</td>
<td>.001</td>
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<tr>
<td>No. (%) admitted to pediatric intensive care unit</td>
<td>22.0 (25)</td>
<td>0</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Length of intensive care unit stay, mean±SD, median (range), d‡</td>
<td>1.4±1.1, 0 (0.0-5.0)</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>No. (%) discharged from same-day surgery unit</td>
<td>4.0 (5)</td>
<td>22.0 (34)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td><strong>Postoperative period, mean±SD, median (range), h</strong></td>
<td>27.8±23.1, 23.5 (0.0-142.0)</td>
<td>15.3±11.4, 16.0 (0.0-49.0)</td>
<td>.001</td>
</tr>
<tr>
<td>Duration of intravenous therapy</td>
<td>9.0±15.6, 5.0 (1.0-119)</td>
<td>8.0±25.1, 4.0 (1.0-200)</td>
<td>.03</td>
</tr>
<tr>
<td>Time until intake of clear liquids</td>
<td>1.4±8.1, 0 (0.0-72.0)</td>
<td>0.35±1.5, 0 (0.0-9.0)</td>
<td>.75</td>
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<tr>
<td>Duration of intravenous morphine sulfate administration</td>
<td>16.1±17.2, 14.0 (1.0-135.0)</td>
<td>10.0±8.8, 6.0 (1.0-30.0)</td>
<td>.004</td>
</tr>
<tr>
<td>Time until out of bed</td>
<td>3.2±6.2, 0 (0.0-27.0)</td>
<td>2.3±4.3, 0 (0.0-24.0)</td>
<td>.84</td>
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<tr>
<td>Duration of postoperative emesis</td>
<td></td>
<td></td>
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<tr>
<td>Readmission, No. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patients readmitted for treatment of dehydration</td>
<td>4 (5)</td>
<td>2 (3)</td>
<td>.49</td>
</tr>
<tr>
<td>Patients readmitted for treatment of bleeding</td>
<td>3 (3)</td>
<td>1 (2)</td>
<td>.43</td>
</tr>
<tr>
<td>Total</td>
<td>7 (8)</td>
<td>3 (5)</td>
<td>.32</td>
</tr>
<tr>
<td>No. (%) of patients with postoperative bleeding</td>
<td>4 (5)</td>
<td>1 (2)</td>
<td>.29</td>
</tr>
</tbody>
</table>

*At Children’s Hospital of Pittsburgh, Pittsburgh, Pa, January 1, 1986, through March 30, 1996. Children in group 1 had Down syndrome; children in group 2 did not.
†Total equals 7 because 1 child had stridor and upper-airway obstruction.
‡Ellipses indicate not applicable.
Down’s Syndrome

How to avoid complications with adenotonsillectomy:

- Pre-op flex/ext films and preventing hyperextension and hyperflexion during laryngoscopy, intubation, and surgical procedures is important because of the high incidence of atlantoaxial instability.

- Use an endotracheal tube of a smaller size than would be expected for age in children with Down syndrome because these children’s airways are often smaller than expected for age, and they may have unsuspected laryngotracheal stenosis.

- Inpatient hospitalization with overnight measurement of pulse oximetry and intravenous hydration until the resumption of adequate postoperative oral intake.
Cleft Palate

- Normally a contraindication for tonsillectomy or adenoidectomy
- Can cause VPI in patients with submucous cleft
- Submucous cleft palate is a condition that is well recognized by ENT surgeons, with a typical appearance of:
  - a bifid uvula,
  - a midline lucency of the soft palate
  - notching of the hard palate.
Cleft Palate

- An occult submucous cleft is a less well-recognized anatomical anomaly. It too involves abnormality of the structure and function of the palatal musculature, but is not detectable on oral examination.

- On endoscopic examination of the nasopharynx, there is loss of the usual midline convexity of the superior surface of the soft palate with either flattening or a midline groove, consistent with the absence of musculus uvulae. This is sometimes known as the ‘seagull sign’.
For adenoidectomy on submucous cleft the “superior-half” of adenoid pad is removed to unblock the choanae while leaving the contact with soft palate and pharynx.
General Considerations

Preoperative Evaluation

- **Dental consultation** is obtained for any child with potentially loose teeth.
- **Sleep studies** are usually unnecessary for children with upper airway obstruction, unless the diagnosis or need for surgery is in question.
- **Cardiac evaluation** for cor pulmonale or right-sided heart failure is necessary for children with known or suspected obstructive sleep apnea syndrome (OSAS).
- **Coagulation tests** remain controversial. There is no consensus on the benefit of preoperative studies such as platelet count, prothrombin time (PT), partial Thromboplastin time (PTT), and bleeding time. Any child with a personal or family history of easy bruising or extensive bleeding (nasal, dental) is tested.
General Considerations

► Von Willebrand disease requires aggressive preoperative hematological optimization, including desmopressin and cryoprecipitate. Patients who receive desmopressin need careful fluid and electrolyte management after surgery.

► Sickle cell disease requires preoperative transfusion and intravenous hydration, which should be coordinated by a pediatric hematologist.
Adenotonsillar Hypertrophy

- Excess of pharyngeal lymphoid tissue.
- Lymphoid tissue can occupy a large amount of space in upper airway
  - Especially apparent in children with small anatomical airways (e.g. achondroplasia & craniofacial syndromes).
- Obstruction usually increases when patients are supine or has decreased neuromuscular tone or obesity from inward collapse of soft tissue.
Adenotonsillectomy - Indications

► Primary snoring disorder:

- Loud snoring, mouth breathing, sleep pauses or breath holding, gasping, enuresis and restless sleeping.
- Daytime manifestations: hypersomnolence, AM headache, hyponasal speech, chronic nasal obstruction w/ or w/o rhinorrhea.
Adenotonsillectomy-Indications

- **Obstructive apnea syndrome**

- Obstructive hypopnea is defined as a decrease in airflow by 50% despite effort during the same time or breath cycles, associated with a desaturation or arousal. The apnea/hypopnea index (AHI) is the same as for adults: the total number of apneic events plus hypopneas per hour of sleep. An arousal index describes the number of arousals per hour of sleep.

- Defined in adults as cessation of airflow at nostrils and mouth for at least 10 seconds and a hypopnea (decrease in $V_T$ of at least 50% or drop in $PO_2$ of 4%) with 5-10 episodes in one hour.
Adenotonsillectomy-Indications

In kids:

- Obstructive apnea is commonly defined as a cessation of ventilation despite effort for 10 seconds or two breath cycles in older children, or 6 seconds or 1.5–2 breaths in younger infants.

- No clear consensus for criteria in children – pts may develop RVH, pulm. HTN, cor pulmonale, failure to thrive, neurologic damage and death.
Adenotonsillectomy—Indications

- Dysphagia & speech impairment
  - Large tonsils can interfere with pharyngeal phase of swallowing.

- Abnormal dentofacial growth
  - Long face syndrome

- Halitosis
  - No clinical trials support adenotonsillectomy for halitosis.
Tonsillectomy-Indications

  - Temperatures above 38.5°C
  - Cervical adenopathy > 2 cm
  - Tonsillar exudate or (+) group A β-hemolytic strep. Cx.
  - ≥7/yr, 5/yr x 2 yrs or 3/yr x 3 yrs.
  - Failure of medical treatment

► Chronic tonsillitis
  - > 3 months in duration with tonsillar inflammation, reasonable if patients have failed aggressive antibiotic therapy.
Tonsillectomy - Indications

- Peritonsillar abscess
- Streptococcal carriers
  - Asymptomatic carriers that have family members with acute glomerulonephritis, carrier is food handler or hospital worker. Tonsillectomy should be reserved for those refractory to antibiotics.
- Hemorrhagic tonsillitis
- Unilateral tonsil enlargement
Adenoidectomy - Indications

► Recurrent or chronic sinusitis or adenoiditis
  ▪ Poorly understood - possibly caused by obstructive adenoid tissue causing stasis of secretions predisposing the nasal cavity to infection.

► Otitis media
  ▪ Proximity of adenoid tissue to eustachian tube
  ▪ Adenoidectomy can be recommended on 1st set of tubes if nasal obstruction and recurrent rhinorrhea is present or on 2nd set of tubes if needed.
Adenotonsillectomy- Contraindications

► Velopharyngeal insufficiency
  - Overt cleft palate, submucous (covert) cleft
  - Neurologic or neuromuscular abnormality leading to impaired palate function

► Hematologic
  - Anemia
  - Any disorder or hemostasis
  - Surgery should not be undertaken if Hgb is less than 10 gm/dL, or Hct less than 30%.
Adenotonsillectomy- Contraindications

► Immunologic
  ▪ Respiratory allergy not treated for at least 6 months

► Infectious: Should not be done in the face of active infection unless urgent obstructive symptoms are present or:
  ▪ Appropriate antibiotics have been tried and unsuccessful
  ▪ Usually an interval of at least 3 weeks allow the patient to recuperate enough to reduce operative hemorrhage.
Complications
Complications

► Noniatrogenic complications after adenoidectomy
  - *Regrowth of adenoid tissue*, particularly in very young children, which may require revision (secondary) adenoidectomy.
  - *Hypernasality*, because of temporary pain splinting. Persistent hypernasality is rare and probably caused by unrecognized pre-existing velopharyngeal weakness.
  - *Atlantoaxial subluxation* (Grisel’s syndrome), which presents with persistent torticollis 1-2 weeks after surgery.

► Iatrogenic complications after adenoidectomy include
  - *Dental injury*, from intubation or the mouth gag
  - *Nasopharyngeal stenosis*, caused by excessive tissue removal.
  - *Eustachian tube injury*, if the torus tubarius is cauterized or denuded.
Complications

Non iatrogenic complications after tonsillectomy

- **Bleeding** in 1-2% of children, which is typically delayed (5-7 days); bleeding in the first 24 hours is less common. Most bleeding will stop spontaneously, but generally requires 24 hours of inpatient observation.

- Initial adjuvant techniques for hemostasis include clot removal, gargling with salt water or hydrogen peroxide, local cautery with silver nitrate sticks, and injection of epinephrine 1:200,000

- **Persistent bleeding**, requiring control in the operating room
  1. Rapid sequence anesthesia is used for induction.
  2. Bleeding vessels are cauterized or suture ligated
  3. Refractory hemorrhage requires external carotid artery embolization by an interventional neuroradiologist.
  4. When embolization is unavailable, external carotid artery ligation
Complications

- **Dehydration**, requiring re-admission for hydration
- **Airway obstruction**, requiring observation in an intensive setting, parenteral steroids, racemic epinephrine, careful insertion of a nasopharyngeal airway of appropriate length, and consideration for re-intubation if necessary.
- **Post obstructive pulmonary edema**, which may result from increased intrathoracic venous and hydrostatic pressure relieved by intubation or surgery. Presenting signs include oxygen desaturation and pink frothy secretions. Diuretics and re-intubation may be needed.
- **Atlantoaxial subluxation** (Grisel’s syndrome), presenting with persistent torticollis 1-2 weeks after surgery. Neurological or orthopedic consultation
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