Chapter 2
General Pediatric Otolaryngology

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PEARLS

- Croup-like symptoms on presentation for the child <6 months of age should be of concern for possible subglottic hemangioma
- After maximization of medical therapy, adenoidectomy is the first-line surgical option for recurrent, acute sinusitis/adenoiditis in children
- Consider adenoidectomy to help treat underlying Eustachian tube dysfunction
- Nasal polyposis in a child should prompt a work-up for cystic fibrosis
- Torticollis or decreased neck range of motion post-tonsillectomy should be suspicious for Grisel's syndrome
- Neck masses in children are most commonly the result of an infectious process

PEDIATRIC SINUSITIS

- Major criteria for chronic pediatric sinusitis
  - Nasal obstruction
  - Purulent nasal discharge
- Other presenting symptoms
  - Headache
  - Chronic cough
  - Behavioral change, irritability
  - Halitosis
  - Postnasal drainage
  - Daytime cough with exacerbation at night
- Predisposing factors
  - Environmental
  - Allergy
  - Tobacco smoke
  - GERD
  - Immunodeficiency
  - Cystic fibrosis
    - Nasal polyps in a pediatric patient suggest CF until proven otherwise.
  - Ciliary dyskinesia
  - Infectious—viral, etc

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F.Y. Lin and Z.M. Patel (eds.), *ENT Board Prep: High Yield Review for the Otolaryngology In-service and Board Exams*, DOI 10.1007/978-1-4614-8354-0_2,

- Complications of pediatric rhinosinusitis
  - Meningitis
  - Epidural/subdural/intraparenchymal brain abscess
  - Orbital complications
    - Chandler classification
      - I: Periorbital cellulitis (pre-septal)
      - II: Orbital cellulitis
      - III: Sub-periosteal abscess
      - IV: Orbital abscess
      - V: Cavernous sinus thrombosis
    - Stage I and II can generally be managed with intravenous antibiotics. Stage IV and V require urgent surgical intervention. Small medial sub-periosteal abscesses may be treated with a trial of intravenous antibiotics with close observation and a low threshold for surgical intervention if clinical improvement is not seen
  - Indications for CT scanning for pediatric rhinosinusitis
    - Severe illness or toxic condition
    - Acute rhinosinusitis that does not improve with medical therapy in 48–72 h
    - Immunocompromised host
    - Presence of a suppurative complication other than orbital cellulitis
  - Bacteriology of acute pediatric sinusitis
    - Aerobes: *Pneumococcus*, *Moraxella catarrhalis*, *Haemophilus influenzae*, *Staphylococcus aureus*, *α-hemolytic Strep*, *Pseudomonas*
    - Anaerobes: *Peptococcus*, *Peptostreptococcus*, *Bacteroides*
  - Bacteriology of chronic pediatric sinusitis
    - Aerobes: *S. aureus*, *Streptococcus pneumoniae*, *H. influenzae*
    - Anaerobes: *Prevotella*, *Porphyromonas*, *Fusobacterium*

VELOPHARYNGEAL INSUFFICIENCY

- Four patterns of velopharyngeal closure
  - Coronal (55 %, most common)
  - Sagittal (10–15 %, least common)
  - Circular (10–20 %)
  - Circular with Passavant's ridge (15–20 %)
- Management of velopharyngeal insufficiency (VPI)
  - Medical
    - Speech therapy
    - Prosthetics: palatal lift or obturator
    - Biofeedback with nasometry
  - Surgical
    - Pharyngoplasty
    - Use when good anterior–posterior motion, poor lateral motion
    - Pharyngeal flaps
    - Use when good lateral motion, poor anterior–posterior motion
    - Posterior pharyngeal wall augmentation

UPPER AIRWAY INFECTIONS

- Laryngotracheitis (Croup)
  - Viral etiology (most commonly associated with parainfluenza)
  - Slow onset with URI prodrome leading to barky cough and inspiratory stridor
  - Presents in patients aged 6 months–3 years
  - AP neck X-ray with "steeple sign" (subglottic narrowing)
  - Supportive care with humidification, racemic epinephrine, ±steroids
  - Intubation rarely required and should be avoided if possible

- Supraglottitis (epiglottitis)
  - Bacterial etiology (classically *H. Influenza B*)
  - Rapid onset with high fevers, dysphagia, drooling, and toxic appearance
  - Presents most commonly in patients aged 1–8 years
  - Lateral neck X-ray with "thumbprint sign" (swollen epiglottis)
  - Secure airway, IV antibiotics
    - OR intubation/bronchoscopy with tracheotomy equipment available; extubate once edema decreased and air leak present
- Bacterial tracheitis
  - Bacterial etiology (*S. Aureus*, *S. Pyogenes*, *H. Influenza*, *M. Catarrhalis*)
  - May be bacterial superinfection after viral laryngotracheitis
  - URI prodrome with rapid escalation to toxic symptoms with high fevers, cough, hoarseness, and respiratory distress
  - IV antibiotics
  - OR intubation/bronchoscopy with therapeutic removal and culture of tracheal exudates
- Retropharyngeal abscess
  - Mixed aerobic/anaerobic bacterial etiology
  - URI prodrome with slowly progressive sore throat, dysphagia, drooling, and decreased neck range of movement
  - Lateral neck X-ray (widening of pre-vertebral soft tissues) vs. CT scan
  - IV antibiotics—may obviate the need for surgical drainage
  - Secure airway as needed; possible OR drainage (trans-oral vs. trans-cervical)

ADENOTONSILLAR DISEASE

- Adenoid anatomy
  - Blood supply
    - Pharyngeal branch of the internal maxillary (major supply)
    - Ascending palatine branch of the facial artery
    - Ascending cervical branch of thyrocervical trunk
    - Ascending pharyngeal artery
  - Innervation: CNs IX and X
    - Histology: ciliated pseudostratified columnar, stratified squamous and transitional epithelia present; presence of inflammation increases specialized squamous epithelium proportion and decreases respiratory proportion
  - Indications for adenoidectomy
    - Infection
    - Recurrent/chronic adenoiditis
    - Chronic otitis media with or without effusion (kids >4 years)
    - Obstruction
      - Adenoid hyperplasia with chronic nasal obstruction or obligate mouth breathing
      - OSA or sleep disturbances
      - Associated with cor pulmonale, failure to thrive (FTT)
    - Craniofacial growth abnormalities
    - Occlusion abnormalities
    - Speech abnormalities
    - Swallowing abnormalities
    - Others
      - Suspected neoplasm
      - Chronic sinusitis
- Tonsil anatomy
  - Blood supply to the tonsil
    - Facial artery (tonsillar branch, ascending palatine branch)
    - Dorsal lingual branch of lingual artery

        - Internal maxillary artery (descending palatine, greater palatine artery)
        - Ascending pharyngeal artery
    - Etiology of pseudomembranous tonsillitis
        - Epstein–Barr virus (mononucleosis)
        - Candidiasis
        - Vincent's angina
        - *Neisseria gonnorhoeae*
        - Syphilis
        - *Corynebacterium diphtheria*
        - Group A β-hemolytic *Streptococcus*
    - Indications for tonsillectomy
        - Infection
            - Recurrent acute infections >7 in 1 year, >5/year in 2 years, >3/year in 3 or more years
            - Recurrent acute infections with complications (cardiac valve disease, febrile seizures)
            - Chronic tonsillitis associated with halitosis, persistent sore throat, tender cervical adenitis, unresponsive to medical therapy
            - *Streptococcus* carrier
            - Peritonsillar abscess
            - Tonsillitis with cervical abscess
            - Mononucleosis with obstructing tonsils unresponsive to therapy
            - PFAPA (*see below*: syndrome of periodic fever, aphthous stomatitis, pharyngitis, and adenitis)
            - Obstruction
            - Suspicion of malignancy
- AAO-HNS guidelines for overnight admission post adenotonsillectomy
    - Severe OSA (AHI >10) or other craniofacial abnormalities
    - Emesis or hemorrhage
    - Age <3 years
    - Patient lives greater than 60 min away from hospital
    - Poor socioeconomic class which may predispose to neglect
    - Any other medical comorbidity which requires attention postoperatively (diabetes, seizures, Down syndrome, asthma, cardiac disease, etc.)
- Complications of adenotonsillectomy
    - Postoperative hemorrhage: 0.5–10 %
    - Postoperative pulmonary edema: due to loss of auto-PEEP from chronic obstruction and decreased intrathoracic pressure. Treat with diuretics, fluid restriction, CPAP. Intubation if necessary to control O_2 saturation
    - Hypoxemia: loss of hypercapneic respiratory drive
    - VPI
    - Nasopharyngeal stenosis
    - Atlantoaxial subluxation (Grisel's syndrome): deep calcification of anterior arch of atlas, laxity of anterior transverse ligament; Down syndrome children more prone to this
        - Diagnosis: MRI or CT C-spine
        - Treatment: muscle relaxants, benzodiazepines, spine consultation/traction, cervical collar, NSAIDs
    - Malodorous breath (most common complaint)
- PFAPA syndrome
    - Periodic high fevers, aphthous stomatitis, pharyngitis, cervical adenitis occurring every 3–5 weeks for at least 6 months
    - Repeated negative throat and viral cultures
    - Medical management with steroids, definitive surgical management with adenotonsillectomy
- Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal infections (PANDAS)
    - Not validated as a disease entity
        - Dx: GABHS-Ig

- Rapid onset of obsessive compulsive disorder (OCD) in association with group A β-hemolytic streptococcal infections (GABHS)
- Treatment: psychiatric medications for OCD, PCN/abx

PEDIATRIC HEAD AND NECK MASSES

Most common neck mass in a child is inflammatory adenitis:

- Treatment with antibiotics
- Suppurative adenitis likely to require incision and drainage
- Deep-space neck infection may present with neck mass/fullness
- Cat scratch fever
  - *Bartonella henselae*
  - History of cat exposure
  - Dx: serum titer measurement
- Atypical mycobacterial infection
  - Childhood disease, non-tender slowly enlarging neck mass, no pulmonary involvement or systemic, drug therapy usually ineffective (biaxin may be effective)
  - Tx: incision and drainage/curretage, may cause fistulization

SALIVARY GLAND MASSES

- Most common pediatric salivary gland mass is hemangioma
- Most common pediatric salivary gland neoplasm is pleomorphic adenoma
- Most common pediatric salivary gland malignancy is mucoepidermoid carcinoma
- Overall ~50 % of parotid gland neoplasms in children are malignant (vs. ~20 % in adults)

SMALL BLUE-CELL MALIGNANCIES IN CHILDREN

- Lymphoma
- Sarcoma
- Rhabdomyosarcoma
  - Most common sites (descending order)
    - Orbit
    - Nasopharynx
    - Middle ear/mastoid
    - Sinonasal cavity
  - Metastatic sites
    - Lung
    - Bone
    - Bone marrow
  - Histopathology
    - Embryonal (75 %): most common in infants and children
      - Spindle-shaped cells with eosinophilic cytoplasm, best prognosis
      - Botryoid variant
    - Alveolar (20 %): most common in adolescents
      - Small round cells separated by fibrous septae into alveolar groups
    - Pleomorphic: most common in adults
- PNET (neuroendocrine tumor)

DIFFERENTIAL DIAGNOSIS FOR MIDLINE NECK MASS

- Thyroglossal duct cyst
  - Embryologic remnant of tract from descent of thyroid gland from foramen cecum to natural anatomic position

  - Evaluate for the presence of normal thyroid gland using ultrasound prior to surgical management
  - Tx: Sistrunk procedure—excision of cyst, surrounding tissue, and central portion of hyoid; variable tract path
- Teratoma
- Dermoid
- Lymphatic malformation
- Plunging ranula
- Thymic cyst
- Hemangioma

PEDIATRIC BASE OF TONGUE MASS

- Differential diagnosis
  - Lingual thyroid
  - Thyroglossal duct cyst
  - Vallecular cyst
- Evaluation
  - Thyroid function tests: TSH, T3/T4
  - CT or MRI
  - I-131 scan: identify other foci of functioning thyroid tissue
- Treatment of lingual thyroid: observation, thyroid suppression therapy, RAI, surgery

LYMPHATIC AND VASCULAR MALFORMATIONS

- PHACE syndrome
- Kasabach–Merritt syndrome
- Sturge–Weber syndrome
- Maffucci syndrome
- von Hippel Lindau syndrome
  - Autosomal dominant
  - Hemangioblastomas of CNS and retinas, renal cysts/carcinoma, pheochromocytoma, pancreatic cysts, papillary cystadenomas of epididymis
  - Associated with endolymphatic sac tumors

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