My ear itches and my kid always has the sinus!

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No disclosures

Outline

- External auditory canal pruritis
  - Otitis Externa
  - Chronic Dermatitis
  - Isolated EAC pruritis
  - Lichen Planus
- Pediatric sinus disease
  - Indications for sinus surgery
  - Definition of chronic rhinosinusitis (CRS)
  - Medical management
  - Surgical management
  - Conclusions

My ear itches doc!

- **Otitis externa**
- **Dermatitis**
- **Idiopathic**
- **Lichen Planus**
- Psoriasis
- Dermatomycosis
- Dermatophytid reaction

Otitis externa

- External auditory canal (EAC) only skin lined cul-de-sac in the body
- Prone to becoming moist, excellent for bacterial and fungal growth
- Thin skin
- Easily traumatized
- Cerumen acidic coat containing lysozymes and other substances that inhibit bacterial/fungal growth
  - Hydrophobic and prevents water from penetrating skin and causing maceration

Otitis Externa

- Too little cerumen can predispose to infection
- Too much cerumen can be obstructing
- Excessive moisture elevates pH and removes cerumen
- Keratin debris absorbs water and creates good environment for bacterial/fungal growth

Otitis externa

- Avoid water exposure
- Possible ear wick placement
- Cirpodex ear drops
  - Steroids to decrease inflammation
  - Antibiotic to fight bacteria
- Aural toilet
- Need for oral/IV if topical fails or severe infections
- Future prevention
  - Recommend water precautions
  - Discuss q-tip/excessive ear cleaning

Contact Dermatitis

- Protective layers of EAC removed by q-tip/aggressive ear cleaning
- EAC skin thin and vulnerable to penetration of haptens
- Multiple sensitizations with chemicals from hair products can cause allergic dermatitis can lead to inflammatory process
- Inflammation can reduce/halt cerumen production

Contact Dermatitis

- Avoid q-tips
- Avoid water exposure in the ear canals
  - Avoid swimming
  - Avoid dunking head during bath
  - Cotton ball with Vaseline for shower
- Consider changing to free and clear shampoo/conditioner/hair product
- Ear plugs for swimming
- May need to change hearing aid mold if wears hearing aids

Contact Dermatitis

- Oral antihistamines
- Acetic acid 2-4%
- Mineral oil
- Topical steroids
  - Betamethasone BID for 7 days
  - Recommend taking a 3 week break in between applications
  - Concern for ear canal skin thinning

Contact Dermatitis

- Topical pimecrolimus
  - MOA
    - Inhibit T cell activation
    - Prevent release of inflammatory mediators and cytokines
  - Effective for atopic dermatitis and nonatopic pruritis
  - Low side effect profile: 1% risk of epidermal thinning
  - Less skin penetration

Evidence for Pimecrolimus

- Djalilian et al performed retrospective study
  - 36 patients with pruritis EAC failed topical and system steroids treated with pimecrolimus for 3 months.
  - Control group 19 patients only performed aural toilet only 3 weeks
  - 94% in treatment group compared to 16% in control group had resolution of symptoms
  - No side effects of treatment
  - 2 failed patients
    - Atopic dermatitis
      - Treated with oral doxepin hydrochloride in combination with topical pimecrolimus
      - Only pruritic with high humidity improved with acetic acid drops

Evidence for Pimecrolimus

- FDA recommendations
  - Noted risk of possible cancer associated with high dose prolonged use found in animal studies
  - Use as second line agent short term and intermittent treatment of atopic dermatitis unresponsive to other treatments
  - Avoid in children younger than 2
  - Avoid in immune compromised patients
- European Dermatology Forum
  - No increased carcinogenic risk after comprehensive review of animal studies

Isolated itching of the EAC

- Mostly in middle aged women
- Acar et al performed a prospective case control study of 24 patients undergoing evaluation of contact dermatitis of the EAC and 24 controls
- A single blinded dermatopathologists performed histopathology evaluation of all biopsies
- Biopsy results did not support diagnosis of dermatitis
- Consider other causes—somatization disorder

Lichen planus

- EUA: smooth firm whitis papules and granulation tissue
- Middle age adults
- Caused by T-cell mediated immune response of unknown origin
- May be found in patients that have ulcerative colitis, alopecia areata, vitiligo, dermatomyositis, morphea, lichen sclerosis, myasthenia gravis
- Treatment—topical steroids and/or oral
- Immunosuppressant—tacrolimus
- Surgery

Key Points For EAC Pruritis

- Counsel on avoidance of aggressive ear cleaning
- Counsel regarding avoidance of contact allergens or changing hair products
- Avoid or limit water exposure
- Trail treatment with topical therapy, acetic acid, mineral oil, floxin drops, topical steroid, or topical immunosuppressant
- If concerning lesions are present or no improvement with obvious inflammation present recommend biopsy

Pediatric Chronic Rhinosinusitis

Pediatric Sinonasal Disoders

- Indications for sinus surgery
- Definition of chronic rhinosinusitis (CRS)
- Medical management
- Surgical management
- Conclusions

Indications for surgery in children

- Massive nasal polyposis causing obstruction
- Mucocele or mucopyocele
- Antrachoanal polyp
- Invasive fungal sinusitis
- Complications of acute sinusitis: orbital, intracranial
- **Chronic rhinosinusitis refractory to medical management**
  - A controversial subject

Definition of CRS in Children

- 2 or more symptoms
  - One of the following symptoms
    - Nasal blockage/obstruction/congestion
    - Nasal discharge anterior or posterior nasal drip
  - One of the following symptoms
    - Facial pressure/pain
    - Cough
    - Endoscopic evidence of sinus disease or relevant changes on CT scan
- Symptoms >12 weeks

European Position Paper on Rhinosinusitis and Nasal Polyposis (EPOS 2012)

Medical Management

Medical management

- 1st line optimal medical therapy
  - Topical nasal steroids
  - Saline nasal irrigation
    - Antibiotic nasal irrigation
      - One teaspoon of bactroban ointment in one Neil med bottle
  - Long-term oral antibiotics
    - Duration for “maximum medical therapy” unclear

Medical management

- Consultations
  - Allergist
    - Allergy work up
    - Immune work up
      - Immunodeficiency
      - Non-responders for vaccines
  - Pulmonologist
    - Asthma
    - Cystic Fibrosis
    - Ciliary dyskinesia or dysmotility

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Table 3. Medical Management of Pediatric Chronic Rhinosinusitis (PCRS) Statements Reaching Consensus.

Table 3. Medical Management of Pediatric Chronic Rhinosinusitis (PCRS) Statements Reaching Consensus.

Number	Statement	Mean	Outliers	Quality Improvement Opportunity
9	Twenty consecutive days of antibiotic therapy may produce a superior clinical response in PCRS patients compared to 10 days of antibiotic therapy.	7.44	0	Promoting appropriate care
10	Culture-directed antibiotic therapy may improve outcomes for PCRS patients who have not responded to empiric antibiotic therapy.	8	0	Promoting appropriate care
11	Daily, topical nasal steroids are a beneficial adjunctive medical therapy for PCRS.	7.44	0	Promoting appropriate care
12	Daily, topical nasal saline irrigations are a beneficial adjunctive medical therapy for PCRS.	7.78	0	Promoting appropriate care
13	Empiric treatment for gastroesophageal reflux disease (GERD) is not a beneficial adjunctive medical therapy for PCRS.	7	0	Reducing inappropriate or harmful care

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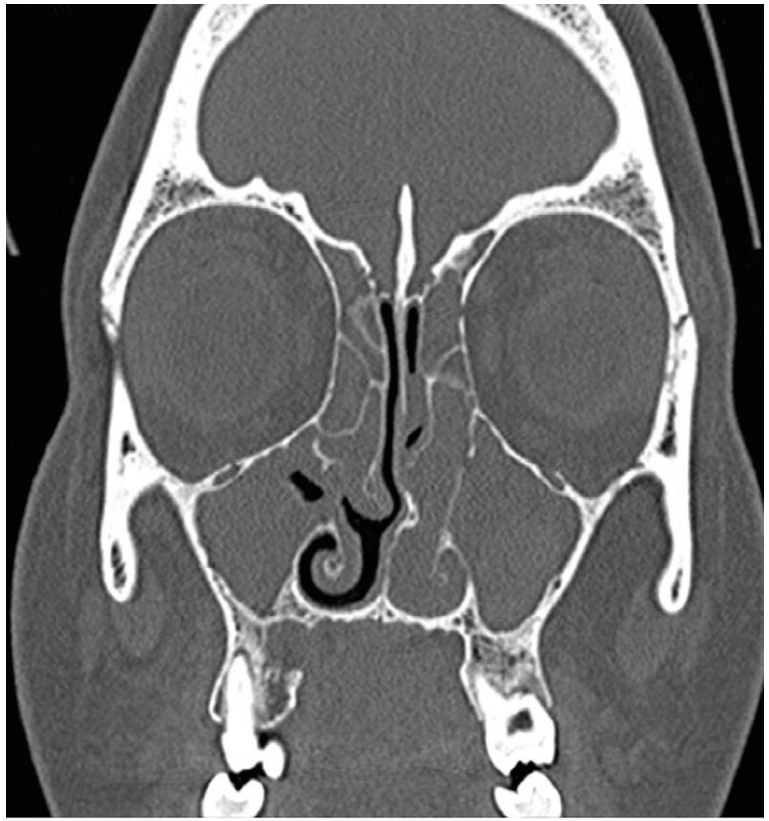
Oral Appliance?

- Case series of 3 Korean children with history of CRS
- Imaging revealed narrow maxillary arches and crowding of mandibular teeth, sinus opacification, mucosal thickening
- Biomimetic oral appliance prescribed for 12-16h per day
  - Late afternoon and during sleep
  - Partly in line with circadian rhythm of tooth eruption
  - Adjusted monthly
- After 10 months reported better sleep and nasal breathing
- Follow up imaging showed fully aerated sinus
- Further research is needed, but may be considered in future management of CRS prior to surgery.

Surgical Management

CT Lund-Mackay Staging System

	0=clear	1=partial occlusion	2=complete occlusion
Left maxillary			
Left OMC		N/A	
Left anterior ethmoid			
Left posterior ethmoid			
Left sphenoid			
Left frontal			
Right maxillary			
Right OMC		N/A	
Right anterior ethmoid			
Right posterior ethmoid			
Right sphenoid			
Right frontal			



*Most available points is 24

Surgical options

- Adenoidectomy only
- Adenoidectomy w/sinus wash + PO/IV antibiotics
- Endoscopic Sinus Surgery (ESS) +/- adenoidectomy

Adenoidectomy

- Size is not a factor
- Biofilms
- Bacterial reservoir

www.drpaulose.com

Adenoidectomy

- Success Rate Varies Widely
  - Takahashi 1989 – 56% success rate (CRS by Sx only)
  - Vandenberg 1997 – (CRS by failed Abx)
    - 58% success based on complete or near-total resolution
    - 80% success if include “at least some long-term improvement”
  - Ramadan 2004 – 52% success rate (CRS by CT and failed Abx)

  - Overall, the “exact” success rate is unclear
    - F/U varies in length and technique
    - Some use PE +/- CT
    - Some only use phone calls

Adenoidectomy

- Adenoidectomy Failures
  - 2007 Ramadan
    - Retrospective review
    - 121 children had adenoidectomy for CRS, 61(50%) failed
      - Failure = continued Sx and CT findings despite medical management
    - Reviewed age, sex, +/-asthma, +/-allergy status, CT score (Lund-Mackay)
    - **Asthma** and **Age ≤6** were the only variables that increased risk of failure
      - These children failed earlier
      - Others variables did not correlate in this study

Adenoidectomy with sinus wash + IV antibiotics

- 1999 Buchman et al (Yellon, Bluestone)
  - CT proven disease, refractory to 1+ months oral Abx
  - 27 patients - sinus wash, culture via inferior meatus, and IV Abx
    - 10 also had adenoidectomy, 6 had prior adenoidectomy
  - 89% resolution while on IV Abx
  - 57% had recurrent RS episode(s) requiring PO Abx after stopping IV Abx
  - Complications: Superficial thrombophlebitis (7%), diarrhea (7%), intravenous catheter guide-wire kink requiring venotomy (4%), and serum sickness-like syndrome (4%)
- 2006 Adappa et al
  - 89% long-term resolution(at least 1 year follow up)

Adenoidectomy with sinus wash + PO antibiotics

- 2007 Ramadan
  - 32 patients - adenoidectomy, sinus wash, and 2 weeks PO Abx
    - 88% success at 12 mo F/U
    - **Asthmatics** and **CT>6** showed statistically improved success in this group
  - 28 patients - adenoidectomy and 2 weeks PO Abx (no wash)
    - 60% success at 12 mo F/U
  - Wash technique
    - 18-g needle bent at 45 through natural os using 30 deg scope
    - 3-5 cc saline flushed

Adenoidectomy with sinus wash + PO antibiotics

- 2008 Criddle
  - 23 children had adenoidectomy with a sinus wash for CRS
  - Two PO Abx were given for a range of 2-10 weeks after surgery (Avg. 5.8)
  - 78% achieved resolution of symptoms without IV Abx
  - 95% achieved resolution when excluding those with immunodeficiencies

Table 4. Adenoidectomy/Adenoiditis Statements Reaching Consensus.

Table 4. Adenoidectomy/Adenoiditis Statements Reaching Consensus.

Number	Statement	Mean	Outliers	Quality Improvement Opportunity
18	Adenoidectomy is an effective first line surgical procedure for children up to 6 years of age with chronic rhinosinusitis (CRS).	8.33	0	Promoting appropriate care
19	Adenoidectomy is an effective first-line surgical procedure for children aged 6 to 12 years with CRS.	7.11	1	Promoting appropriate care
20	Adenoidectomy can have a beneficial effect in patients with pediatric CRS that is independent of endoscopic sinus surgery (ESS).	7.33	1	Educating and empowering clinicians and patients
21	Tonsillectomy (without adenoidectomy) is ineffective treatment for PCRS.	8.56	0	Reducing inappropriate or harmful care

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Endoscopic Sinus Surgery (ESS)

- Widely accepted in adults

- Less enthusiasm for children
  - Concern for growth retardation of face
    - Animal studies showed growth lagged behind non-operated side
    - Human studies no impact over 10 year period
      - Senior et al 2000 and Bothwell et al 2002
      - Bothwell et al no statistically significant difference with or without FESS using quantitative anthropomorphic analysis after 13.2year follow up

Endoscopic Sinus Surgery

- 2004 Ramadan
  - 10 year **non-randomized** prospective study
  - 1850 children referred for surgical opinion
  - Inclusion: Failed Abx, steroids, allergy Tx, and GERD Tx
    - Symptoms for 6 months
  - **202/1850 were surgical candidates (11%)**
  - 19 patients refused surgery or were lost to follow up
  - 183 surgical patients analyzed (10% of all referred)
    - Adenoidectomy only vs ESS only vs ESS/A

TABLE III.
Univariate Analysis of Success of Three Procedures (N = 183).

Variable	ESS/A	ESS	Adenoidectomy
No. of patients	79	40	64
No. (%) needing further surgery	6 (7.6)	5 (12.5)	16 (25)
No. with no improved symptoms	4	5	15
No. (%) with success	69 (87.3)	30 (75)	33 (51.6)

ESS/A = endoscopic sinus surgery with adenoidectomy; ESS = endoscopic sinus surgery alone.

- **Age**
  - **≥6**
    - Surgical success 84%; revision rate 4.3%
    - ESS/A 96% success, better than ESS alone 79% and adenoidectomy alone 67%
    - ESS vs. A not significant
  - **<6**
    - Surgical success 59.5% ; revision rate22.5%
    - No stat difference b/w ESS/A ESS and A
- **Asthma**
  - ESS/A and ESS better than just A

- **Smoke Exposure**
  - 27% exposed to smoke
  - ESS/A and ESS only better results than A only

- **CT results**
  - Lund-Mackay >4 best with ESS/A > ESS only >adenoid only (sig)
  - Lund-MacKay <4 no stat sig difference b/w groups

- **Conclusions**
  - A alone: age <6, no asthma and low CT scores
  - ESS/A: Asthma, >6 with high CT scores after repeated positive scans
  - Smoking poor predictor of surgical outcome

Table 5. Endoscopic Sinus Surgery/Turbinoplasty Statements Reaching Consensus.

Table 5. Endoscopic Sinus Surgery/Turbinoplasty Statements Reaching Consensus.

	Statement	Mean	Outliers	Quality Improvement Opportunity
23	Endoscopic sinus surgery (ESS) is an effective procedure for treating pediatric chronic rhinosinusitis (PCRS) that is best performed after medical therapy, adenoidectomy, or both have failed.	7.89	0	Promoting appropriate care
24	A CT scan of the paranasal sinuses is indicated prior to ESS to assess structure, development, and extent of disease.	8.56	0	Promoting appropriate care
25	Image-guided ESS is useful for revision ESS cases and/or for patients with extensive nasal polyposis that can distort anatomical landmarks.	8.22	1	Promoting appropriate care
26	There is a lack of convincing evidence that ESS causes a clinically significant impairment of facial growth when performed in children with CRS.	7	0	Educating and empowering clinicians and patients
27	Postoperative debridement after ESS for PCRS is not essential for treatment success.	7	1	Reducing inappropriate or harmful care
28	The effectiveness of balloon sinuplasty compared to traditional ESS for PCRS cannot be determined based on current evidence	7.89	0	Reducing inappropriate or harmful care

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Prognostic Factors for Revision ESS

- Retrospective review of 188 children who underwent ESS 2004 to 2017
- 12.8% required revision
- Multivariate logistic regression identified the following as poor prognostic factors
  - Younger age (cut off was 15.68 years)
  - Nasal allergy
  - Higher Lund-Mackay score on pre-op CT
- Surprisingly did not identify asthma or smoke exposure?

Key Points for Pediatric Sinonasal Disorders

- Optimize medical management
- Counsel families regarding smoking cessation
- Allergy and Pulmonology work up
- Adenoidectomy
  - 1st line
  - Addition of PO antibiotics and sinus wash
- Endoscopic Sinus surgery
  - Consider first line in older patients (>6), higher CT scores and asthma

Key Points

Surgical Options

- Adenoidectomy
  - ≤6 years old, no asthma, cough not a major symptom
  - If a CT is done, LM≤2 great candidates, LM<5 good candidates
- Adenoidectomy with Sinus Wash + PO Antibiotics
  - ≤6 years old with asthma and/or CT≥5
- Endoscopic Sinus Surgery with Adenoidectomy
  - >6 years old with asthma and/or CT≥5
- Somewhat Gray Area if CT is 3-4

Questions????