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 systemic 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 whitish 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 Disorders

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

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

<table>
<thead>
<tr>
<th></th>
<th>0=clear</th>
<th>1=partial occlusion</th>
<th>2=complete occlusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left maxillary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left OMC</td>
<td>N/A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left anterior ethmoid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left posterior ethmoid</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Left sphenoid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left frontal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right maxillary</td>
<td></td>
<td></td>
<td></td>
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<td>Right OMC</td>
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*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
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.

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

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

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 rate 22.5%
    • 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>
<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td>7.89</td>
<td>0</td>
<td>Promoting appropriate care</td>
</tr>
<tr>
<td>24  A CT scan of the paranasal sinuses is indicated prior to ESS to assess structure, development, and extent of disease.</td>
<td>8.56</td>
<td>0</td>
<td>Promoting appropriate care</td>
</tr>
<tr>
<td>25  Image-guided ESS is useful for revision ESS cases and/or for patients with extensive nasal polyposis that can distort anatomical landmarks.</td>
<td>8.22</td>
<td>1</td>
<td>Promoting appropriate care</td>
</tr>
<tr>
<td>26  There is a lack of convincing evidence that ESS causes a clinically significant impairment of facial growth when performed in children with CRS.</td>
<td>7</td>
<td>0</td>
<td>Educating and empowering clinicians and patients</td>
</tr>
<tr>
<td>27  Postoperative debridement after ESS for PCRS is not essential for treatment success.</td>
<td>7</td>
<td>1</td>
<td>Reducing inappropriate or harmful care</td>
</tr>
<tr>
<td>28  The effectiveness of balloon sinuplasty compared to traditional ESS for PCRS cannot be determined based on current evidence</td>
<td>7.89</td>
<td>0</td>
<td>Reducing inappropriate or harmful care</td>
</tr>
</tbody>
</table>
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????