Children with Multiple Allergic Conditions (MAC)

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• Multiple Allergic Conditions
• Not uncommon in practice to see children with multiple allergic conditions: Asthma, Allergic Rhinitis, Allergic conjunctivitis and Eczema or Food Allergy
• Also termed “Multiple Allergic Comorbidities”
Children with “Multiple” Allergic Conditions (MAC)

• What is meant by “Multiple” Allergic Conditions?
• 2 or more allergic conditions in same child?
• Unified airway: most children with asthma also have allergic rhinitis
• “Multiple” – 3 or more Allergic Conditions in same child
Children with Multiple Allergic Conditions (MAC)

**ICD10 Coding**

- One child may have multiple ICD10 codes:
  - J45.0
  - J30.3
  - L20.9
  - Z91.010
  - Z91.012
  - H10.1
Prevalence of individual Allergic Diseases in Korean Children
ISAAC Study 2010: 31,200 children

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>Atopic Dermatitis</th>
<th>Asthma</th>
<th>Allergic Rhinitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>19.3 %</td>
<td>16.5 %</td>
<td>28.5 %</td>
</tr>
<tr>
<td>4-6</td>
<td>19.7 %</td>
<td>9.8 %</td>
<td>38.0 %</td>
</tr>
<tr>
<td>7-9</td>
<td>16.7 %</td>
<td>6.5 %</td>
<td>38.5 %</td>
</tr>
<tr>
<td>10-13</td>
<td>14.5 %</td>
<td>5.4 %</td>
<td>35.9 %</td>
</tr>
</tbody>
</table>

Hong S et al. Environ Health Toxicol; 2012: 27
MAC Prevalence: Korean Children

- Both atopic dermatitis and asthma: 2.5%
- Both asthma and allergic rhinitis: 4.7%
- Both atopic dermatitis and allergic rhinitis: 8.7%

Prevalence of co-morbid conditions decreased with age.
Hong S et al. Environ Health Toxicol; 2012: 27
Patient CF

- DOB: 31/01/2003
- Lives on farm in Caledon district
- Atopic Eczema since infancy
- Asthma since age of 2 years
- Allergic Rhinitis since age of 2 years
- Allergic Conjunctivitis since age of 5 years
- Chronic Urticaria since age of 11 years
- Allergy to shellfish (recent)
Patient CF (cont)

- Strong family history of allergies
- Father has allergic rhinitis and asthma
- Mother has allergic rhinitis and eczema
- Highly allergic to grass cuttings
- Eye, nose and skin symptoms worsen with grass contact
- Angioedema and urticaria recently on eating shellfish
- Cat and Dog at home
Patient CF (cont)

• Disturbed sleep
• Skin very itchy especially at night
• Itchy blocked nose
• Itchy eyes
• Night cough frequent
• Attends school regularly
• Concentration affected
• Likes sport, but allergies interfere with activities
Current treatment

- Seretide MDI 25/125 twice daily
- Topraz 10mg at night
- Deselex 5mg at night
- Avamys Nasal Spray twice daily
- Rupanase 10 mg twice daily
- Advantan ointment - frequent use
Examination

- Pleasant with positive attitude
- Height and weight on 25\(^{th}\) percentile (Tall Parents)
- ‘Allergic Features’
- Mouth breathing, dry lips
- ENT Severe Allergic Rhinitis
- Oral candida
- RS Chest hyperinflated with marked expiratory wheeze
- Skin Flexural eczema and generalised chronic urticarial rash
- Allergic conjunctivitis
Investigations

- Total IgE 2433 (1-85)
- Phadiotop: Positive
- Food screen: Negative
- Skin Prick Tests: (Reactions blunted despite being off antihistamines for 4 days)
  - Histamine 2/3
  - Blomia tropicalis 5/10
  - Cat 4/6
  - D. pteronissinus 4/5
  - Dog 4/5 Grass mix 2/3
  - Foods negative
- Ice block and warm water tests: Negative
- Running water test: Complained about ‘tight chest’
- PEFR: Predicted 360 Pre 200 Post 270
Diagnosis

- Multiple Allergic Conditions (MAC)
- Moderate Persistent Asthma
- Persistent Allergic Rhinitis
- Atopic Eczema
- Allergic conjunctivitis
- Chronic Urticaria
- Shellfish allergy
Management

- Environmental control measures for his bedroom: mites, cat and dog
- Avoid cutting grass
- Avoid shellfish (Investigations and treatment to follow)
- Foxair MDI 25/125 2 puffs twice daily - technique corrected and oral thrush treated
- Avamys Nasal Spray twice daily
- Rupanase 10mg twice daily
- Ventolin MDI PRN
- Patanol eye Drops twice daily
- Epimix as skin moisturiser
- Advantan ointment when required
MAC in Children

- Allergic March conditions may persist with new allergic conditions developing as child gets older
- Surprisingly little information in literature
- Practice experience-not uncommon
- May be more common on Highveld and with children living in maize farming areas
- Severe eczema associated with multiple comorbid allergic conditions in UK children (Silverberg, 2013)
MAC – Co-existence of asthma, eczema, food allergy, allergic rhinitis and anaphylaxis

Age-sex standardised incidence of MAC was 4.72 per 1000 patients in 2001

Increased to 6.28 per 1000 patients in 2005 (32.9% increase)

Conclusion: Recorded incidence and lifetime prevalence of MAC has increased substantially in recent years in England

MAC and Isle of Wight Birth Cohort Study

- Co-existence of allergic disorders is common
- Approximately 2% of population report co-existence of eczema, asthma and allergic rhinitis during first 18 years of life
- Combined effect of allergic sensitization and FLG variants increased the risk of having eczema and asthma
- Increased proportion of allergic co-morbidities associated with allergic sensitization and FLG variants emphasise their joint importance in allergic disease.

Ziyab AH et al. Clin Exp Allergy 2014, 44; 1170
MAC Burden in Children

- Quality of Life
- Self esteem
- Growth
- Sleep
- School
- Exercise
- Psychological effects
- Diet
- Medication
- Doctor visits
Comorbidity burden of the treated asthma patient population in British Columbia

- 12.6% of children with asthma and allergic co-morbidity burden were clinically depressed

Prosser R. Chron Dis Can 2010; 30: 46-55
Treatment of MAC in Children

• No ‘magic bullet’
• No treatment protocols for MAC
• Multiple medications needed
• Difficulty with adherence to medication use
• Side effects
• Expense
• Regular supply
• Medical Aids and Chronic medications
• State hospitals and clinics
Steroid Burden in children with MAC

- Inhaled steroids for asthma
- Intranasal steroids for rhinitis
- Topical steroids for eczema
- Ocular steroids at times
- Short courses of oral corticosteroids may be required
MAC and Steroid Burden

- Two-thirds of asthmatic children treated on ICS showed some degree of HPA dysfunction
- Some children developed HPA suppression after short period on low dose ICS
- Genetic variants may predispose some asthmatic children on ICS to HPA suppression
- Some children can tolerate high doses of ICS without developing HPA suppression

Future Research

• Epidemiology
• Management
• MAC Burden
• Environment and MAC
• Genetic studies
• Gut microbiome
• Socio-economic aspects
MAC in Children: Summary

- Not uncommon
- A major health and treatment issue for many allergic children
- Prevalence of MAC relatively high in children
- Prevalence of MAC may decrease with age