Update on Clinical Aspects of Anaphylaxis

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Case 1.0
• 7 year old girl with known peanut allergy
• Past history of anaphylaxis to peanut
• Carries an adrenaline autoinjector
• Has asthma on regular ICS and requires salbutamol approx once or twice every couple of months
• Currently has an URTI
• Has needed salbutamol bd last few days

Case 1.1
• At school; given a plain milk chocolate by a friend in a sealed wrapper
• Opens and eats the chocolate
• 45 minutes later develops a cough and watery eyes (playing on the grass oval)
• School gives salbutamol and calls mother who arrives and gives antihistamine

Case 1.2
• Mother takes her to Paediatric Emergency
• At triage noted to have a soft wheeze and O2 sats 98% in room air, RR 20, No tug/recession
• Nurse comments that "this is mild asthma not allergy because there is no rash or swelling"
• Waits 30 minutes for a doctor with ongoing cough and wheeze
• Mother asks if child should have adrenaline and is told no
• Doctor sees her and treats with salbutamol and steroids
• Symptoms resolve slowly over 24 hours

Case 1 Questions
• What is the diagnosis?
  • Asthma?
  • Anaphylaxis?
• What do you think was the most likely trigger for these symptoms?
• Do you agree/disagree with any advice or other aspects of management?

Case 2.0
• 9 year old boy
• No known history of any allergic disease
• Gets ‘croup’ about once a year – not requiring meds
• Eats tuna and avo sushi
  • 1 hour later
  • Sudden onset of cough and difficulty breathing
  • Mother observes him closely at home
  • Not given any treatment and recovers spontaneously over several hours
• Since then has eaten the same sushi meal without symptoms
Case 2.1
• What is the diagnosis?
• Which allergens, if any, should be tested?
• Does this child require an adrenaline autoinjector?
• Is any dietary avoidance required?

Case 2.2
• Could the sushi have been contaminated with an allergen?
  • But what?
  • Child has had an unrestricted diet for 9 years
  • Or has he??
  • Never tried shellfish
  • Family doesn't eat shellfish
  • SPT: Prawn 6x5 mm; Crab 7x6 mm

Case 2.3
• What is the diagnosis?
• Does this child require an adrenaline autoinjector?
• Is any dietary avoidance required?

DEFINITION OF ANAPHYLAXIS

• “a serious allergic reaction that is rapid in onset and may cause death”

• Anaphylaxis is a rapidly evolving, generalised, multi-system reaction characterized by involvement of the respiratory and / or cardiovascular system and at least 1 other system such as the skin or gastrointestinal tract.

  • Australasian Society of Clinical Immunologists and Allergists (ASCIA)
    • www.allergy.org.au
Sensitivity 97%
Specificity 82%

In ED:
NPV 98%
PPV 67%

**Take home messages 1**

- Anaphylaxis is on a continuum with mild / moderate allergic reactions
- Involves histamine (mediator) release from IgE dependent or independent mechanisms
- There are no “non-anaphylactic” histamine mediated reactions. There are just reactions that stop.....
- The diagnosis is Allergy not Anaphylaxis

**EPIDEMIOLOGY OF ANAPHYLAXIS**

- ~3 fold increase in rate over 10 years
  - JACI. 2007
  - Mullins et al. JACI 2015; 136(2):367

- Hospital anaphylaxis admission rates per 100,000 population:
  - 1998/99 = 6.3
  - 2004/05 = 10.6
  - 2005/06 = 12.2
  - 2011/12 = 15.7
  - 2013/14 = 18.8

- Rate of increase accelerating over time (average 0.59/100,000/yr in 1998/99 to 1.11/100,000/yr in 2011/12)
- Increase of 8% per year from 1997 to 2013
- Rate of anaphylaxis admissions increasing as a proportion of total hospital admissions i.e. not a product of increasing population

**FATAL REACTIONS**

Mallins et al. JACI 2015: 136/207
Mallins et al. CEA 2015: 11/27

Trends in hospitalizations for anaphylaxis, angioedema, and urticaria in Australia, 1993-1994 to 2004-2005

Anaphylaxis fatalities and admissions in Australia

112 fatalities over 9 years

Admissions ↑ but fatalities static

Due to improved management

Absolute Numbers

Rate

Food 6%
Drug 20%
Probable Drug 38%
Insect Sting 18%
Undetermined 13%
Other 5%

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Take home messages 2

- Anaphylaxis rates increasing over time
- Hospital admissions
- Fatalities
- Triggers for fatal anaphylaxis vary by age
- Children / Adolescents = food
- Adults = stings
- Elderly = medication

Impact on quality of life

CLINICAL FEATURES

"I'm just saying—let's not do anything foolish!"
Evaluation of a Patient with a History of Anaphylaxis

- History
  - Signs and Symptoms of the event – ? c/w usual manifestations of anaphylaxis
  - Potential causes
    - Food; Sting; Drug; Exercise; Exposure
  - Duration of the episode(s)
  - Treatment required
  - Atopic status of the patient

Symptoms of Anaphylaxis

- Cutaneous (60 - 100%)
  - Urticaria (often explosive and rapidly progressive), angioedema, erythema, itch
- Upper respiratory (78%)
  - Nasal congestion, tongue swelling, hoarseness, stridor
- Lower respiratory (46 - 58%)
  - Cough, dyspnoea, wheeze, cyanosis
- GI Symptoms (4 - 37%)
  - Nausea, Vomiting, Diarrhoea
- Cardiovascular (25 - 30%)
  - Tachycardia, Anysthymia, Hypotension
- Neurological (5 - 27%)
  - Anxiety, ‘Feeling of impending doom’

Must you have hives?

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<thead>
<tr>
<th>Absorbed Allergen</th>
<th>Reaction Threshold</th>
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<td>TIME</td>
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Augmenting / Co-Factors

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Take home message 3

- In order to get urticaria or angioedema you must
  - Be alive
  - Have a near normal blood pressure
  - Have a normal circulation
  - Not have vasoconstriction
- In severe anaphylaxis with circulatory compromise skin symptoms are often absent
- Beware of co-factors

Predicting the Risk of Anaphylaxis
Anaphylaxis Risk: History

- Anaphylaxis is associated with previous anaphylaxis
- But anaphylaxis also frequently occurs after previous less severe reactions
  

Anaphylaxis Risk: Clinical Predictors

- Asthma
  - Poor control increased risk
- Adolescents
- Nut allergy
- Mastocytosis
- Biochemical: Basal serum tryptase; PAF

Anaphylaxis Risk: Threshold Dose (Food)

- Anaphylaxis is associated lower threshold doses

Anaphylaxis Fatality Risk: Drugs

- Risk Factors: Drug
  - Antibiotics 35%
  - Penicillin 45%
  - Cephalosporins 40%
  - General Anaesthetic 35%
  - Muscle relaxants 72%
  - X-Ray Contrast 14%
- Risk Factors: Patient
  - Older Adults (Median age ~65 yrs)
  - Majority of deaths in a medical facility
  - Communication issues:
    - Unable to communicate all language or dementia or alert bracelet ignored
  - Co-morbid disease common
  - 40% asthma/emphysema
  - 74% CVS disease

Patterns of Reactions

Anaphylaxis Fatality Risk: Insect Sting

- Risk Factors: Insect
  - Honeybee 72%
  - Ant 9%
  - Tick 9%
  - Wasp 6%
- Risk Factors: Patient
  - Male 90%
  - Adults (Median age 50 yrs)
- Risk Factors: Location
  - Death often occurs at home or in rural location
  - May represent delayed presentation and treatment
- Risk Factors: Activity
  - Tending or disturbing hives; driving
- Risk Factors: Management
  - Manual attempts at tick removal (3 tick deaths in Aus series)
  - Sudden CVS collapse after assuming upright posture
  - Adrenaline autoinjector not prescribed or used when prescribed
  - No previous immunotherapy in nearly all cases
Anaphylaxis Fatality Risk: Food

- **Risk Factors: Patient**
  - Young adults and children (median age 28 yrs)
  - Asthma in majority. Often poorly controlled or compliant
  - Previous reactions often mild
  - Lapses in vigilance due to disrupted routine (unaware of allergen in food)
  - Low rate of allergy specialist reviews prior to death
  - Ethanol or recreational drugs
  - Most have known food allergy / History of mild reactions

- **Risk Factors: Trigger**
  - Peanut / Australia
  - Peanut/Tree nuts – Australia / USA / UK
  - Cow’s Milk – UK / Israel

- **Risk Factors: Source**
  - Eating outside the home and school, preschool, work, restaurants

- **Risk Factors: Management**
  - Sudden CVS collapse in patients assuming upright posture (e.g. to sit in a car)
  - Delayed treatment with adrenaline
  - Autoinjector not prescribed or used
  - Adrenaline not given in ambulance

Take home messages 4

- Milder reactions often precede anaphylaxis
- Asthma control important
- Incl not overusing LABA’s
- Threshold dose is important
- Co-morbidity assoc with fatalities in drug anaphylaxis
- Upright posture and delayed adrenaline assoc with fatalities in food and venom

MANAGEMENT

Management of Acute Anaphylaxis

- **ABC**
- Adrenaline
  - 1st line treatment
  - Dose 1:1000 0.01 ml / kg; IMI; q5min
  - IMI anterolateral thigh > IMI or SC deltoid
  - Absorption better & plasma levels higher in healthy adults
  - Infusion (IV bolus NOT recommended)
  - Reserved for arrest or profound hypotension despite repeated IMI adrenaline

Adrenaline Autoinjectors
**Autoinjector Prescribing**

- All patients entitled to 2 autoinjector devices regardless of age
- Dose
  - EpiPen Jr (150ug) for 10 - 20 kg
  - EpiPen (300 ug) for > 20 kg
- Dose calculation = 10 ug/kg adrenaline
- ASCIA Prescribing Guidelines
- Different to product information (> 30 kg)
- Additional authority prescription if used or expired
- Over the counter

**ASCIA Anaphylaxis Action Plans**

- 2017 Changes
  - Bold symptoms of anaphylaxis
  - Guidance re positioning of the patient
  - Change to hold time for EpiPen
  - Guidance for asthma versus anaphylaxis
- 2018 Changes
  - Tick boxes for tick allergy
  - Action plan due for review date
  - EpiPen dose guide lower left corner
  - Action if adrenaline accidentally injected lower right

**Take home messages 5**

- Adrenaline is first line treatment for anaphylaxis
- Should be administered IMI
- 300mcg autoinjector for all humans over 20kg
- Autoinjector should be carried at all times
- All patients must be provided with an ASCIA action plan and be trained in autoinjector use
  - Brand Specific
  - Management guidelines available online

**THANK YOU**

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