Cases from the Pediatric ED

"Things are not always what they seem"

Robert Porter MD

Case 1 Sept 09

- 2 ½ year old girl
- Presented 3 am with SOB x 3 hours
- History of RAD & multiple food allergies
  - Eggs, milk, peanuts all 4+
- No admissions or ED visits
- Flovent & Ventolin (Flovent increased to 2 puffs bid 2 days prior)
- Took ventolin puffer at home

On exam

- Alert
- T 36.3 HR 177 RR 36 BP 96/52 O2Sat 94%
- Decreased A/E
- Subcostal & intercostal indrawing, tracheal tug
- Inspiratory & expiratory wheeze

Treatment

- Treatment
  - 0305 Ventolin 0.4 ml + Atrovent 0.4 ml
  - 0335 Ventolin 0.4 ml + Atrovent 0.4 ml
  - 0405 Pediapred 15 mg
  - 0415 Ventolin 0.4 ml
  - 0515 Ventolin 0.4 ml
  - 0610 Ventolin 0.4 ml
  - 0715 Ventolin 0.4 ml

- Sats 92% - 96%

‘a turn for the worse’

- 0845 – awakened from sleep and shortly after developed increased respiratory distress
- 0845 Ventolin 0.4 ml
- “Can I give another mask ... like ... now?”
- 0900 Ventolin 0.4 ml
- No apparent effect from second mask

- I saw patient

Hmmm?

- Child able to speak
- “I want my puffer”
- Anxious, respiratory distress including head bobbing, flushed

- What’s going on here?
- What should you do?

- Cap gas, IV and portable CXR ordered
- Capillary blood gas
  - pH 7.243
  - pCO_2 53.3
  - TCO_2 23.9
  - Base Excess -5.1

- Chest Xray (portable)
  - Peribronchial cuffing
  - Mild hyperinflation
  - Minor areas of mucus plugging
  - “consistent with reactive airways disease”

What next?

- Epinephrine 0.15 ml of 1:1000 IM
- Within minutes child settled and distress resolved
- Admitted to floor

Final diagnoses

- Exacerbation of RAD
- Anaphylactic reaction

Case 2 - 11 am Sunday morning

- 16 y/o male arrived by ambulance
- Found on floor by bed ~ 10:30 by mother, unconscious, blood coming from nose
- Profoundly cyanotic according to paramedics
- Given 5 mg salbutamol neb en route and PPV – said to have improved significantly

Other History

- Visiting from another province
- Up watching TV with grandmother from 1 am to 3 am
- Asthmatic – left puffers at home
- No meds
- Environmental allergies only

On arrival

- Immobilized in C-collar
- Bagged with 100% oxygen – sats high 80’s
- Blood coming nostrils
- T 36 ax; BP 80/50; RR 8/min
- Chest – equal but decreased A/E, + crackles
- Pupils small - Reactive
- “Difficult to bag”

Treatment

- Ventolin 1ml & Atrovent 1 ml nebulized
  - No improvement
- Differential diagnosis?
- Next step?

Treatment

- RSI with propofol/succinylcholine (lots of fresh blood suctioned from oropharynx)
- Gush of blood up tube and high pressures required to ventilate – “2 hands on the bag”
- Epinephrine 0.5 mg IM
- Narcan 2 mg – patient woke up and tried to pull tube out
- Given more propofol

Chest X-ray – 1116h

- Bilateral infiltrates upper lung zones (right upper and middle lobes and less marked LUL involvement). Most likely aspiration pneumonia. Cardiac size and pulmonary vascularity normal.

- Admitted for 18 days – ‘stormy course’
- Eventually got better
- Morphine level 0.65 mg/L (Lethal doses reported at 0.07 mg/L)
- Grandma’s MSContin 200 mg x 15 missing
- Final diagnosis – opiate overdose with pulmonary hemorrhage

Case 3 – Sept 07

- 9m 11d old male
- c/o trouble breathing, listlessness
- Saw GP day prior diagnosed with croup

- On exam
  - Very pale
  - Skin cool
  - ++ indrawn
  - Very poor air entry
  - O2 sat ?
  - HR ~ 140

- Physiologic state?

Pediatric Assessment Triangle

- Initial treatment
  - Bagged with 100% O2
    - Sat increases to 100%
  - IV/IO access

- Initial drugs
  - Epinephrine 0.16 mg of 1:1000 s/c
  - Dexamethasone 6 mg IM
- Other drugs given
  - Nebulized epinephrine
  - Dexamethasone IV
  - Heliox

- Blood gas
  - pH 7.138
  - pCO2 66.2
  - TCO2 23.5
  - Base Excess -8.1

- Patient arrived ER 1337
- Transferred to OR 1440

- Bronchoscopy
  - Findings?
  - Mild subglottic edema only

- Final Diagnosis
  - Viral croup
- 2 Days in PICU

Case 4 March 2010

- 17 year old male
- Pain right neck + anterior chest x 6 months
- Neck “cracks” with movement
- Pain with chewing/swallowing
- Feels SOB at times
- Worse x 2 days
- Seen by FD day prior – BW & CXR ordered which were reportedly normal
- Healthy otherwise; no meds; no allergies; non-smoker
- No hx trauma; cough; vomiting 1-2 x am of presentation

On exam

- Sat 99% RA; T 36.6 oral; RR 20; HR 70; BP 132/73 Wt 89.3 kg
- Resp/ CV/ GI/ Neuro exams normal
- Neck – no thyromegaly; subcutaneous emphysema palpable bilaterally in supraclavicular regions

Course

- CT showed extensive subcutaneous emphysema involving mediastinum, right axilla, right lateral neck to mandibular condyle
- Multiple nodules in RML (fissural LN, infectious, vasculitis, autoimmune)
- No bullae, blebs, pneumothorax

Course

- Admitted x 2 days
- CXR 1 April 2010; sc emphysema almost resolved; otherwise normal
- Decision was made not to scope
- Referred to genetics/cardiology/ophthalmolgy as OP (r/o Marfans)

Final diagnosis

- Spontaneous pneumomediastinum
  - No cause identified

Spontaneous pneumomediastinum

- To be distinguished from secondary pneumomediastinum
  - Trauma
  - Interventions in esophagus or tracheobronchial tree
  - Ruptured hollow viscus
  - Pneumothorax
  - Mediastinal infections

Spontaneous pneumomediastinum

- Most common presenting complaints
  - Chest pain (54%)
  - SOB (39%)
  - Subcutaneous emphysema (32%)
- Most common causes
  - Emesis (36%)
  - Asthma flare-up (21%)
  - No cause identified (21%)
- CXR diagnostic in 69%
  - CT required in 31%

- From a series of patients > 12 years of age (Caceres et al, *Ann Thorac Surg* 2008)

Case 5 – winter 2010

- 21 day old term female
- Visited ER with cough/nasal congestion
- Looked well. Afebrile
- Nasal congestion
- Wet cough
- Chest clear; good AE; O2sat 97%
- Dx: URTI Rx: nil

4 days later

- Seen by FD
- Continued cough/nasal congestion + fever; started on Amoxil
- Presented to ED
  - vigorous; flushed
  - Exp wheeze; AE decreased
  - +++ retractions
  - No cardiac murmur
  - RR 66; T 38 (T); HR 178; BP 88
  - O2sat 87% RA

- Initial treatment
  - 100 % O2 (sat increased from 84% to 94%)
  - IV NS 20 cc/kg
  - What next to do?

  - Nasal suctioning
  - Salbutamol 0.15 ml nebulized (x2)

Cap gas

- pH 7.203
- pCO_2 91
- HCO_3 34

- Baby settled in ED
- Repeat gas improved

- Given IV antibiotics & transferred to PICU

- RSV positive

Bronchiolitis

- High risk (strongly consider admission)
  - Very young
  - Premature
  - Co-morbidities
- Can present as Apparent Life-Threatening Event (ALTE)

Treatments

- Hydration
  - po/iv
- Oxygen
- Nasal suctioning
- Other
  - Bronchodilators
    - Epinephrine/salbutamol ???
  - Corticosteroids ???
  - Hypertonic saline ???
  - Oxymetolazone ???

Epinephrine

- *There is some evidence that epinephrine may be more effective than salbutamol and placebo for bronchiolitis in outpatients. There is no evidence to support its use in inpatients.*

  - Plain language summary of Cochrane Review of epinephrine in bronchiolitis 2004

Corticosteroids

- “Available evidence suggests that corticosteroid therapy is not of benefit in this patient group”
  - Cochrane Review of glucocorticoids for acute viral bronchiolitis in infants and children 2004

Bronchodilators – AAP CGP 2006

- *Bronchodilators should not be used routinely in the management of bronchiolitis.*

- *A carefully monitored trial of α-adrenergic or β-adrenergic medication is an option. Inhaled bronchodilators should be continued only if there is a documented positive clinical response to the trial using an objective means of evaluation.*

A Randomized Trial of Nebulized 3% Hypertonic Saline With Epinephrine in the Treatment of Acute Bronchiolitis in the Emergency Department

Simran Grewal, MD; Samina Ali, MD; Don W. McConnell, MD; Ben Vandermeer, MSc; Terry P. Klassen, MSc, MD

Arch Pediatr Adolesc Med. 2009;163(11):1007-1012

- RCT: epinephrine in 3% saline vs. epinephrine in 0.9% saline
- Primary outcome: change in respiratory distress score
- Results: no difference

Epinephrine and Dexamethasone in Children with Bronchiolitis

Plint et al.

N Engl J Med 2009;360:2079-89.

- ED based multicentre RCT
- 800 infants
- 6 week – 12 months
- 4 groups
  - Nebulized epi + oral dexamethasone
  - Nebulized epi + oral placebo
  - Nebulized placebo + dexamethasone
  - Nebulized placebo + oral placebo

- Dosages
  - Nebulized epinephrine
    - 3 ml of 1:1000 epinephrine
  - Dexamethasone
    - 1 mg/kg in ED followed by 0.6 mg/kg x 5 days
- Primary outcome: hospital admission within 7 days

Results

- Only infants in epi/dex group were significantly less likely to be admitted (RR 0.65; 95% CI 0.45 – 0.95) p=0.02

- When adjusted for multiple comparisons this fell below the level of significance (p=0.07)

A RANDOMIZED, DOUBLE-BLIND STUDY EXAMINING THE COMPARATIVE EFFICACIES AND SAFETY OF INHALED EPINEPHRINE AND NASAL DECONGESTANT IN HOSPITALIZED INFANTS WITH ACUTE BRONCHIOLITIS

Livini et al

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QUESTIONS?