A Case of Throat Distemper

DR LIONEL NYAMURENJE
REGISTRAR PAEDIATRIC INFECTIOUS DISEASE
UKZN
6/11/15
A.N

- 9yr old female
- Referred from Regional Hospital
- Presenting Complaint:
  - 3/7 htx of fever, neck swelling + drooling, difficulty swallowing
  - Received 2/7 Solpen @ base
  - Throat swab had been done at PSH
  - Immunisation history unknown
  - Mum had demised. Granny primary caregiver with other siblings.
Clinical Examination

- III looking child, drooling with neck swelling tender and in pain
- Stable vitals good perfusion
- Chest Clear
- CNS alert normal cranial Nerves rest of system unremarkable
- CVS S1 S2 heard no gallop nil murmur 110bpm
- Abdomen NAD
Admitted via ENT on 26-04-2015

Surgical Management:

- EUA done in OT - Day 1
  - Creamy – grey pseudomembrane covering L soft palate and L pharyngeal wall, extending down L supraglottis with ass L supraglottic oedema). Membrane bleeds on peeling.

- Biopsy taken and patient intubated
Pseudomembrane

Images on intubation

Images Courtesy of Dr S Singh
Laboratory

- FBC WCC 10.4 HB 11 platelets 280
- Na 138 K 4.5 normal urea and creat
- Rest of electrolytes negative
- ASOT neg
Complications

- Myocarditis
  - PSM @ apex, bradycardia.
  - CK MB 22.8  Trop I 751  BNP 1887
  - T wave inversion and prolonged QT interval
  - Echo : Mild LV dilatation and dysfunction + FS 35%
ECG Changes in Myocarditis
Complications

- Neurological:
  - Bulbar palsy
    - Drooling++++

- Pt discharged to High Care on Day 18.
9 year old presented with fever and drooling who on clinical examination had neck swelling, grey pseudomembrane on soft palate extending to pharyngeal wall complicated by myocarditis and cranial nerve palsies ten days later.
THOTS
PICU Care

- C. Diphtheria confirmed on Day 4 of admission
- 6/7 Amphotericin B – Candida on B/C
- 2/52 Solpen
- IPPV 6/7, Tpiece 3/7
- Antitoxin given day 13 of admission
- Base Hospital contacted: Case worker – contact and management of family contacts
History

- Epidemics of throat distemper not described until the 16th century
- Major epidemic occurred in New England in the early 1700s killing up to one third of all children
- Clinician-pathologist Pierre Bretonneau first described its unique clinical characteristics in 1821 after an epidemic in Southern France
- 1883 Klebs described chaining cocci and bacilli in microscopic sections of diphtheritic membranes-Loeffler then isolated the bacillus in pure culture
- 1923 Ramon found that exposure of toxin to formalin rendered it non toxic but able to reduce an Ab response
- Widespread immunisation led to dramatic decrease in incidence in Diphtheria from 200000 cases in 1921 to 0 to 2 cases since year 2000
DIPHTHERIA

- Caused by Corynebacterium Diphtheria-non-motile, uncapsulated gram positive bacillus
- Localised infection with systemic toxaemia
- Respiratory (toxin producing strain C. diphtheria); Cutaneous
- Bull neck, cervical lymphadenopathy, pseudomembrane = typical features
- Airway compromise => fatal
Pathogenesis - Pseudomembrane

C. Diphtheria

Inflammation

Exotoxin

- Interferes with cellular protein synthesis
- Tissue necrosis

Pseudomembrane

- Accumulation of inflammatory cells
- Necrotic epithelial cell and organism debris
Pathogenesis - Exotoxin

1. Diphtheria toxin’s receptor-binding domain (B) binds host membrane.

2. Membrane-bound toxin (A + B) enters by endocytosis.

3. Catalytic subunit A is cleaved but held to the B subunit by disulfide bonds. Endosome vesicle acidifies; the disulfide bonds are reduced.

4. The transmembrane domain facilitates passage of the catalytic A peptide through the vesicle membrane.

5. The catalytic A domain ADP-ribosylates elongation factor 2 (EF2). This halts protein synthesis and kills the cell.
Case Definitions

- Classic Respiratory Diptheria-upper respiratory tract illness-sore throat, low grade fever and an adherent membrane of the tonsillar pharynx AND

- EITHER

- Laboratory confirmation of toxigenic strain-isolation of diphteria toxin producing corynebacterium OR

- Epidemiological link to a laboratory confirmed case with toxigenic strain OR

- Laboratory confirmation of a toxigenic strain with other presentations of diphteria-mild resp symptoms but no membrane
Management of confirmed cases

- Isolation until two cultures taken 24 hours apart from nasopharynx and throat are negative
- Airway management
- Anti-toxin treatment – confirmed or probable cases in a hospital setting
- Antibiotic treatment – to eliminate organism and prevent spread; penicillin and macrolides for 14 days based on local susceptibility. Confirm elimination by repeat throat swab
- Immunisation – confirmed or probable cases should receive a booster dose of diphtheria – toxoid containing vaccine – no booster if last dose given last 12 months
- Management of complications
Antitoxin

- Produced from horse serum
- Used only for treatment of toxic strain of diphtheria
- Not readily available in South Africa
- Had to be outsourced from India and Japan
Antitoxin

Hyperimmune antiserum that inactivates diphtheria toxin.

Neutralises unbound toxin

Needs to be administered as soon as possible

Test dose to be given first – for sensitivity
Airway Management


- Indications for intubation:
  - Laryngeal diphtheria
  - Respiratory failure: gradual, aggravated by exam
  - Risk of dislodging membrane >>>>>tracheostomy
Airway Management in OT

- Gas induction: Sevoflurane
- Pt allowed to breathe spontaneously
- Gas inhalation until able to tolerate laryngoscope
- Visualisation of airway
  - Intubate, usually awake
  - Difficult airway >>>>>tracheostomy
Complications

Myocarditis
- Bulbar symptoms
- Paralysis of proximal and distal skeletal muscles incl diaphragmatic paralysis

Cardiac
- 1 – 2 weeks

Neurological
- 4 – 12 weeks

Others
- Renal, Otitis media, Resp insufficiency
ICU Monitoring of Complications

**CARDIAC**
- Bradycardia
- Trop I
- CK MB
- AST
- Prolonged PR interval
- Cardiac arrhythmias
- Heart block

**NEURO**
- Strabismus
- Blurred vision
- Paralysis
- Decr tendon reflexes

**RENAL**
- Proteinuria
- Renal failure
Prophylaxis for HCW

- **Isolate** patient with suspected C. Diphtheria/confirmed for 14 days or until 2 negative cultures 24hrs apart

- **Prophylaxis**: Close contacts, HCW
  - Those exposed to oral or respiratory secretions of patient
HCW Prophylaxis

- All Nurses, Doctors, Physiotherapists, Clinical Techs
- Azithomycin 500mg daily X 3/7
  Protection for 10 days after initial exposure
- Provided by IALCH
- All staff received booster dose of Tetanus diphtheria (Td) / Tetanus diphtheria acellular Pertussis (Tdap) unless had received dose in previous 12mnths
Conclusion

- Need to be suspicious of diphtheria with symptoms of neck swelling, difficulty swallowing etc.
- Management in resp diphtheria is multidisciplinary approach involving ENT, critical care and anaesthetics.
- Antitoxin must be administered asap to avoid serious complications.
- Some complications are long term and can be fatal, important to follow up patients appropriately.
- Immunisation important preventative measure and prophylaxis equally vital in presence of active disease.
2015 Guidelines Public Health Control and Management of Diptheria in England and Wales

Corynebacterium Diptheriae Rob Roy MacGregor