Enterovirus and parechovirus infections in children

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Viruses in May, Katoomba 2014
OUTLINE

• Introduction – Enteroviruses and Parechoviruses

• Epidemiology in Australia
  • Recent parechovirus outbreak and example case

• Clinical features

• Diagnosis

• Management

• Outcomes
Enteroviruses

- **Picornaviridae family**

- **No envelope**
  - Resistant to gastric acid
  - Survives for days on surfaces
  - Resistant to some disinfectants

Modlin Ch in Mandell & Bennett
Solomon 2010 Lancet Infect Dis
Classification of Enteroviruses

- 4 species
- > 90 subtypes
- *Parechoviruses previously EV22-23, now separate*

<table>
<thead>
<tr>
<th>Serotype</th>
<th>CV-A2-8, CV-A10, CV-A12, CV-A14, CV-A16, EV71, EV76, EV89-92</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>CV-A9, CV-B1-6, E1-7, E9, E11-21, E24-27, E29-33, EV69, EV73, EV74-75, EV77-88, EV93, EV97, EV98, EV100, EV101, EV106, EV107</td>
</tr>
<tr>
<td>D</td>
<td>EV68, EV70, EV94</td>
</tr>
</tbody>
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*Table 1: Human enterovirus serotypes, by species*
Epidemiology

• Transmission
  • Faecal- oral
  • Respiratory secretions
  • Surfaces / fomites

• Viral shedding
  • Pharynx 3-4 weeks
  • Faeces 5-6 weeks

• Seasonal periodicity
• \( \frac{3}{4} \) infections < 15 yrs of age
Clinical - Enteroviruses

- Asymptomatic 50-80%
- Non specific febrile illness
- Herpangina
- Hand, foot & mouth disease (HFMD)
- Aseptic meningitis
- Brainstem / cerebellar encephalitis, myelitis
- Acute flaccid paralysis
- Post infectious neurological syndromes
Australian babies diagnosed with ‘parechovirus’ for first time

Updated Sun 1 Dec 2013, 12:42am AEDT

Doctors are being urged to look out for a new virus, called parechovirus, that affects infants and has not been seen in Australia before.
Human parechoviruses

- Human parechovirus (HPeV) were detected in a number of neonates and young infants admitted to NSW hospitals since October 2013
- Sepsis-like presentations
- Some additional features:
  - Irritability and appearing to be in pain
  - Maculopapular or erythematous rash
  - Diarrhoea or loose stools
  - Tachycardia
  - Abdominal distension

- Tachypnoea
- Encephalitis
- Myoclonic jerks
- Hepatitis
HPEV Case

- 13-day old neonate
- 1 day of rhinorrhoea and fever plus loose stools
- Developed maculopapular rash becoming confluent with facial sparing
- Admitted to hospital:
  - Mottled, capillary return >3 seconds
  - Tachycardic and tachypnoeic
  - No improvement with fluid bolus
  - Treated as sepsis
    - IV amp/gent (later also given cefotaxime/aciclovir)
    - Transferred to SCH CICU
HPEV Case

- pH 7.07 on arrival
- RR 70, SaO2 100% in RA
- HR 180
- CRT 4 seconds
- T 38.4 degrees Celsius
- Irritable, confluent rash, distended abdomen
HPEV Case - Outcome

- CICU admission 7 days
- CPAP support
- Surgical review of abdomen – no surgical abdomen
- All cultures negative, HSV PCR negative
- Normal echocardiogram, unremarkable head U/S

- Discharged to ward, afebrile, in room air, feeding and clinically well

- PARECHOVIRUS PCR POSITIVE (FAECES AND NPA)
Other features

• Sepsis-like presentation most notable

• Abdominal distension

• Hepatitis +/- coagulopathy

• Encephalitis/white matter changes on MRI
  • Small number of infants
  • Generally normal CSF cell counts

• Suspected myocarditis due to tachycardia
  • Normal echocardiogram and recovery in our cohort
Diagnosis

- PCR
  - CSF (often normal cell count)
  - Throat swabs/NPAs
  - STOOL – best sample
  - Blood
  - (HPEV is not picked up on standard Enterovirus PCR!)

- Serology/Viral culture
  - Not used in this outbreak
Treatment

• Supportive care
  • Antibiotics prescribed prior to confirmation of diagnosis

• Severe cases
  • Circulatory and ventilatory support
  • Inotropes
  • Albumin
Prevention

• Vaccines? – the race is on
  • Poliovirus vaccines available for many years worldwide
  • Enterovirus 71 vaccines successfully trialled in China

• Education and hygiene?
Prevention

• Public health measures
  • Hand washing
  • Nappy disposal
  • Surface cleaning with bleach based disinfectants
  • Heightened surveillance
  • “Social distancing” measures?
  • Awareness campaigns
HPEV encephalitis outcomes

- 9 neonates admitted to NICU with clinical seizures (Netherlands and Canada)

- Head Ultrasound: increased echogenicity in periventricular white matter all infants

- MRI: confirmed white matter changes – later gliosis

- Outcomes
  - Normal development 5 infants
  - Neurological impairment or epilepsy 3 infants
  - Possible mild impairment one infant

HPEV encephalitis outcomes

Outcomes – NSW cohort

• Variable illness severity often for 4-7 days

• Generally followed by defervescence and rapid recovery

• Generally good outcomes in these infants to date, even in infants severely ill

• Reversal of MRI changes (to normal scan) in one SCH infant, who was clinically normal at follow-up
Acknowledgements

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