

Dermatology

A 2 year old with a rash

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A 2 year old developmentally normal boy presented to the paediatric admissions unit, with a three day history of a rash. The rash was over his right shoulder, arm, and back. He was systemically well, and had had chickenpox twice previously. On examination he was well, there were red, raised, crusty vesicles on his right chest wall, back and upper arm, as illustrated in figure 1.

QUESTION

What is the spot diagnosis in figure 1.

Answer

The rash was diagnosed as herpes zoster, he was prescribed a 10 day course of oral aciclovir and discharged home.

Two days later he represented to the paediatric admissions unit. He was unwell, with a one day history of high fever, vomiting, and lethargy.

On examination he was feverish at 40°C, poorly perfused, capillary refill time of four seconds. There was no neck stiffness, photophobia or other rash except for the "shingles". He required 40 ml/kg of normal saline (0.9%) fluid boluses. He had a full septic screen, and was given intravenous ceftriaxone and intravenous aciclovir.

QUESTION

What would be the differential diagnoses on this second presentation?

Answer

The differential diagnoses would be:

- Bacterial meningitis, for example, *N meningitidis*, *S Pneumoniae*.
- Septicaemia.
- Varicella meningitis/encephalitis.
- Viraemia.

QUESTION

What investigations would you perform to differentiate these diagnoses?

Answer

A case of suspected meningitis or septicaemia, should have a blood culture, throat swab, EDTA sample for

polymerase chain reaction amplification (PCR), baseline clotted sample for serology, full blood count, CRP, electrolytes, liver function tests, clotting. When the child is stable they should have a lumbar puncture, the cerebrospinal fluid (CSF) should be sent for microscopy, culture and sensitivity, glucose, protein and PCR.¹

PCR for both *N meningitidis* and *S Pneumoniae* in blood and CSF can be obtained.

If suspecting viral or varicella meningitis (VZV), all of the above would be done, but in addition; viral titres, VZV can be identified quickly by PCR testing of cells from cutaneous lesions. CSF can be sent for PCR for herpes simplex virus (HSV), herpes zoster (HV), and VZV.²

In differentiating bacterial and viral meningitis; the first will show a higher CRP, normally over 100. In the CSF the protein will be high, glucose low, and the white cells will be predominantly neutrophils in bacterial meningitis. Specific PCR confirmation and Gram staining will confirm the diagnosis.

RESULTS OF PATIENT INVESTIGATIONS

His initial blood results showed a CRP of 195 mg/l, white cell count of $1470 \times 10^6/l$ with a neutrophil predominance. His lumbar puncture showed cloudy CSF with 98 red blood cells/l and 2823 white blood cells/l, 80% polymorphs, 20% lymphocytes, the protein was 0.2 g/l, and the glucose was 1.0 mmol/l. VZV IgG was detected. Both CSF and blood cultures grew pneumococcus, confirming the diagnosis of pneumococcal meningitis.



Figure 1 The picture shows a child with a vesicular rash on right upper body, consistent with herpes zoster.

QUESTIONS

What is the gold standard in treatment of;

1. Pneumococcal meningitis?
2. Varicella meningitis?
3. General management of meningitis?

Answers

1. *S pneumoniae meningitis* requires 10–14 days of intravenous antibiotics. In most cases a broad spectrum cephalosporin is appropriate, for example, ceftriaxone 80–100 mg/kg/day, for children 3 months and older in age. This covers *S pneumoniae*, *N meningitidis*, and *Haemophilus influenzae*, and also penetrates the CSF well. When the infection has been isolated to *S pneumoniae*, antibiotic treatment can be switched to high dose intravenous penicillin, if shown to be sensitive. Resistance to penicillin in *Streptococcus pneumoniae* has emerged in the past decade, and seems to be worsening, for example, in Australia the rates of penicillin resistance have risen from 1% in 1989 to 25% in 1997.³

For infants under the age of 3 months, ampicillin should be added in to cover for *Listeria monocytogenes*.²

2. Varicella meningitis requires 10 days of intravenous aciclovir 250 mg/m² thrice daily.⁵

3. Intravenous fluids are usually restricted to half or two thirds, to help prevent any damage attributable to syndrome of inappropriate antidiuretic hormone, unless the patient is obviously hypovolaemic and requires more fluid.

Use of dexamethasone decreases the release of various cytokines, which can lead to cerebral oedema. Inflammatory changes in meningitis may lead to nerve damage and deafness. The best evidence for dexamethasone use is in *Haemophilus influenzae meningitis* but less proven in *S pneumoniae* infection.²

QUESTION

What further investigations would you perform after recovery?

Answer

Herpes zoster in a child is rare, but there is a 10% lifetime risk of developing shingles, of which 75% is after 45 years of age.⁶ To predispose to pneumococcal meningitis raises questions as to whether there is an element of viral immunosuppression or coexisting immune dysfunction, therefore sending blood for immune function would be advised, including immunoglobulins, complement and complement activity, white cell profile and antibacterial antibodies, including pneumococcal

Learning points

- Herpes zoster is rare in healthy children <10 years of age but does tend to be mild in this group. It occurs more frequently in children receiving immunosuppressive therapy, or with HIV.
- Secondary bacterial infections of the skin usually caused by *Streptococcus pyogenes* (group A β -haemolytic *Streptococcus* or *Staphylococcus aureus*) may occur in 5% of children with varicella. This can be superficial impetigo to cellulitis, lymphadenitis, and subcutaneous abscesses. An early manifestation of secondary bacterial infection is erythema of the base of the vesicle.
- When managing an unwell child, with signs of herpes zoster, it is of vital importance to treat bacterial septicaemia and meningitis, not to delay treatment when presuming it is illness related to VZV.
- Prevention; should we be routinely giving a pneumococcal vaccine?

The European Medicines Agency (EMA) have recently approved a new conjugate pneumococcal vaccine for use in infants and children from 2 months to 2 years. It provides active immunisation against the seven most common serotypes causing pneumococcal meningitis and septicaemia in the UK.⁷ Certain countries, including Canada, Austria and the USA are routinely using the pneumococcal vaccine.

The Joint committee on Vaccinations and Immunisations (JCVI) have given their recommendation in principle to its wider use in the UK, but there are still hurdles to clear before the vaccine can be incorporated into the childhood vaccine schedule. This represents an important step forward.⁸

antibodies. Pneumococcal antibodies need to be checked four weeks after convalescence, to rule out any pneumococcal antibody deficiency.

Hearing test after meningitis is also advised. The *Pediatric Infectious Disease Journal* report a figure of 13.9% sensorineural hearing loss after meningitis, consistent with previous reported rates of between 5% to 35%.⁴

DISCUSSION

This case was unusual as the patient had chickenpox twice, which suggests a poor immune response to initial infection, predisposing him to further severe infections.

VZV causes primary, latent, and recurrent infections. The primary infection is manifested as chickenpox, and results in establishment of lifelong latent infection of sensory ganglion neurons. Reactivation of the latent infection causes herpes zoster (shingles). Although this is often a mild illness, chickenpox in adolescents and immunocompromised persons, can predispose to severe group A *Streptococcus* and *Staphylococcus aureus* infections.

In contrast with adults, children with herpes zoster are unlikely to suffer with pain, hyperaesthesias, pruritis, or low grade fever. The rash is mild with new lesions appearing for a few days;

symptoms of acute neuritis are minimal, and complete resolution usually occurs in one to two weeks.

Immunocompromised children may have more severe herpes zoster like adults, including post-herpetic neuralgia.⁶

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