

# **Paediatric Diagnosis and Management: Childhood Exanthems**

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# CUTANEOUS MANIFESTATIONS OF SYSTEMIC INFECTIONS

- Separated into 3 broad categories:
  1. Dissemination of infectious agents by blood - secondary infection of skin. Clinical findings result from infectious agents in the epidermis, dermis or dermal capillary endothelium, eg chicken pox, enteroviral infections and meningococcaemia.

# CUTANEOUS MANIFESTATIONS OF SYSTEMIC INFECTIONS

2. Dissemination of a specific toxin of an infectious agent eg scarlet fever, SSSS and toxic shock syndrome.

# CUTANEOUS MANIFESTATIONS OF SYSTEMIC INFECTIONS

3. Systemic disease with exanthem probable immunologic basis eg erythema multiforme, erythema nodosum.

# Measles-global issues

- Measles, in spite of available vaccination, remains a heavy public health burden worldwide especially in developing countries with 30-40 million cases and 745 000 deaths in 2001.
- This represents 50-60% of the estimated one million deaths attributable to vaccine-preventable diseases of childhood.

# Measles-global issues

- Ultimately responsible for more child deaths than any other single agent because of complications from pneumonia, diarrhoea and malnutrition.
- Measles is also the major cause of preventable blindness in the world, affecting the same disadvantaged populations.

# Measles - clinical

- Measles is an acute disease with fever, cough, coryza, conjunctivitis, erythematous maculopapular rash and pathogenomonic enanthem (Koplik spots).
- Complications are:
  - otitis media
  - bronchopneumonia
  - laryngotracheobronchitis (Croup)
  - diarrhoea
  - encephalitis

# Measles - clinical

- Acute encephalitis with permanent brain damage occurs in 1 in every 1,000 cases.
- Death, predominately respiratory and neurological complications occurs in 1-3 of a 1,000 cases
- Subacute sclerosing panencephalitis (SSPE), 1 in 100,000 commonest in males, usually in the first decade in life and universally fatal.



# Measles - Clinical

- Case fatality rates are increased in
  - < 5 years
  - immunocompromised
  - severe malnutrition.
- The characteristic rash doesn't necessarily develop in immunocompromised patients.

# Measles - epidemiology

- The only natural host of measles are humans.
- Transmission - infectious droplets or air-borne spread.
- Temperate areas, peak is late winter/early spring.
- Patients contagious 1-2 days before symptoms, 3-5 days before the rash and 4 days after the start of rash.
- Immunocompromised patients may have prolonged excretion of the virus in respiratory tract secretions
- Incubation period is 8-12 days with a range of 7-18 days.
- Patients with SSPE are not as contagious.
- The incubation of SSPE on average is 10.8 years.

# Measles - the virus

- Measles virus
- *paramyxoviridae* family
- genus morbillivirus,
- ss -ve RNA virus
- 1 serotype.

# Measles - diagnosis

- Positive serological tests for measles
  - IgM - may not be positive < 72 hours of a rash.
  - A significant increase in measles IgG titre in paired acute in convalescent serum
- Isolation of measles from clinical specimens, urine, blood or nasopharyngeal secretions.
- Detection of measles antigen in nasopharyngeal aspirate by immunofluorescence.
- RT-PCR

# Measles - treatment

- No specific antiviral therapy is available.
- *In vitro* susceptibility-ribavirin?
- Vaccination:
  - active vaccination,
  - passive vaccination with immunoglobulin.
- WHO recommend vitamin A for children with measles if vitamin A deficiency
- Vitamin A treatment decreases morbidity and mortality.

# Parvovirus B19

## Erythema Infectiosum (Fifth Disease).

### ■ Clinical Features

- mild systemic symptoms,
- fever in 15-30% of patients
- a distinctive rash.

# Parvovirus B19

- Rash: a “slapped cheek” appearance plus circumoral pallor.
- Symmetric maculopapular lace-like and often pruritic rash also occurs on the trunk, spreading to arms, buttocks and thighs.
- Arthralgia and arthritis rare in children but commonly in teenagers or young adults, especially females.
- Mild respiratory tract illness with no rash,
- peticial polyarthropathy syndrome,
- Transient aplastic crisis 7-10 days in patients with haemolytic anaemia.

# Parvovirus B19 - clinical

- Chronic parvovirus B19 may cause severe anaemia in patients with immunodeficiency eg HIV infection
- May be associated with thrombocytopenia and neutropenia.
- Red blood cell aplasia is related to lytic infection in erythrocyte precursors.
- Parvovirus B19 infection in pregnancy can cause fetal hydrops but is not a proven cause of congenital abnormalities



# Parvovirus B19 – the virus

- Human Parvovirus B19 is a non enveloped single stranded DNA virus replicating only in human erythrocyte precursors.

# Parvovirus B19 - epidemiology

- Distributed world-wide and humans are the only host.
- Incubation period is usually 4-14 days but can be 21 days.
- Transmission by exposure to respiratory secretions or infected blood or vertical transmissions.

# Parvovirus B19- Diagnostic Tests

- In the immunocompetent, detection of B19 specific IgM.
- Usually detected in 90% of patients at the time of their rash, or by day 3 of illness with transient aplastic crisis.
- IgG antibody indicates previous infection and immunity.
- Detection of DNA by PCR is method of choice in immunocompromised patients.
- B19 DNA can be detected by PCR in serum for up to 9 months after the acute viraemic phase, so it does not necessarily indicate acute infection.
- Parvovirus B19 has not been grown in standard cell culture, but has been cultivated in experimental cell culture

# Rubella - clinical

- Rubella is generally a mild disease with erythematous maculopapular rash, generalised lymphadenopathy (commonly suboccipital, post auricular and cervical) and a slight fever.
- Transient polyarthralgia and polyarthrititis is rare in children but common in adolescents and adults, especially females.
- Encephalitis and thrombocytopenia are rare complications

# Rubella – the virus

- Rubella is from the *togaviridae* family, positive ss RNA virus.
- Classified as Rubivirus.

# Rubella - epidemiology

- Humans are the only source of infection.
- Peak incidents are late winter/early spring.
- Approximately 25-50% of infections are asymptomatic.
- Immunity from W-T or vaccine virus is prolonged but re-infection can result in congenital rubella.
- Communicability extends from a few days before to 7 days after onset of rash.
- Incubation period for post-natal rubella is rated from 14-23 days usually 16-18 days.
- Infants with congenital rubella can shed virus in NP secretions and urine for > 1 year and transmit to susceptible contacts.
- Prevalence of rubella has decrease 99% due to vaccine.

# Rubella - diagnosis

- Detection of rubella specific IgM indicates recent post-natal infection.
- False positive IgMs can occur (Rh F).
- Rubella virus can be cultured in rabbit kidney cells from NPAs, blood, urine, CSF or T/S. Notify laboratory.
- Sero conversion of IgG or 4-fold rise in acute and convalescent serum titres indicates infection.
- Serological methods are haemagglutination inhibition, ELISA, latex agglutination or IF assays.

# Rubella - treatment

- No specific antivirals



# Varicella - clinical

- Primary infections results in varicella (chicken pox) manifesting as generalised pruritic vesicular rash typically consisting of 250-500 lesions, mild fever, and other systemic symptoms.

# Varicella - clinical

- Complications are
  - bacterial super-infection of skin lesions
  - thrombocytopenia
  - arthritis
  - hepatitis
  - cerebellar ataxia
  - encephalitis
  - meningitis
  - glomerulonephritis.

# Varicella - clinical

- Varicella more severe in adolescents and adults
- Reye syndrome can be associated.
- In immunocompromised, progressive severe varicella - eruptions of lesions and high fever persisting into 2nd week of illness, encephalitis, hepatitis and pneumonia can develop also haemorrhagic varicella .
- Severe and fatal varicella can occur in children on corticosteroids.
- In children with HIV infection, chronic or recurrent varicella (disseminated herpes zoster) can develop. New lesions can appear for months.

# Varicella - epidemiology

- Humans are the only source of infection for this highly contagious virus. Infection by contact of mucosa from upper respiratory tract or conjunctiva. Person to person transmission is primarily by direct contact with patients with varicella or zoster. Occasionally it occurs by airborne spread from respiratory tract secretions, rarely from zoster lesions.
- In temperate climate, peak incidents are during late winter and early spring.
- Incubation period is 14-16 days, occasionally as short as 10 or as long as 21 days. It may be prolonged for 28 days if VZIG given. Shortened in immunocompromised patients

# Varicella - diagnostic tests

- Viral culture
- DFA
- Tzanck smear
- EIA
- Latex agglutination
- Immunofluorescence antibody
- Complement fixation test
- PCR

# Varicella - treatment

- Acyclovir or foscarnate.
- Vaccination:
  - active vaccination,
  - passive vaccination

# Roseola

- Also known as:
  - Exanthem Subitum,
  - Pseudo Rubella,
  - Exanthem Criticum,
  - 6th Disease or
  - 3 Day Fever

# Roseola - clinical

- Roseola infantum is a common acute illness of young children characterised by a fever of 3-5 days duration, rapid defervescence and then the appearance of an erythematous macular or maculopapular rash that persists for 1-2 days
- The most important complications are convulsions and other neurological symptoms.



# Roseola – the viruses

- It is estimate that HHV-6 - 73.5%, HHV-7 - 10.2% and other - 16.2% of roseola cases.
- HHV6 appears to be the major cause of roseola.

# Roseola - treatment

- Because roseola is the result of an infection with multiple different viruses, no practical way to prevent this exists.
- There is no specific treatment.

# Mumps - clinical

- Systemic disease characterised by swelling of parotid and salivary glands
- 50% have CSF pleocytosis -10% symptomatic
- Orchitis common after puberty
- Arthritis, thyroiditis, mastitis, glomerulonephritis, myocarditis, endocardial fibroelastosis, pancreatitis, hearing loss, transverse myelitis, polyradiculitis, thrombocytopenia.

# Mumps - epidemiology

- Humans only host
- Spread by contact with resp secretions
- Death rare – 1.6 to 3.8 per 10,000
- 1<sup>st</sup> trimester pregnancy – increased spontaneous abortion. No congenital syndrome recognised.
- Incubation period 16 to 18 days but may be 12 to 25 days.

# Mumps – the virus

- Paramyxoviridae
- Rubulavirus
- -ve ss RNA enveloped virus

# Mumps - diagnosis

- Viral culture of T/S, urine, CSF
- Mumps IgM
- Four-fold rise in titre of mumps IgG (CFT or HAI) or seroconversion (ELISA).
- PCR

# Mumps - treatment

- Supportive
- No specific antiviral