

Common Childhood Infectious Diseases

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Definitions

Exanthem: A skin eruption occurring as a symptom of a general disease.

Enanthem: Eruptive lesions on the mucous mb



Causes of fever and rash

★ Maculopapular rash most common type of rashes in pediatric

Viral
most common infection in pediatric is viral

HHV6 or 7 (Roseola infantum) – <2 years old
Enteroviral rash
Parvovirus ('slapped cheek') – usually school-age
Measles – uncommon if immunised
Rubella – uncommon if immunised

Bacterial

Scarlet fever (group A streptococcus)
Erythema marginatum – rheumatic fever
Salmonella typhi (typhoid fever) – classically rose spots

Other

Lyme disease – erythema migrans
Kawasaki disease
Juvenile idiopathic arthritis

★ Vesicular, bullous, pustular

Viral

Varicella-zoster virus – chickenpox, shingles
Herpes simplex virus
Coxsackie – hand, foot and mouth

Bacterial

Impetigo – characteristic crusting
Boils – infection of hair follicles/sweat glands
Staphylococcal bullous impetigo
Staphylococcal scalded skin
Toxic epidermal necrolysis

Other

Erythema multiforme; Stevens–Johnson syndrome

★ Petechial, purpuric not very common type of rashes in pediatric

Bacterial

Meningococcal, other bacterial sepsis
Infective endocarditis

Viral

Enterovirus and other viral infections


Other

Henoch–Schönlein purpura (HSP)
Thrombocytopenia
Vasculitis
Malaria

in such type of rash, you need to exclude serious infection especially meningococcal (especially in those who aren't vaccinated)

Classic Childhood Exanthems

in such infection the child will present with fever and rash

 know all the other names of each infection bc you might come across it in the exam

- Measles (Rubeola)
- Scarlet Fever
- Rubella (German measles)
- Erythema Infectiosum (fifth disease, Parvovirus B19)
- Roseola Infantum

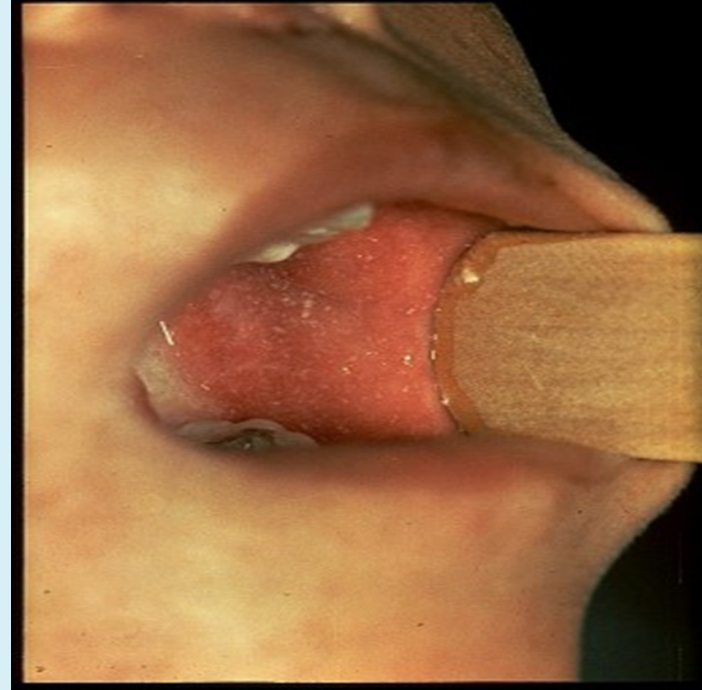
A and B: multiple generalized (almost a spread sheet = no normal area) maculopapular rash



A



B



C



D

C and D:

- koplik spot:
 - almost always pathognomic for measles,
 - appears 48h prior the onset of rash
 - found opposite the 1st and 2nd upper molars,
 - if don't find it, u can't exclude measles.

10 years back we didn't see it, but now it's re-emerging and causing an outbreak due to the vaccination refusal, vaccination hesitancy and delay.

Measles

- Paramyxovirus
- At risk: children who are not yet vaccinated or who miss vaccination

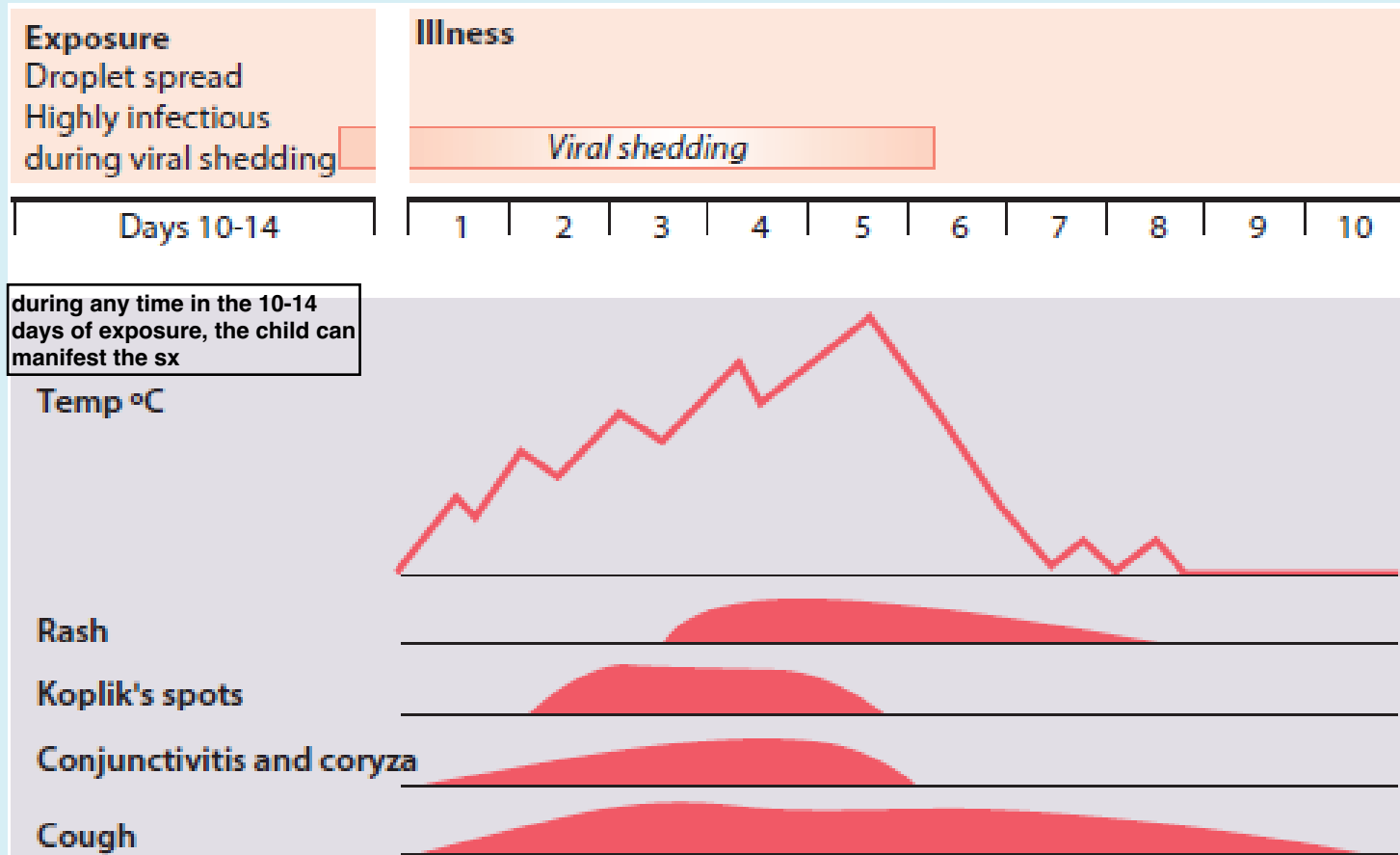
Incubation period is really imp in some infection to know if a child got exposed and he is not vaccinated, till when to exclude the child from school, when to give him the vaccine

★ • Incubation period: 10-14 days **IMPORTANT**

• Infectious period: 1-2d before prodrome to 4 days after onset of rash

after which you can tell the parents they can send their child to school. ex: child with 6 days hx of rash, he can go to school and mix with other people

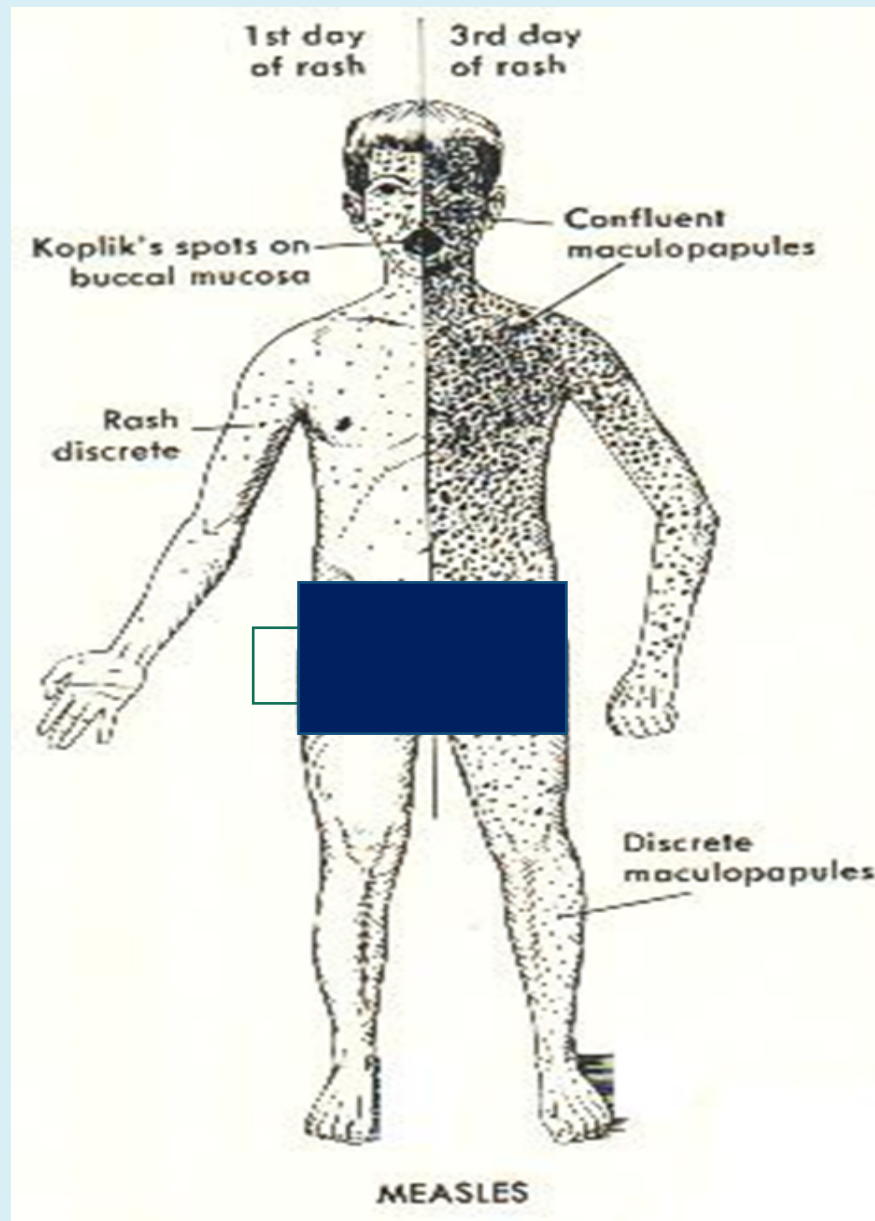
Measles clinical features



in measles, like any viral infection, the manifestation will start with:

- very bad coryza, very high fever,
- then child will start to have koplik's spots which will not last for long. (48h prior the rash)
- once the child start to have the rash if didn't catch them early you might miss the koplik's spots.
- they develop also pneumonitis (could be severe in immunocompromised pt.) and they will have cough.
- you need to look for conjunctivitis as they usually have it

the characteristic of measles rash: starts from the upper part of the body and descend down. (u have to ask about it in the hx)



Symptoms

- Prodrome: day 7-11 after exposure
 - Fever, cough, coryza, conjunctivitis
 - Enanthem: Koplik's spots appear 2 days before the rash, last 2 days into the rash
- rash spread downwards from face
- Highly contagious
- Treatment: symptomatic, Vitamin A no antiviral medication for measles, - vit A given to preserves vision and reduces complications
- **Prevention 2 doses of measles vaccine** one dose is not sufficient as the antibodies go down with time
- Immunize susceptible contacts, Immune globulin
immunocompromised not vaccinated and get exposed to measles > indication for immune globulin

there is a specific measles IG one dose IM: prepared from donors (vaccinated with good antibodies titer).
if such IG are not available in the hospital, don't wait is ur bound by the time of AB activity and give IVIG.

Measles: complications

- Otitis media
- Bronchopneumonia
- Encephalitis
- Myocarditis
- Pericarditis
- Subacute sclerosing panencephalitis SSPE—late sequelae due to persistent infx of the CNS

Strawberry tongue: the difference (A: white) (B: red)

A



B







Scarlet Fever

- Due to erythrogenic exotoxin-producing Group A beta-hemolytic streptococci
- Peak age: 4-8 yr
- Incubation period: 2-5 days

Scarlet Fever

- Abrupt onset fever, headache, vomiting, malaise, sore throat
- Bright red oral mucosa
- Palatal petechiae
- Tongue change

- Rash appears 1-2 days after the onset of illness
- Described as "sandpapery" in quality
- Can last for over a week  you feel it better than seeing it
- As the rash fades, peeling (desquamation) may occur (finger tips, toes, and groin area) 

Treatment: penicillin

group A strept is the only bacteria that isn't resistance to penicillin

or erythromycin if there is penicillin allergy

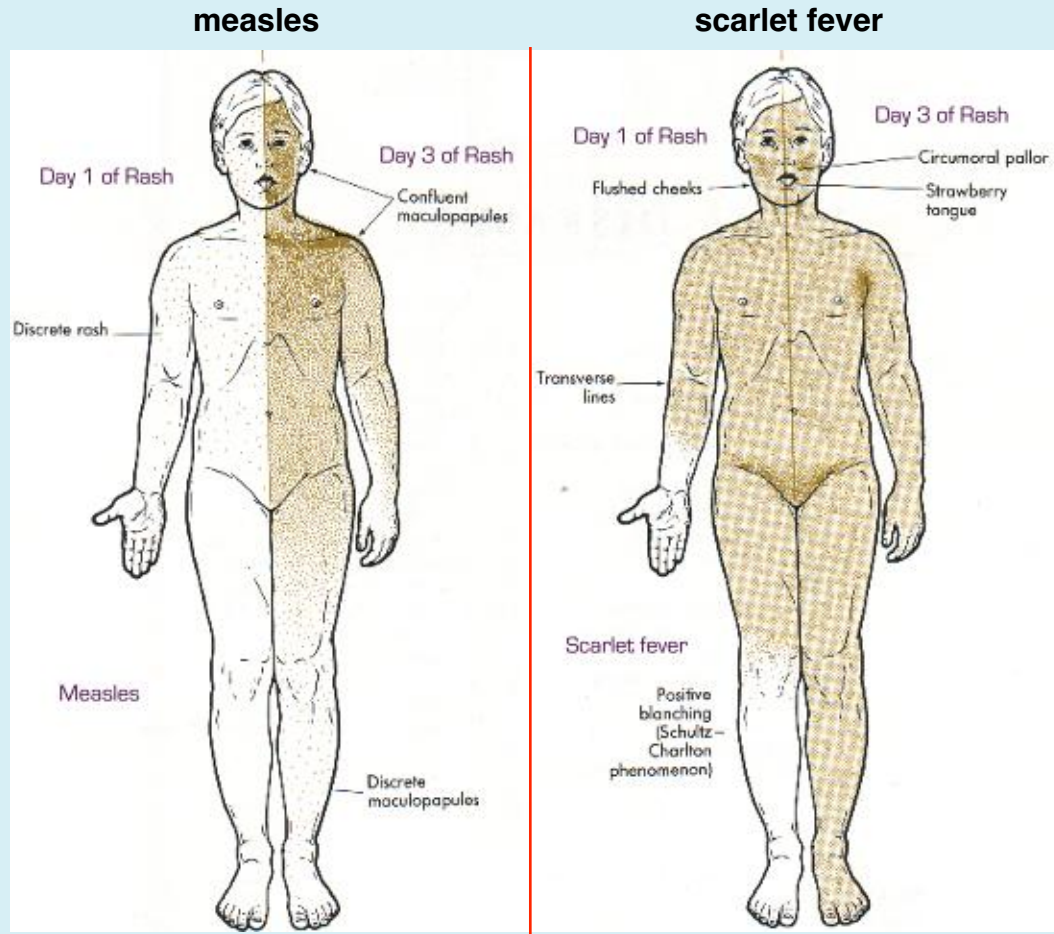
give macrolides

for 10 days

 to prevent rheumatic fever

Measles versus Scarlet fever

1st day of rash found more in the upper side by day 3 you will find the rash already descending (but still i descending matter)



day 1 you will find the rash but not involving the hands and feet
by day 3 the rash is all over (involving the hands and feet) and you have to look for intensification of redness at the flexor surfaces

Pastia lines



Scarlet Fever: complications

Purulent complications: direct invasion of the bacteria into other site

- Otitis media
- Sinusitis
- Peritonsillar/retro-pharyngeal abscesses
- Cervical adenitis

Nonsuppurative sequelae: related to the toxin that the bacteria produces, leaving serious illness's if not treated

- Rheumatic fever
- Acute glomerulonephritis



slapped check

netlike rash



Fifth Disease Erythema Infectiosum (Human Parvovirus)

know all its three names as one of them might come in your exam

Raised, red, warm rash, first appearing on cheeks
(slapped cheek appearance).

After 1 - 4 days, a lace-like rash spreads to the rest
of the body.

- **Infectiousness** greatest before onset of the rash and not after the rash. once they develop the rash they are not infectious
- **Control** In school outbreaks, alert pregnant staff. as it can cause hydrops fetalis if non immune pregnant lady got exposed
- In pts hemolytic anaemia (e.g SCA) it can precipitate aplastic crisis
- Treatment: supportive there is no specific antiviral Rx

Roseola infantum (exanthema subitum)

Human Herpesvirus-6

- it's a self-limiting disease, that doesn't need to be treated (only supportive) and most of the pt. recover without any complications
- it's usually it affect infants, the infant present with continuous unexplained fever usually for 3-4 days
- at day 5 or 6 of illness the fever subsides and the rash appears (maculopapular)
- due to the previous description (rash appears once the fever is subside) is used to diagnose the disease by Hx (to got the infection, no need for hx of contact)
- in rare cases it can lead to aseptic meningitis as a complication.



Chicken Pox



zoster





Chicken Pox (Varicella)

it's not a good infection to have it as an adult, if you didn't have the natural immunity please check your vaccine status

- if the child get infected (he is having natural immunity in such case) he might experience reactivation of the virus as shingle (the latent infection)

- if the person is not immune and had a contact with someone with shingle, the non immune will have chicken pox (the primary infection)

another explanation: 1st exposure to the virus (with from someone having the primary infection "chicken pox" or the secondary reactivation "shingle") will lead to the primary infection (chicken pox).

- DNA Virus

the time during which the pt. might manifest the infection after he get exposed to cases

- Incubation Period: 10 – 21 days **IMPORTANT**

if you are not immune, the chance of getting infected is around 95%

- Very contagious; can be spread by direct contact, airborne transmission

it stay suspended in the air, that's why isolation should be done in a negative pressure room

by touching the contents of the vesicles

most common mood of transmission

- Infectivity: 1-2 days before rash till all skin lesions have crusted (~ 6th day of rash) **IMPORTANT**

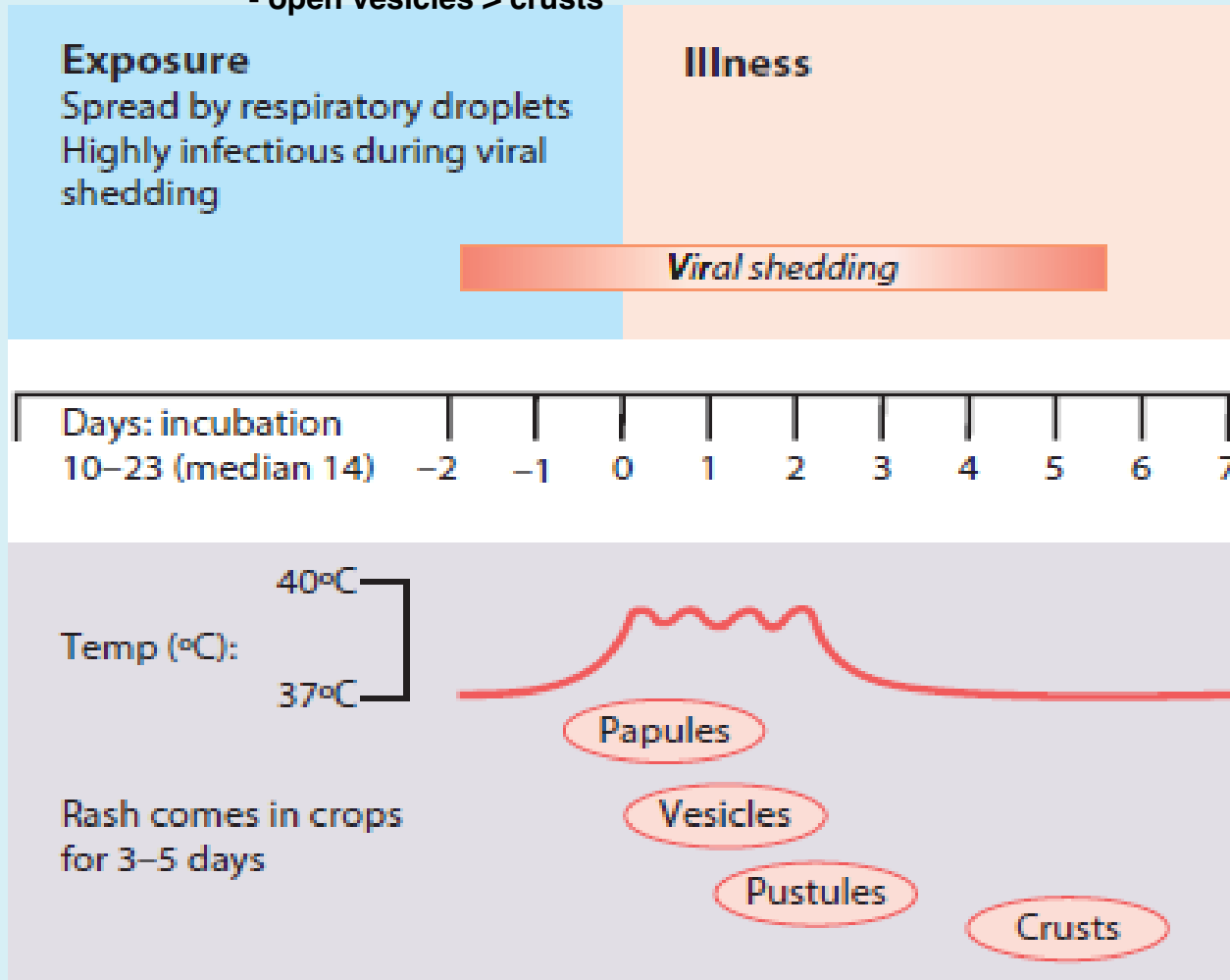
- Vaccine

if the pt. is still having new vesicles or didn't open he is still infectious
- in normal pt. usually by day 6 they have crusted, but in immunocompromised pt. usually they take more time

Varicella

the pt. will have fever at the early stage of illness > rash which you will see it in all the stages (all the stages sometimes can be see at the same site “usually start at the trunk then involve the rest of the body”):

- starts as macular
- then becomes maculopapular
- then vesicles
- open vesicles > crusts



Complications

we lost pt. not from varicella, but bc of its complications

- Secondary infection of the blisters may occur
- pneumonia, myocarditis pneumonia one of the most complication in adult and pregnant
- Cerebellar ataxia may appear during the recovery phase or later
- Encephalitis (rare)
- Congenital infection during pregnancy if the mother not immuned and got the infection, especially during the first 28 weeks of pregnancy
- Newborns are at risk for severe infection (if mother is not immune)
- Disseminated dis: immunocompromised
- Treatment: Acyclovir




**Neonatal varicella with secondary bacterial infection
the mother got exposed just before the onset of labor**

mumps : infection of the parotid gland



Mumps

- RNA Virus
- Incubation Period: 15 – 24 days
- Clinical Features: fever, parotitis, may be subclinical
usually transmitted by droplet
- Complications: meningitis, encephalitis, orchitis 
and might lead to infertility
- Treatment
- Isolation & Infectivity: 7 days after onset of parotid swelling.
- Vaccine MMR vaccine

Rubella

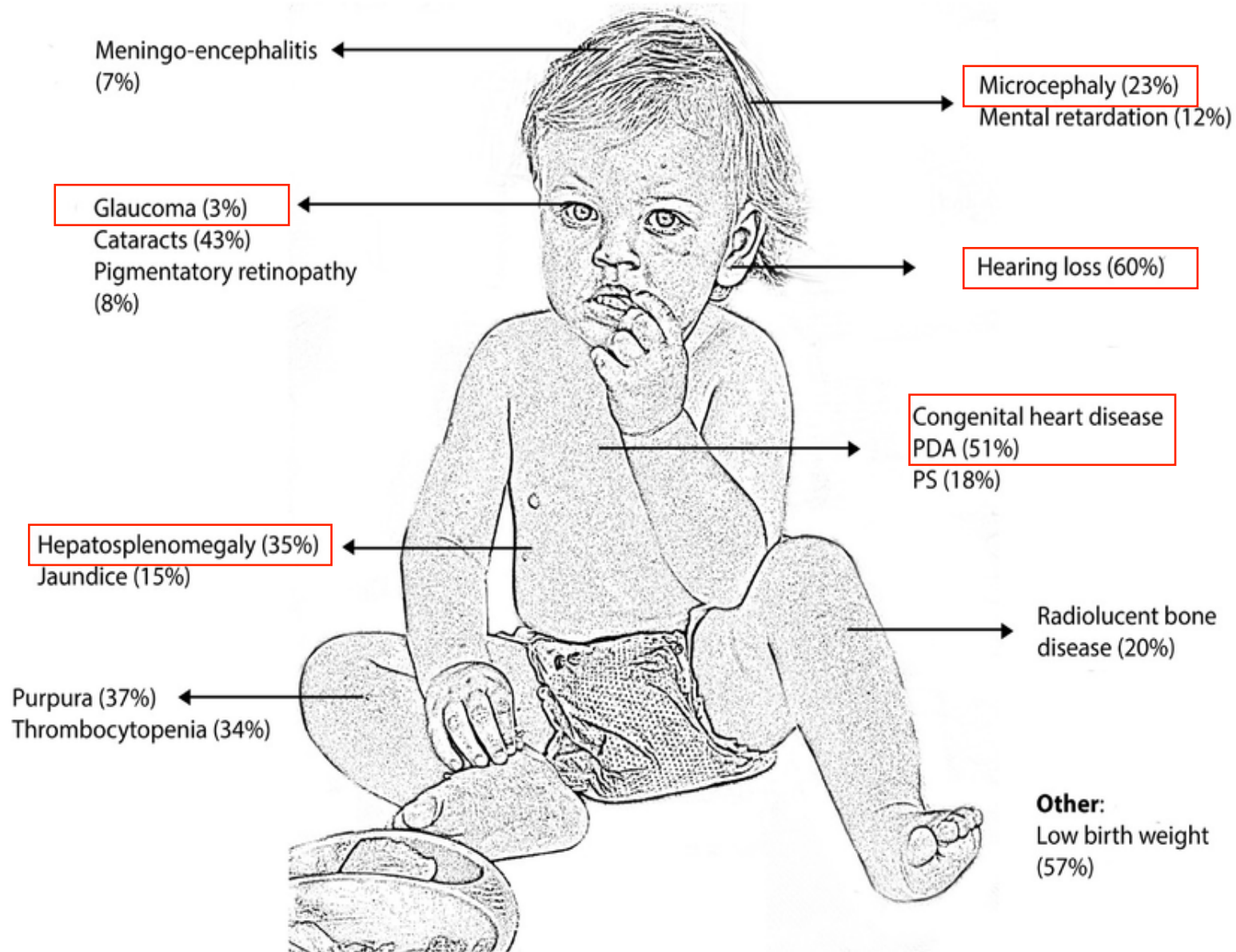
- RNA Virus
- Incubation Period: 15 – 20 days
- Spread by respiratory droplet.
- generally a mild disease in childhood, Lymphadenopathy particularly the occipital and postauricular nodes, is prominent, arthralgia and arthritis.
- Serious in pregnancy: cong. infection **can cause congenital rubella syndrome**
- Treatment
- Isolation & Infectivity: 7 days from onset of rash
 - Congenital Rubella: until 1 year of age
- Vaccine **continue to secrete the virus in the urine up-to 1 year of age**

you can't diagnose rubella based on the rash as it's very discrete and maculopapular , which is look like most of the viral infections



Congenital rubella syndrome

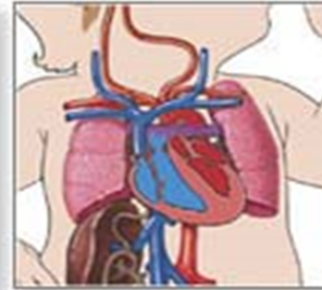
- Infection of seronegative mother during pregnancy
- Risk of fetal infection
 - First trimester : 75-90%



Rubella syndrome



Microcephaly



PDA



Cataracts

blueberry rash: not seen alot, but it is one of the characteristic of some congenital infection (one of it is rubella)



MCQ

14-year-old girl, unvaccinated, presented with sore throat, low-grade fever, and a diffuse maculopapular rash. During the next 24 hours, she develops tender swelling of her wrists. In addition, her physician notes mild tenderness and marked swelling of her posterior cervical and occipital lymph nodes. Four days after the onset of her illness, the rash has vanished. Which of the following is the most likely diagnosis?

- a. Rubella
- b. Rubeola
- c. Roseola
- d. Erythema infectiosum
- e. Erythema multiforme

Enterovirus infection

a very big group of viruses , usually classified into common and other
- the common enteroviruses include: Nonpoliovirus, Echoviruses, Group A and B Coxsackieviruses,

Nonpoliovirus)

and Parechovirus Infections

(Group A and B Coxsackieviruses, Echoviruses,

Numbered Enteroviruses, and Human

Parechoviruses)

Hand, foot, and mouth disease (HFMD)



vesicular lesions at the Hand, foot, and mouth

vesicular lesions at the hard palate



ENT examination in febrile child is a must

The most common manifestation of enteroviruses is nonspecific febrile illness

• Other manifestations can include the following:

(1) respiratory: coryza, pharyngitis, herpangina, stomatitis, bronchiolitis, pneumonia.

vesicular lesions
at the hard palate

(2) skin: handfoot-and-mouth disease, and nonspecific exanthems.

looks like polio that's why
they call it non polio
motor paralysis

(3) neurologic: aseptic meningitis, encephalitis, and motor paralysis

enterovirus is one of the most common cause of aseptic meningitis especially during summer

(4) gastrointestinal: vomiting, diarrhea, abdominal pain, hepatitis, pancreatitis.

(5) eye: acute hemorrhagic conjunctivitis and uveitis

(6) heart: myocarditis especially with
Coxsackieviruses

(7) muscle: myositis

Hand-Foot-and-Mouth Disease

- Coxsackievirus infection
- Usually a mild illness
- Generally complete recovery occurs in 5-7 days

Complications:

- Dehydration may occur
 - mouth lesions cause pain with swallowing
 - a very rare complication is nails loss**

Herpes simplex virus 1

most common sites are lips and fingers or thumbs
(herpes whitlow)





herpetic whitlow usually painful



Herpes simplex virus infection

- **Herpes** “cold sores” in adult
- **Symptoms** Superficial clear vesicles (blisters) with red base, usually on face or lips, which crust and heal within days.
- **Method of Direct contact**
- avoid contact with children with eczema or burns and the immunocompromised. they are more liable to have complications from Herpes simplex virus infection

Herpes simplex virus infection

- Gingivostomatitis – may necessitate, intravenous fluids and aciclovir
- Eczema herpeticum – may result in secondary bacterial infection and septicaemia
- Herpetic whitlows – painful pustules on the fingers
- Eye disease – blepharitis, conjunctivitis, corneal ulceration and scarring
- CNS – aseptic meningitis, encephalitis
- Pneumonia and disseminated infection in the immunocompromised.

all these pics represent a very bad primary herpes infection in children who are having eczema



she also has a secondary bacterial infection



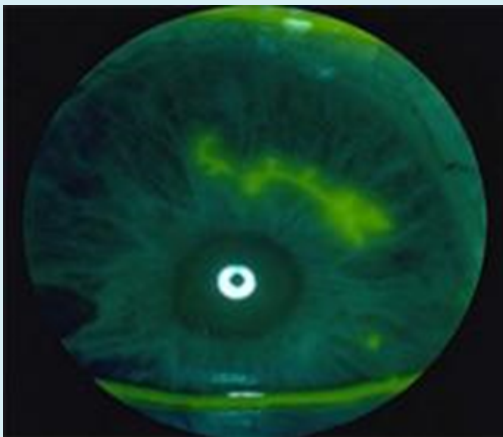
the name of very bad herpes infection in pt. who is having eczema:

Eczema herpeticum

(kaposi varicelliform eruption)

- serious condition, emergency care
- Widespread vesicular lesions develop on eczematous skin
- This may be complicated by secondary bacterial
- infection, which may result in septicaemia
- high fever, irritability, lesions then rupture and crust over the course of a couple of days
- Lesions can become hemorrhagic
- If area of involvement is large, can be lots of fluid loss and potentially fatal
- Treat promptly with acyclovir **acyclovir ASPA + supportive Rx and intensive care**

another complication of herpes infection called herpetic keratitis due to autoinoculatio

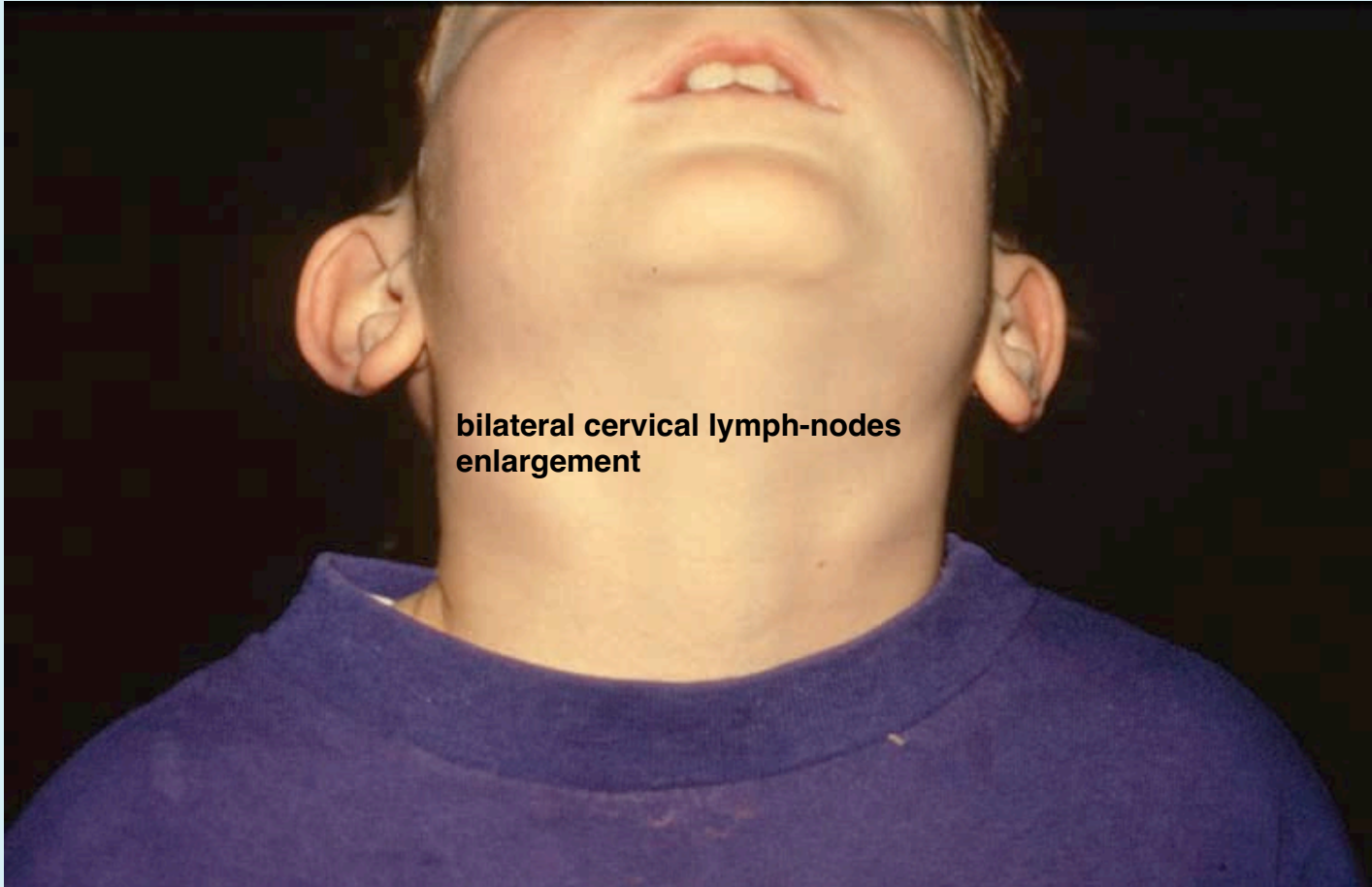


Infectious Mononucleosis

**Cause: Epstein-Barr virus and
Cytomegalovirus**

**they both usually present with fever, rash , follicular tonsillitis
and lymphadenopathy**





**bilateral cervical lymph-nodes
enlargement**

- Enlarged lymph nodes
- Rash
 - Pink, measles-like rash
 - more common if given amoxicillin for throat infection
- Enlarged spleen & liver
- transmitted by saliva and close contact
- Diagnosis: serology, PCR
- Treatment is usually supportive, unless immunocompromised, where antiviral is indicated.

ADENOVIRUSES

- one of the common infection in the pediatric with different presentations

Incubation period is 2-14 days.

- Clinical syndromes:

★ Eye Epidemic keratoconjunctivitis, acute follicular conjunctivitis, pharyngoconjunctival fever. this is one of the common presentation bc of that ADENOVIRUSES other name is pharyngoconjunctival fever.

- Respiratory system Common cold (rhinitis), pharyngitis, tonsillitis, bronchitis, pneumonia.

- Genitourinary Acute hemorrhagic cystitis, orchitis, nephritis.

- Gastrointestinal Gastroenteritis, mesenteric adenitis, appendicitis.

picture like

- Rare results of adenovirus infections: Meningitis, encephalitis, arthritis, myocarditis, hepatitis.

- Fatal disease may occur in immunocompromised patients, as a result of a new infection or reactivation of latent virus

★ if you see follicular tonsillitis and conjunctivitis in febrile child think about adenovirus.
- child who is going to school and having conjunctivitis > might lead to outbreak (transmitted by contact), which has been reported before

follicular tonsillitis



conjunctivitis



MCQ

An 8-year-old sickle-cell patient seen at the emergency room (ER) for fever. Over the previous several days, the child has become progressively tired and pale. The hemoglobin concentration in the ER is 3.1 mg/dL.

Which of the following viruses commonly causes such a clinical picture?

- a. Roseola
- b. Parvovirus B19
- c. Coxsackie A16
- d. Echovirus 11
- e. Cytomegalovirus

case

- a six month old male, had the acute onset of fever to 39° c and irritability.
- He was seen in your office and examination of the tympanic membranes revealed the physical findings noted.



acute otitis media

Risk factors for OM

- Children cared for in group ^{daycare} settings
- Children who live with adults who smoke
- Infants who nurse from a bottle while lying down ^{Eustachian tube}
- Children who are not breast-fed ^{their immunity is lower}

number one

- Strep. Pneumoniae

- H. influenzae

- M. catarrhalis

- Strep. pyogenes

- Staph. Aureus

- **No growth** bc most of the children, whom middle ear fluid was taken through tympanocentesis, were on Antibiotics, or it's indicative of a viral infection

OM treatment

Amoxicillin

it's always the 1st line (drug of choice)
- you don't need to know the other Rx lines

Complications of OM

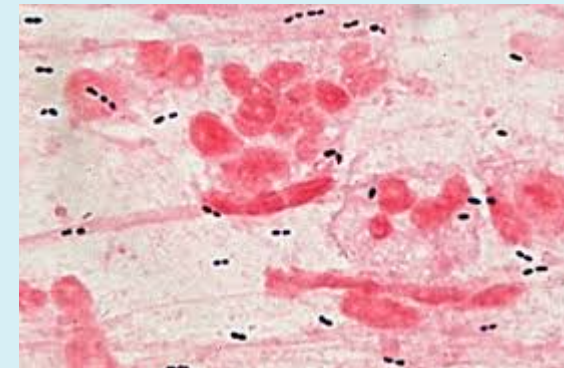
- chronic effusion, hearing loss
- Mastoiditis
- intracranial extension (brain abscess, subdural empyema, or venous thrombosis).
- cholesteatoma (mass-like keratinized epithelial growth)

Pneumococcal infections

making it problematic, bc it waits for any viral infection, inflammation in the mucus membrane or decrease in the immunity to falir up

- Often carried in nasopharynx of healthy children
- transmission is by respiratory droplets.
- the incidence of invasive disease has declined. ^{meningitis}
- Susceptibility is increased in hyposplenism (e.g. SCD, nephrotic syndrome, splenectomy) ^{bc it's encapsulated}
- May cause pharyngitis, otitis media, conjunctivitis, sinusitis, invasive disease (pneumonia, bacterial sepsis and meningitis).
- Prevention: Vaccine (^{conjugated}PCV13, ^{polyscarised}PPV23)
- Prophylaxis for high risk ^{those who are liable for recurrent meningitis}

due to vaccine (before a decade Pneumococcal meningitis was number 1 due the lack of Pneumococcal vaccine. yet pneumonia, otitis and the other infections are still there even with use of vaccine.)



there are lots of serotypes (>90) that aren't covered by vaccine, due to which it's still causing problem although there is vaccine which only covers 13 serotype.

crusted , impetigo



Impetigo

- Impetigo is a bacterial skin infection
- Staphylococcus aureus / streptococcus pyogenes.
- honey-coloured crusted lesions
- Lesions are usually on the face, neck and hands
- most common in infants and young children.
- It is contagious. by contact
- Topical antibiotics (e.g. mupirocin)
- Systemic: cloxa, augmentin, cephalixin.

 if severe

celluliti

S



cellulitis with point entry of the organism



Cellulitis

- Inflammation of the subcutaneous connective tissue – may lead to abscess

the most 2 common organisms regardless the vaccination status are:

- ★ Streptococcus pyogenes, ★ Staphylococcus aureus,
Haemophilus influenzae (<2 yrs) and in those who aren't vaccinated

- Therapy: clindamycin, cefazolin, cloxacillin

- ★ if there was pus > drain + Ab
no pus collection . put them on systemic therapy:
 - 1st line is: clindamycin bc it covers strept and staph
 - cloxacillin also covers both strept and staph

**how you differentiate b/w periorbital and orbital cellulitis ?
absence of proptosis and chemosis and other**

**(please goggle it there are good comparisons on goggle “this is me
not the dr. but the Q was asked by the dr”)**



Periorbital cellulitis

- fever with erythema, tenderness, oedema of the eyelid.
- It is almost always unilateral.
- In young, unimmunised children it may also be caused
- by *Haemophilus influenzae* type b which may also be accompanied by infection at other sites, e.g. meningitis.
- It may follow local trauma to the skin. In older children, it may spread from a paranasal sinus infection or dental abscess
- Treatment : i.v antibiotic

→ 5y and more

due to the severity of the cough they might
have sub-conjunctival hemorrhage



<https://www.youtube.com/watch?v=TIV460AQUWk>

<https://www.youtube.com/watch?v=S3oZrMGDMMw>

Pertusis (Whooping Cough)

now it's causing an outbreak in the US bc of anti-vaccine parents

- Bordetella Pertusis
- Incubation Period: 7 – 14 days★
- Coughing adults are major reservoirs
- Clinical Features: The infection usually lasts 6 wks
 - Cold symptoms (~2 weeks) catarrhal stage; nothing specific in this stag, the infection looks like a bad flu
 - Progressively worse cough (~4 weeks) once the child present with whooping that means he passed the first 2 weeks where the Rx is effective more
 - Complete resolution (may take months)
- Treatment: erythromycin (other macrolids) the efficacy of Ab is less once the child develops whooping, yet we give him Ab to prevent secondary transmission to the family
- Isolation & Infectivity: up to 6 weeks, but with treatment => 5 days after starting therapy Infectivity reduces up to
- Vaccine, doesn't provide lifelong immunity even the mother who got vaccinated when she was a child, the Antibodies she got from vaccination will decrease after 10 years

CDC is recommending that pregnant lady (26-32 weeks of gestation) should be vaccinated to prevent the infection in the baby bc most of the cases occurring in the 1st 6-8 moths of life and the complication is higher at this age and most of the mothers are not immune and they are refusing the vaccine for their child

the problem with adults when they get Pertusis they don't have Whoop (yet they are the source of infection in unvaccinated infants), and they will show the infection as a flu with prolonged cough (which means Whoop is not diagnostic that's why we never ask about whoop in adult bc we know it's not there) - so when the parents bring the child ask about anyone at home having cough which usually will be the usual scenario.

Video

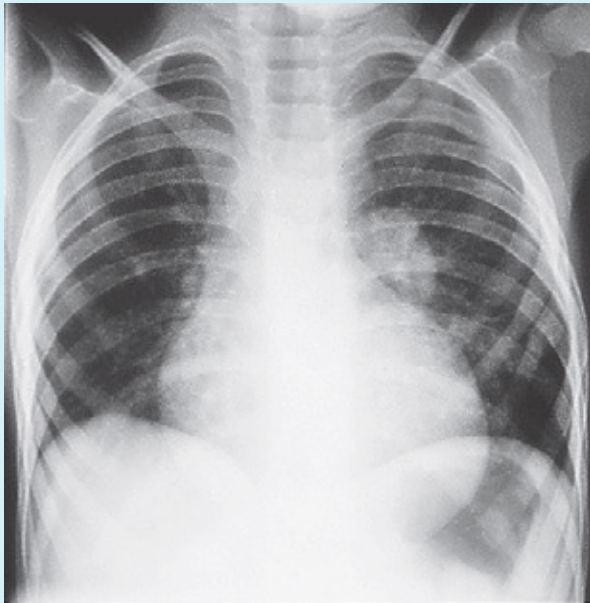
<https://www.youtube.com/watch?v=TIV460AQUWk>

Complication

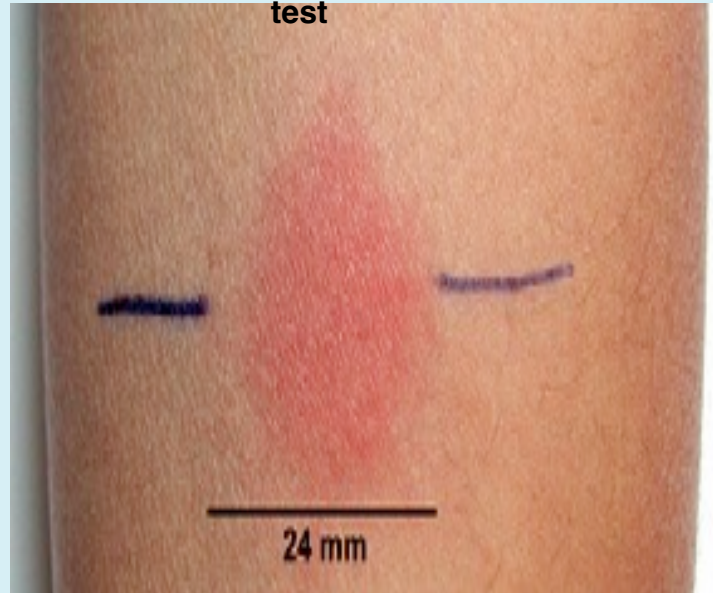
- OM
- Pneumonia
- apnea with the paroxysmal episodes
- Convulsions
- Brain damage from lack of oxygen
- cerebral hemorrhage

MCQ

- Which of the following is responsible for causing Hand-Foot-and-Mouth Disease?
 - a. Adenovirus
 - b. Coxsackievirus
 - c. Cytomegalovirus
 - d. Echovirus 22
 - e. Epstein-Barr Virus



ppd
test



Tuberculosis

we don't see it a lot in pediatric like in adult especially the pulmonary (unusual unless he had a contact with open pulmonary TB "but you have to include it always in the DDx of prolonged cough or severe pneumonia not responding to the usual Ab you have to include TB in the workup").

- we might see tuberculous lymphadenitis

- extra-pulmonary we see it in the pediatric more than the pulmonary.

- TB affects millions of children worldwide; low but increasing incidence in many developed countries.
- Diagnosis of TB in children is even more difficult than in adults. The clinical features of the disease are nonspecific, such as prolonged fever, malaise, anorexia, weight loss or focal signs of infection.
- Clinical features follow a sequence – primary infection, then dormancy, which may be followed by reactivation to post-primary TB.
- TB disease can present as local disease or may be widely disseminated, miliary TB to sites such as bones, joints, kidneys, pericardium and CNS.
- In infants and young children, seeding of the CNS is particularly likely, causing tuberculous meningitis

- Diagnosis is often difficult, so decision to treat is usually based on contact history, Mantoux test, interferon-gamma release assays (Quantiferon), chest X-ray and clinical features.

Mantoux test we don't depend on it a lot in pediatric as sometimes the delayed hypersensitivity reaction in pediatric (especially those below 4y of age) is not as good as in adults

- Young children swallow their sputum, so early morning gastric aspirate are required (3 samples)

through NGT

before feeding (water or milk or anything)

- Contact tracing is important.
- TB is more difficult to diagnose and more likely to disseminate in the immunosuppressed.



- done at the volar aspect of the arm
- the one who do it should ensure of the timing himself,
- intradermal injection will produces bleb on the skin (if not seen while injecting that means the injection is SC “ useless we can’t read it’)
- read it after 48h ad 72h by measuring the induration and document the readings



latent TB: no symptoms only positive ppd (means that he got exposed)

Table 124-3 Recommended Treatment Regimens for Drug-Susceptible Tuberculosis in Infants, Children, and Adolescents

INFECTION OR DISEASE CATEGORY	REGIMEN	COMMENTS
LATENT TUBERCULOSIS INFECTION (POSITIVE TST RESULT, NO DISEASE)		
Isoniazid-susceptible	9 months of isoniazid, once a day	If daily therapy is not possible, DOT twice a week can be used for 9 months.
Isoniazid-resistant	6 months of rifampin, once a day	
Isoniazid-rifampin-resistant	Consult a tuberculosis specialist.	
Pulmonary and extrapulmonary (except meningitis) including tuberculous lymphadenitis	2 months of isoniazid, rifampin, and pyrazinamide daily, followed by 4 months of isoniazid and rifampin twice weekly under DOT	If possible drug resistance is a concern, another drug (ethambutol or an aminoglycoside) is added to the initial three-drug therapy until drug susceptibilities are determined. DOT is highly desirable.
		If hilar lymphadenopathy only, a 6-month course of isoniazid and rifampin is sufficient.
		Drugs can be given 2 or 3 times per week under DOT in the initial phase if nonadherence is likely.
Meningitis some cases we use for them steroid in conjunction to the antibiotics	2 months of isoniazid, rifampin, pyrazinamide, and an aminoglycoside or ethionamide, once a day, followed by 7–10 months of isoniazid and rifampin, once a day or twice a week (9–12 months total)	A fourth drug, usually an aminoglycoside, is given with initial therapy until drug susceptibility is known.
		For patients who may have acquired tuberculosis in geographic areas where resistance to streptomycin is common, capreomycin, kanamycin, or amikacin may be used instead of streptomycin.

the problem with ethambutol it causes eye problem > do a baseline ophthalmology Ex as well as monthly as long as they are on Rx

don't skip it the dr read all the regimen types