Chicken pox

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Chicken pox

- Chickenpox (varicella) is a common illness that causes an itchy rash and red spots or blisters (pox) all over the body.

- After you have had chickenpox, you are not likely to get it again.

- But the virus stays in your body long after you get over the illness.

- If the virus becomes active again, it can cause a painful viral infection called **shingles**.

Uncomplicated varicella

- The clinical manifestations of varicella in healthy children generally develop within **fifteen days after the exposure** and typically include a prodrome of **fever, malaise, or pharyngitis, loss of appetite** , followed by the development of a generalized vesicular rash, usually within 24 hours.

- The vesicular rash of varicella, which is usually pruritic, appears in successive crops over several days.

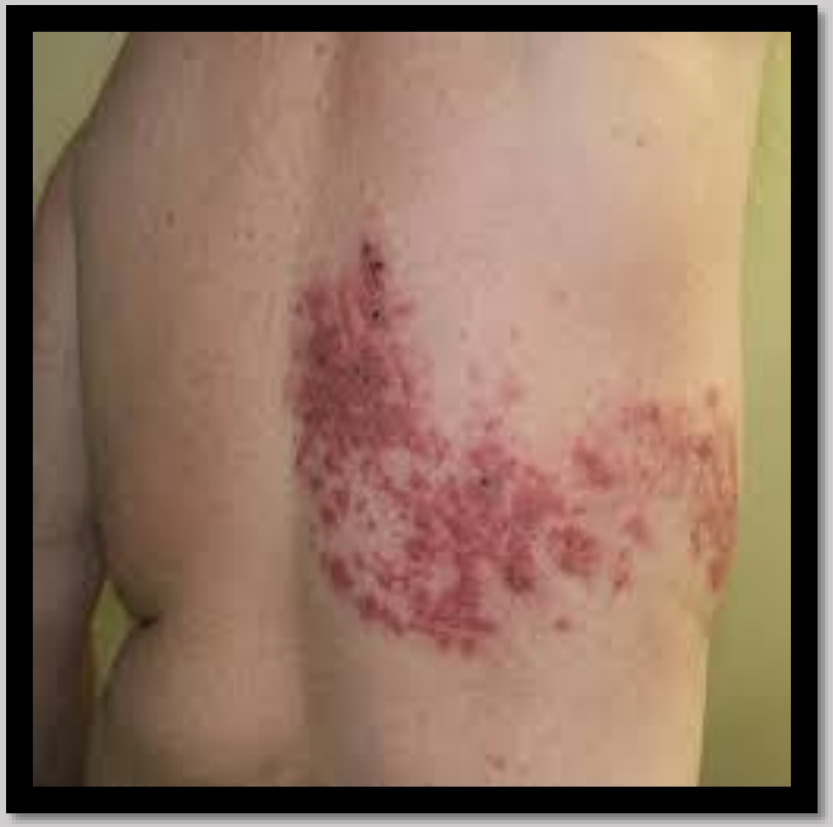
- The lesions begin as macules that rapidly become papules followed by characteristic vesicles; these lesions can then develop a pustular component followed by the formation of crusted papules.

Uncomplicated varicella …

- The patient with varicella typically has lesions in different stages of development on the face, trunk and extremities.

- New vesicle formation generally **stops within four days**, and most lesions have fully crusted by day six in normal hosts .

- Crusts tend to fall off within about one to two weeks and leave a temporary area of hypopigmentation in the skin.



- You can get it from an **infected person who sneezes, coughs, or shares food or drinks.**
- You can also get it if you touch the **fluid from a chickenpox blister.**

Prevention of chicken pox

- General Considerations avoidance measures - exclusion from preschool and school for **5 days sufficient** to prevent varicella transmission based on 4 studies included in systematic reviews.

- Varicella Virus Vaccine Live recommended for prevention of varicella (chickenpox) in adults, adolescents, and children ≥ 12 months old (Centers for Disease Control and Prevention (CDC).

Prevention of chicken pox

- **Varicella Vaccine** Information (2021 Apr 28) CDC recommendations on varicella vaccine or measles, mumps, rubella, and varicella (MMRV) vaccine recommended schedule during routine childhood vaccination (2-dose series) first dose recommended at age 12-15 months MMR and varicella vaccine given separately is preferred for first dose over MMRV at age 12-47 months due to the risk of febrile seizures, though MMRV may be used if parents or caregiver have a preference second dose recommended at age 4-6 years, but dose 2 can be given as early as 3 months after first dose regardless first or second dose, MMRV is preferred over MMR and varicella vaccine separately at age ≥ 48 months recommended catch-up schedule in people without evidence of immunity children age 7-12 years: 2-dose series given ≥ 3 months apart children ≥ 13 years old and adults:
  - **2-dose series given ≥ 4-8 weeks apart if it has been > 8 weeks since first dose,** second dose may be given without restarting schedule

Pneumonia

- Few reports focusing on pneumoniae complications of varicella in pediatric age are available in the literature as pneumonia is frequently detected as an adult varicella complication .

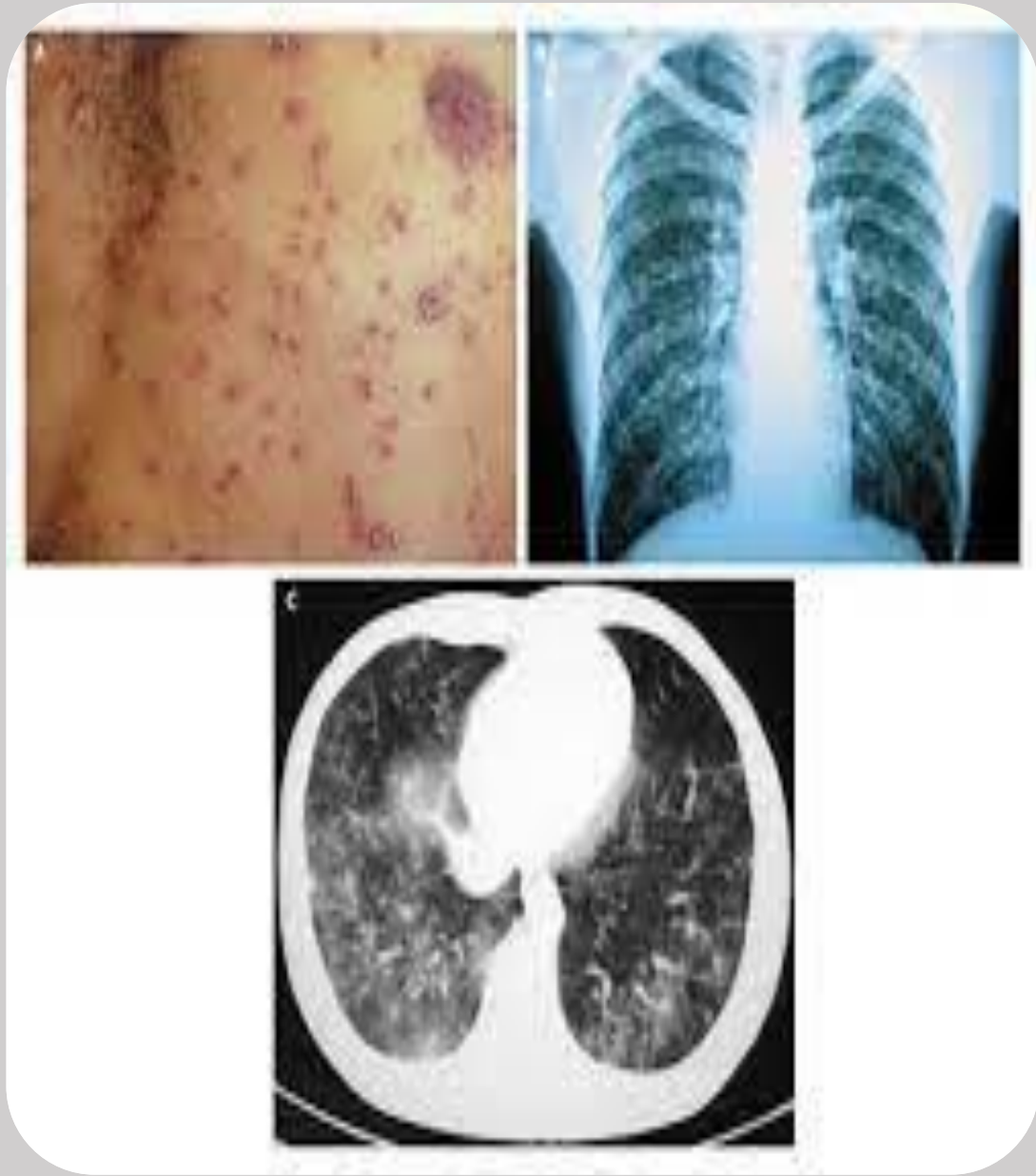
- Previous studies on childhood varicella complications varicella pneumoniae variable from 5.61% to 30.3% among children hospitalized for varicella .

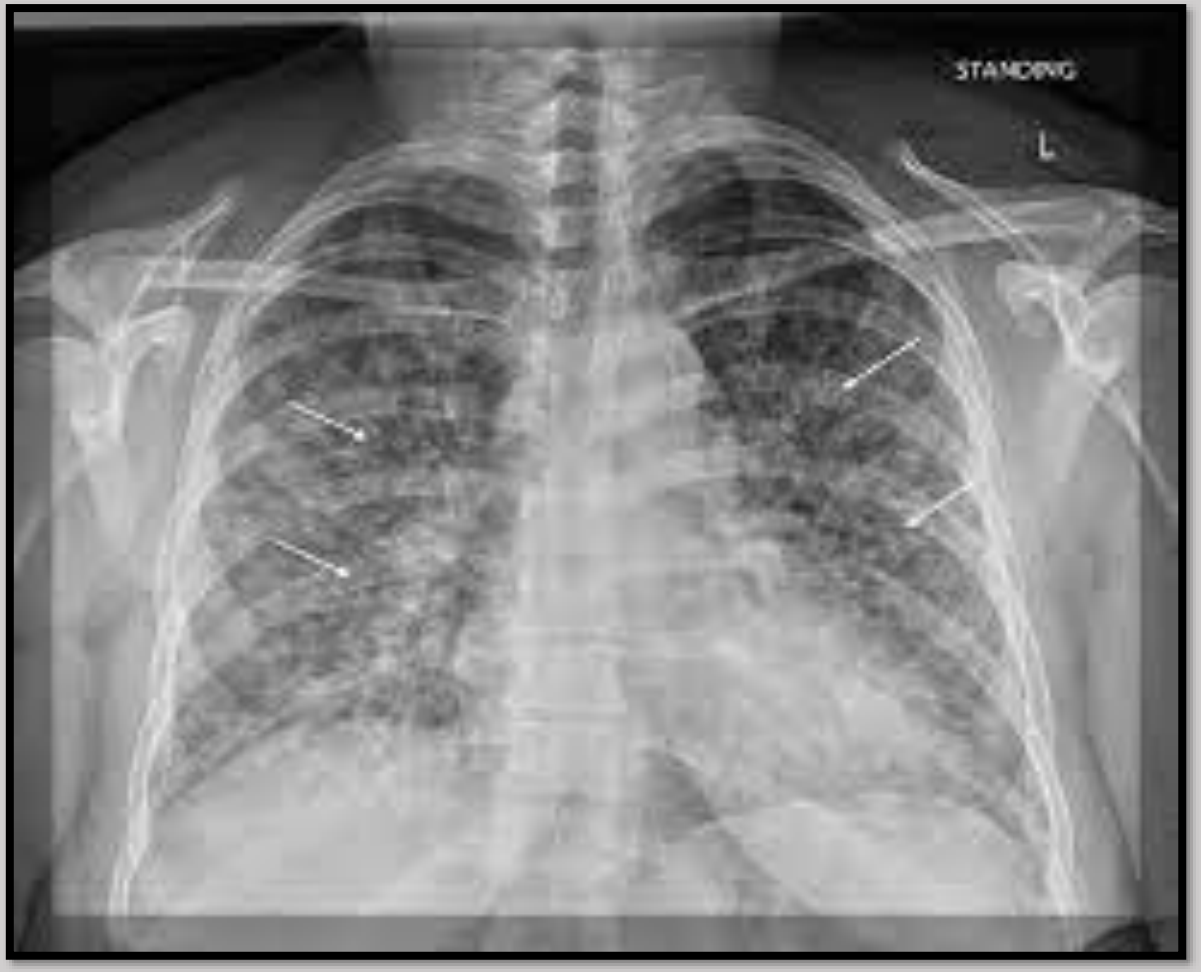
- The outcome of varicella is thought to depend upon the **severity of the disease and the immune state of the patient.**

Pneumonia

Risk factors for VAP in children

- **Age:** Children **under the age of 1y and over the age of 10y** are at increased risk for VAP.
- **Immunodeficiency:** Children with weakened immune systems, such as those with **HIV/AIDS or leukemia**, are more likely to develop VAP.
- **Underlying medical conditions:** Children with certain underlying medical conditions, such as **chronic lung disease or heart disease**, are also at increased risk for VAP.

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Immunodeficiency and other risk factor

- **Pneumonia:** In immunocompetent children with varicella, pneumonia remains an uncommon complication; in contrast, pneumonia accounts for the majority of morbidity and mortality seen in adults with varicella, although it is infrequently seen since the introduction of vaccine (eg, 60 per 10,000 cases).
- In immunocompetent adults, varicella pneumonia has a reported incidence of about one in 400 cases and carries an overall mortality of between 10 and 30 percent.
- However, in patients with respiratory failure who require **mechanical ventilation**, mortality rates approach **50 percent despite institution of aggressive therapy and appropriate supportive measures.**
- Risk factors linked to the development of varicella pneumonia include **cigarette smoking , pregnancy , immunosuppression , and male sex .**

Immunodeficiency and other risk factor

- **Pregnancy may be an additional risk factor** for severe varicella pneumonia although the incidence of pneumonia does not appear to be higher in pregnant patients with varicella .
- In a previous study, comparing healthy and immunocompromised children, pneumonitis was found to be the most common complication of varicella infection in previously ill patients.
- pneumonia associated with varicella infection mainly affected previously healthy children (85.3%).
- The mean length stay was similar in both immunocompetent and immunocompromised children.
- Nevertheless, we have to underline that the only patient who died during the study period was an immunocompromised host due to a malignancy.

- Varicella pneumonia typically develops insidiously within one to six days after the rash has appeared with symptoms of **progressive tachypnea, dyspnea, and dry cough; hemoptysis** has occasionally been reported .Patients demonstrate impaired gas exchange with progressive hypoxemia. Chest radiographs typically reveal **diffuse bilateral infiltrates; in the early stages a nodular component may be present, which can subsequently become calcified.**

- Prompt administration of **intravenous acyclovir** has been associated with clinical improvement and resolution of pneumonia in selected series.

- The use **of steroids as adjunctive therapy** for the treatment of **life-threatening** varicella pneumonia is **controversial** and has not been well studied.

- An uncontrolled study evaluated 15 adult patients with varicella pneumonia; 11 of these 15 patients (73 percent) were smokers and eight (53 percent) required mechanical ventilation.

- All were treated with intravenous acyclovir and supportive measures; six also received steroids.

- The patients who received steroids had a shorter hospitalization (median difference of 10 days) and a shorter ICU stay (median difference eight days).

- The authors of this report suggested a randomized trial, which to date has not been performed.

Management

- **Antiviral therapy** may also affect the prognosis when prescribed within the first 24 h after the rash develops in both immunocompetent and immunodepresed hosts. In our study, we found that the **length of hospitalization was shorter in those who started the therapy promptly.**

- Finally, another important finding is that no children had received immunization in the past, even though 58 patients were older than 1 year and consequently potentially vaccinable.

Diagnosis of VAP in children

VAP is typically diagnosed based on a combination of the child's medical history, physical examination, and chest X-ray. A chest **X-ray** may show signs of pneumonia, such as **infiltrates (fluid in the lungs) or consolidation (hardening of the lung tissue).**

Treatment of VAP in children

Most children with VAP can be treated with **supportive care and antiviral medications**. Antiviral medications, such as **acyclovir (Zovirax) or valacyclovir (Valtrex**), can help to shorten the duration of the illness and reduce the severity of symptoms. In some cases, children with VAP may need to be hospitalized for oxygen therapy or intravenous fluids.

Prevention of VAP in children

The best way to prevent VAP is **to vaccinate children against varicella**. The varicella vaccine is safe and effective, and it is recommended for all children at 12-15 months of age, with a second dose at 4-6 years of age. Children who have not been vaccinated against varicella should be vaccinated as soon as possible after exposure to the virus.

Central nervous system (CNS) complications of varicella-zoster virus

- **The most common CNS complications of VZV in children are**:

- **Encephalitis**: Inflammation of the brain, which can cause a variety of symptoms, including **fever, headache, vomiting, confusion, seizures, and coma**.
- **Aseptic meningitis**: Inflammation of the **meninges,** the membranes that surround the brain and spinal cord. Aseptic meningitis is usually less severe than **encephalitis** and resolves on its own within a few weeks.
- **Cerebellar ataxia**: Ataxia is a lack of coordination. Cerebellar ataxia is caused by damage to the cerebellum, a part of the brain that controls movement and balance.

Central nervous system (CNS) complications of varicella-zoster virus

- **Myelopathy**: Inflammation of the spinal cord, which can cause weakness, numbness, and paralysis.
- **Stroke**: A stroke occurs when the blood supply to the brain is interrupted. Strokes can be caused by VZV-induced vasculitis (inflammation of the blood vessels).

Other, less common CNS complications of VZV in children include:

- **Guillain-Barré syndrome**: A rare neurological disorder that causes muscle weakness and paralysis.
- **Ramsay Hunt syndrome**: A neurological disorder that affects the facial nerve and can cause facial paralysis, hearing loss, and pain in the ear and face.
- **Transverse myelitis**: Inflammation of the entire cross-section of the spinal cord, which can cause weakness, numbness, and paralysis below the level of the inflammation.

Acute Cerebellar Ataxia

- which is a disease characterized by unsteady gait with a sudden onset, is caused by a secondary **autoimmune response to infection or vaccination** in healthy children; the term ACA is commonly used together with acute cerebellitis (AC), which refers to more severe cases.

- Most ACA patients are young children who cannot describe their symptoms accurately, so it is often difficult to diagnose ACA.

- Furthermore, the exact frequency of the disease has never been investigated, as it occurs infrequently. . However, ACA is known to be the most common cause of childhood ataxia, accounting for 30%to 50% of childhood ataxia cases .

Acute Cerebellar Ataxia

- Ataxia (limb and/or truncal) was the most common cerebellar sign, which was seen in all subjects, and other cerebellar symptoms included **dysarthria , dysmetria , and nystagmus**.

- **a lumbar puncture** was performed in all subjects. The CSF examinations in eight patients were normal. One patient showed an increase in CSF protein levels (136.4 mg/dL) and CSF pleocytosis (white blood cell, 570 cells/μL) with lymphocytic predominance, but both CSF culture (bacterial, fungal culture) and viral/mycobacterial studies (enterovirus real-time PCR [RT-PCR], herpes zoster virus type 1 and 2 PCR, Mycobacterium tuberculosis PCR) in the CSF were negative

- **Although epileptiform discharge or slowing on EEG** was observed in some previous cases , EEG frequently shows normal findings in ACA patients, and all the patients in our study had normal EEG findings.

- Three of our patients showed abnormalities on MRI of the brain, which were the same as those previously reported in children with AC (i.e., hyperintensity in T2-weighted sequences) .

- In previous studies, brain atrophy or diffuse cerebellar signal changes were observed in some patients on follow-up MRI of the brain , but all our patients showed improvement.

- These results suggest that abnormal findings on the initial MRI of the brain do not persist in all patients, and our patients generally showed improvements.

- The prognosis of ACA is usually very good. Although a study reported full recovery of ACA within 24 days without treatment , it is generally recognized that full recovery of symptoms takes 2 to 3 months without treatment.

- There is no consensus on the treatment for ACA, as some studies have reported that **steroids were effective for ACA treatment** , while others reported that they were not helpful .

- Extracerebellar symptoms (e.g., fever, **vomiting, diarrhea, headache, and dizziness) were also present, and these symptoms were similar to those described in previous studies .**

- Symptoms such as seizure and altered mental status, which have been reported to occur in some severe cases , were not observed in our patients.

- Steroid therapy was performed in two different ways.

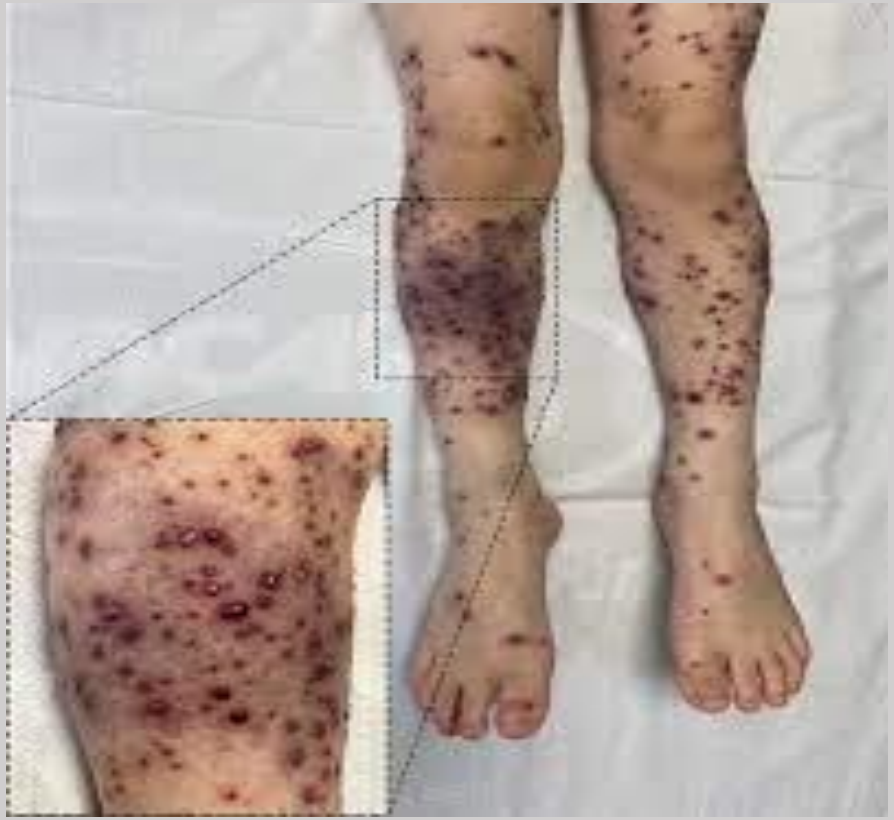
- The cerebellar symptoms began to improve within 2 to 4 days of steroid therapy (and there was no statistically significant difference between patients who received pulse therapy and those treated with oral prednisolone only .

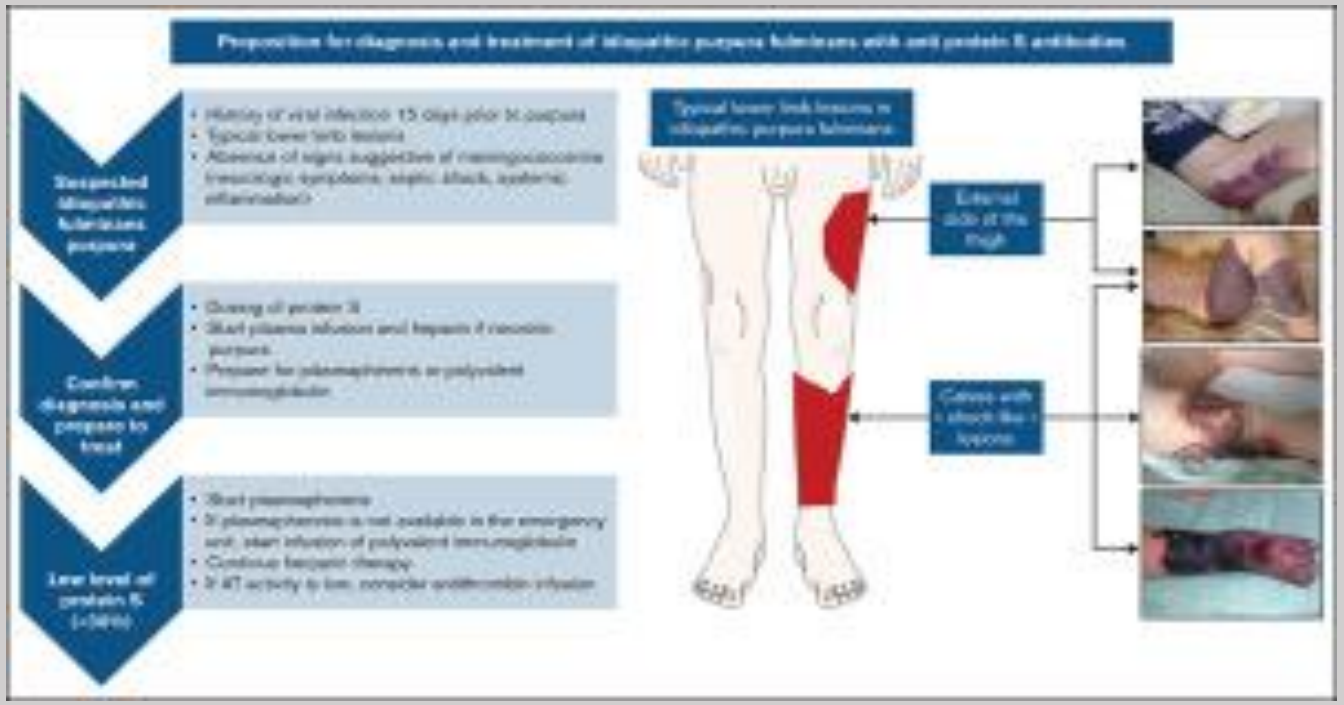
Post-viral idiopathic purpura fulminans

- Idiopathic purpura fulminans (IPF) is a rare and severe prothrombotic disorder,affecting children after a primary infection by common infectious entities such as the **varicella-zoster virus (VZV) or human herpes virus 6 (HHV6).**
- The putative mechanism involves antigenic mimicry between the virus and PS.
- Purpura fulminans (PF) is a **rare and life-threatening** condition characterized by **widespread thrombosis and necrosis of the skin and other tissues.**
- It can be caused by a variety of factors, **including bacterial infections, protein deficiencies, and certain medications.**
- Varicella-zoster virus (VZV), the virus that causes chickenpox and shingles, is a known risk factor for PF.

Post-viral idiopathic purpura fulminans

- This is because VZV can cause a **temporary deficiency of protein S, a protein that helps to prevent blood clots.**
- PF typically presents with **rapidly progressive purpura (purple skin lesions) and necrosis (tissue death) of the extremities.**
- Patients may also experience **severe pain, shock, and organ failure**.
- The treatment of PF is complex and involves a combination of **supportive care, anticoagulants, and plasmapheresis** (a procedure that removes harmful substances from the blood). **In some cases, amputation of affected limbs may be necessary.**
- The prognosis for PF is poor, with mortality rates of up to 50%. However, early diagnosis and treatment can improve the chances of survival





Idiopathic purpura fulminans associated with anti-protein S antibodies in children:

a multicenter case series and systematic review

Here are some of the mechanisms by which VZV can lead to PF:

- VZV can cause **a temporary deficiency of protein S.**
- VZV can **activate the coagulation cascade**, leading to the formation of blood clots.
- VZV can **damage endothelial cells**, the cells that line the blood vessels. This can make the blood vessels more susceptible to thrombosis.
- VZV can **trigger an inflammatory response** that can further damage the blood vessels and tissues.

People at increased risk of VZV-associated PF include:

- Newborns and infants
- Immunocompromised individuals
- Pregnant women
- People with chronic underlying medical conditions such as diabetes, kidney disease, and heart disease

It is important to be aware of the signs and symptoms of PF.

Seek medical attention immediately if you experience any of the following:

- Rapidly progressive purpura (purple skin lesions)
- Necrosis (tissue death) of the extremities
- Severe pain
- Shock
- Organ failure

Early diagnosis and treatment are essential for improving the chances of survival.

Secondary infection

- The most common sequelae are bacterial skin infections, which are usually mild.
- Two major bacteria implicated for post-varicella infection are **Group A b-haemolytic streptococcus (GABHS) and Staphylococcus aureus**
- Secondary bacterial infections occur after the disruption of the protective skin barrier through the varicella vesicle and possibly by virus-induced alterations of immune functions.
- Another contributing factor is trauma to skin from scratching that could lead to bacteraemia.
- GABHS possesses tissue-dissolving enzymes (hyaluronidase and streptolysin) that facilitate penetration of deeper tissues. The incidence and severity of GABHS infection appears to be increasing.

acute complications

secondary bacterial infections, usually due to **Staphylococcus aureus or Streptococcus pyogenes.**

most common cause of varicella-related morbidity in otherwise healthy children

presents as bullous progression or cellulitis surrounding varicella lesions

lymphadenitis or subcutaneous abscesses may occur bacterial superinfection may occur and manifest as necrotizing fasciitis varicella gangrenosa osteomyelitis

septic arthritis streptococcal toxic shock syndrome spinal epidural abscess

- **Necrotizing fasciitis (NF)** is a rare but serious complication of varicella zoster virus (VZV) infection, also known as chickenpox or shingles. It is a rapidly progressive infection of the fascial layer, which is the connective tissue that surrounds muscles, nerves, and blood vessels. NF is caused by a **secondary bacterial infection**, which can occur through a break in the skin, such as a chickenpox blister.
- **NF is more common in adults than in children, and it is especially common in adults who have weakened immune systems**.

Other risk factors for NF include:

- Diabetes
- Obesity
- Cancer
- HIV/AIDS
- Chronic kidney disease
- Recent surgery
- Intravenous drug use

The symptoms of NF typically develop within a few days of a VZV infection.

They include:

- Severe pain and tenderness in the affected area
- Redness, swelling, and warmth of the skin
- Blisters or ulcers on the skin
- Fever
- Chills
- Nausea and vomiting
- Confusion

- If NF is not diagnosed and treated promptly, it can be fatal. Treatment involves **aggressive antibiotic therapy and surgery to remove the infected tissue.**
- How to prevent NF
- The best way to prevent NF is to get **vaccinated against VZV**. The chickenpox vaccine is very effective at preventing both chickenpox and shingles.
- If you do develop chickenpox or shingles, it is important to take care of your skin and **avoid scratching the blisters**. If you have a break in your skin, **wash it thoroughly with soap and water and apply a bandage.**
- If you experience any of the symptoms of NF, such as **severe pain, tenderness, redness, swelling, or warmth of the skin**, seek medical attention immediately.

Hepatitis

- Hepatitis Biopsy proven visceral hepatic involvement with varicella is **uncommon**, but when it occurs, generally affects **immunosuppressed hosts including transplant recipients and AIDS patients;** the outcome is frequently **fatal .**

- Clinical varicella hepatitis in healthy individuals is rare despite the fact that asymptomatic or subclinical transaminase elevation, coincident with the onset of varicella, has been documented in 77 percent of children in one series.

Hepatitis

- In immunosuppressed hosts with varicella hepatitis, the most common presenting features have typically included cutaneous **vesicular lesions, fever, and acute abdominal or back pain**.
- However, the rash may precede , appear coincident with ,or follow the onset of hepatitis, which can delay the diagnosis of this complication.

The development of varicella hepatitis with widespread visceral dissemination has been reported in a bone marrow transplant patient in the absence of a rash .

- Fulminant liver failure with **disseminated intravascular coagulation (DIC) and gastrointestinal hemorrhage with dissemination have also been reported .**

Neonate and VZV

- Varicella during pregnancy is a rare but potentially serious condition able to generate severe maternal and fetal disease as well as disseminated infection in newborns. According to a survey in the UK, its incidence turns around at least 1/2000 live birth.

There are three ways of VZV mother-to-child transmission, defined as follows:

- Transplacental viremia.
- Direct contamination during delivery (skin lesions, blood, and so on)
- Postnatal contamination by respiratory droplets or skin contact with infected vesicles.

The highest risk period for the newborn corresponds to a VZV maternal infection contracted just around delivery (−5 days to +2 days).

- In fetus who were exposed earlier from 20 to 5 days before delivery, neonatal varicella can also develop, generally around the 0–4 days of life (corresponding to 9–15 days after onset of maternal rash). Fortunately, in such cases, subsequent infection is generally mild to moderate.

- Prevention and treatment

- Recommended VZIG doses administered through intramuscular injection are:

- Newborn<2.0 kg: 125 U.

- Newborn>2.0 kg: 250 U.

- Many European procedures, hence, include regular intravenous immune globulins (IVIG) (400 mg/kg once) in combination or not with acyclovir.
- Efficacy of this treatment has been supported by a study assessing 15 newborns considered at high risk of severe presentation after a maternal infection occurring in the risky period (from 7 days before to 5 days after delivery) All of them received 500 mg/kg immediately after birth or after the infective contact, with or without intravenous acyclovir.
- Acyclovir was started 7 days after the first day of onset of maternal eruption and kept for 5 days.
- None of the 10 newborns **receiving IVIG therapy plus intravenous acyclovir presented with symptomatic varicella.**

Mother starting varicella symptoms **from D+3 to D+28 after delivery**: postnatal infection

- Therapeutic recommendations

►► Treat the baby with acyclovir (PO) 80 mg/kg/day

- divided into four doses from day 7 after the onset of maternal rash and administer during 7–10 days.

►► Indication and duration of hospitalisation (with airborne and contact precautions) should be discussed in each case depending on mother and child clinical status, parental compliance and social setting. If any doubt, hospitalisation with optimal medical surveillance are warranted during the risk period.

►► In the rare case, the newborn will develop varicella symptoms despite preventive therapy, consider according to clinical evolution and severity to hospitalise and switch to intravenous acyclovir for at least 3 weeks and search for underlying conditions (congenital immunodeficiency, metabolic disease, viral resistance, and so on).

Mother starting varicella symptoms **from D−20 to D−6 before delivery**

- Keep newborn and mother for at least 3 days hospitalised (with airborne and contact precautions for both).

►► Treat the baby with either VZIG (see dosage above) or, if unavailable, IVIG 400 mg/kg as soon as possible (within the first 48–96 hours after birth).

►► If the child does not have any other comorbidity and is fully asymptomatic and the parents are reliable, mother and baby could leave the hospital after administration of immune globulins. If any doubt, hospitalisation with optimal medical surveillance are warranted during the risk period (first week of life).

►► If vesicles are present at birth or appear, add acyclovir PO 80 mg/kg/day divided into four doses and maintain over 7 days (according to clinical evolution) and hospitalise the baby for surveillance. Duration of hospitalisation (with airborne and contact precautions) should be discussed in each case depending on mother and child clinical status, parental compliance and social setting.

•asymptomatic newborn in contact with VZV from any infected subject

The mother is proved seropositive:

- Very low risk of disease in the baby.
- No treatment should be provided.
- Observance of the baby at home and encourage parents to come back if any clinical sign or symptom appears in the 2 weeks after contact.
- If symptoms or signs of varicella

The mother is proved seronegative or refuses testing:

- Treat the baby with acyclovir PO 80 mg/kg/day divided into four doses to start 7 days after infective contact and administer during 7 days.

- Careful surveillance of the baby during the risk period. Indication and duration of hospitalisation (with airborne and contact precautions) should be discussed in each case depending on child clinical status, parental compliance and social setting.

- If any doubt, hospitalisation with optimal medical surveillance are warranted during the risk period.

- infant<1 month of age presenting with clinical signs of varicella

As for varicella treatment, administration of acyclovir is always recommended.

Way of administration depends on mother immunological status against VZV:

Mother with a confirmed medical history of varicella:

- Low risk of severe varicella disease.
- Treat the baby with acyclovir PO 80 mg/kg/day divided into four doses.
- Hospitalisation according to clinical presentation (fever, altered general status, severe eruption, suspected bacterial superinfection, and so on) and social setting (parental incompliance and so on).

Mother with no history of varicella or status unknown:

- **Mandatory hospitalisation**.
- Treat the baby with **acyclovir for a minimum of 7 days**. Start with acyclovir **intravenous 30 mg/kg/day divided into three doses for moderate to severe cases** and **switch to acyclovir PO as soon as observing significant clinical improvement.**

- Treat directly with acyclovir **PO 80 mg/kg/day divided into four doses for mild clinical presentations**


03-01-2008


Thanks for your attention