Paediatric

Britimedics Notes

DR: Sara El-Menshawi

Paediatric chapter

Respiratory System

All the following conditions may present with signs of respiratory distress:

1. Infant respiratory distress syndrome
2. Congenital pneumonia
3. Transient tachypnoea of the new-born
4. Meconium aspiration syndrome
5. Pulmonary haemorrhage
6. Milk aspiration
7. Pulmonary air leaks such as pneumothorax or pulmonary interstitial emphysema
8. Non-pulmonary conditions such as congenital heart disease, sepsis or severe anaemia

Investigations

- Monitor oxygen saturation.
- Arterial blood gas analysis
- Blood culture should be taken prior to antibiotic administration and as early as possible.
- A chest X-ray is vital in the investigation of respiratory distress!
  - ✓ Bilateral, diffused granular or "ground glass" appearance and reduced lung volumes are seen in infant respiratory distress syndrome.
  - ✓ A patchy shadowing or consolidation would be seen in congenital pneumonia.
  - ✓ Streaky perihilar changes are seen in transient tachypnoea of the new-born.

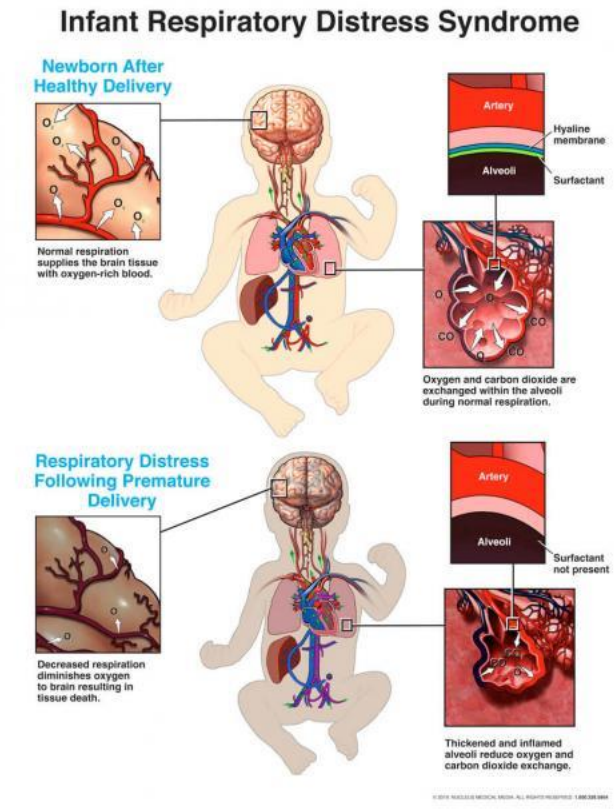
Tips

- Preterm infants are at increased risk of infection.
- A normal temperature does not rule out sepsis in infants.
- Infant respiratory distress syndrome is primarily seen in preterm infants but is rare over 32 weeks of gestation.
- Congenital pneumonia may present similarly to infant respiratory distress syndrome and therefore infants are usually given antibiotics (penicillin or gentamicin) until congenital pneumonia can be ruled out
- Prolonged rupture of the membrane is not a risk factor for infant respiratory distress syndrome (In fact, the incidence of IRDS decreases with prolonged rupture of membranes)

Paediatric chapter

Infant Respiratory Distress Syndrome

Inadequate surfactant in the lungs causing alveoli to collapse resulting in respiratory distress.



- Premature infants
- Caesarean delivery
- Maternal diabetes

Presentation

- Respiratory distress and Tachypnoea
- Subcostal and intercostal retractions
- Expiratory grunting
- Cyanosis if severe

Treatment

Treatment before birth

- If you're thought to be at risk of giving birth before week 34 of pregnancy, treatment for NRDS can begin before birth.
- You may have a **steroid injection** before your baby is delivered. A second dose is usually given 24 hours after the first.

Treatment after the birth

- **Resuscitation** in the delivery room
- Endotracheal **surfactant** replacement
- Surfactant given down the endotracheal tube or via catheter - done in very premature infants usually less than 27 weeks of gestation.
- Respiratory support using **oxygen** via high-flow nasal cannula, CPAP or invasively with mechanical ventilation via endotracheal tube.
- **Fluid** and **electrolyte** monitoring.
- **Antibiotics** until congenital pneumonia is excluded.

Paediatric chapter

Congenital pneumonia

usually caused by aspiration of amniotic fluid/blood from placental abruption. There is an association with prolonged rupture of membranes, chorioamnionitis, and low birth weight it usually presents within the first 24 hours.

Presentation

- tachypnoea (respiratory rate > 60)
- The increased work of breathing often manifests as use of accessory respiratory muscles (i.e., nasal flaring or retractions) or grunting.

Investigation

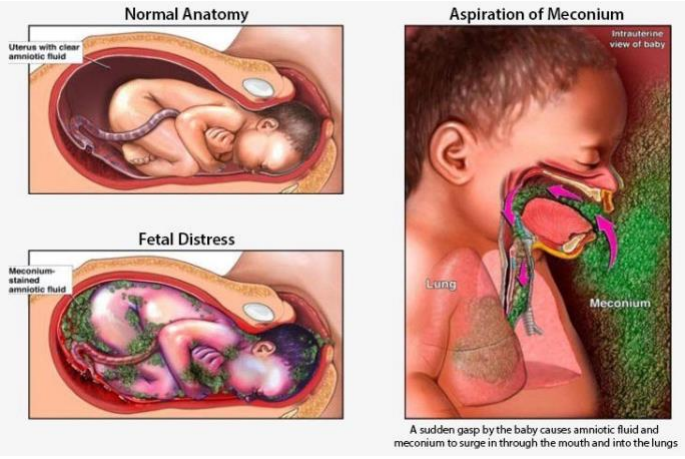
- **Blood culture should be taking first prior to administration of Antibiotic.**
- The chest X-ray would show **patchy shadowing or consolidation**.

Treatment

Antibiotics are usually started early and reviewed once infection screening results are available.

Meconium Aspiration Syndrome

Respiratory distress developing shortly after birth with radiological evidence of aspiration meconium-stained amniotic fluid pneumonitis and the presence of meconium-stained amniotic fluid.



Risk factors

- Post date (>42 weeks gestation)
- Maternal hypertension
- Oligohydramnios)
- Placental insufficiency

Treatment

- Airway **suctioning**
- Maintenance of **oxygen** saturation
- Fluid and electrolyte **monitoring** as perinatal stress can lead to inappropriate antidiuretic hormone (ADH) secretion syndrome and acute kidney injury.

Paediatric chapter

Transient tachypnoea of the new-born

- is the most common cause of respiratory distress in term infants. The condition is caused by a delay in the resorption of lung liquid Risk factors include c-section deliveries.
- The clinical features are of respiratory distress. The chest x-ray shows fluid in the horizontal fissure Management involves administering oxygen. The features of respiratory distress usually settle in a day, but some can go on for a few days.

Neonatal sepsis within 48 hours of delivery

Early neonatal infections are caused by bacteria **ascending from the vagina** and contaminating the amniotic fluid. As the foetus is in direct contact with the amniotic fluid, these infants are at risk of developing pneumonia or septicaemia.

Risk factors

- Premature rupture of membranes
- Chorioamnionitis

Clinical features

- Temperature instability which includes hyper or hypothermia
- Poor feeding
- Apnoea
- Respiratory distress
- Jaundice
- Drowsy

Investigations

- Chest x-ray
- Full blood count
- CRP
- Blood culture

Management

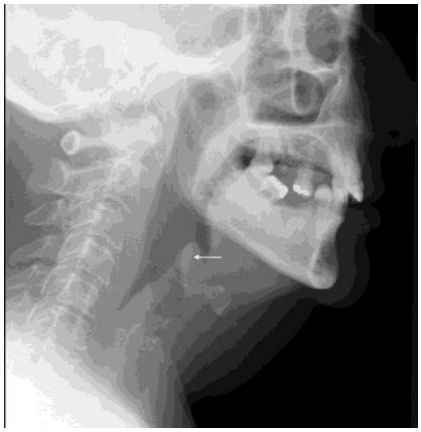
Antibiotic is started once infection is suspected.

Acute Epiglottitis

- Acute epiglottitis is a **life-threatening** condition and can lead onto obstruction of the airway. **should be referred for urgent assessment.**
- Call for **summon** who is the most experienced anaesthetics to intubate before obstruction occur.
- Common organisms:
  - Unvaccinated individuals → H. Influenzae (Hib)
  - Vaccinated individuals → Streptococcus

Presentation

- Drooling of saliva
- Muffled voice - Hot potato voice
- High temperature
- Odynophagia and dysphagia
- Stridor (sign of airway obstruction)



Investigation

- **Laryngoscopy** - gold standard
- Lateral neck X-ray - thumb sign
- Throat swab

Patients who are suspected of having acute epiglottitis **should not have their throat examined with the aid of a tongue depressor,** due to the risk of laryngeal obstruction; rather, they should be urgently referred for laryngoscopy.

Treatment

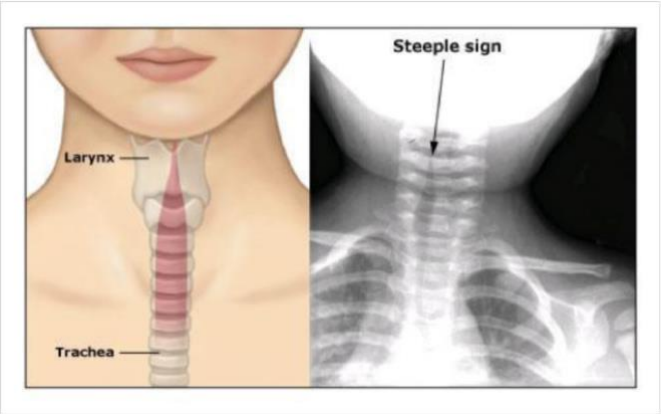
- Intubation if signs of airway obstruction are present.
- IV antibiotics
- Fluids

Paediatric chapter

CROUP (laryngotracheobronchitis)

It is usually caused by inflammation of the upper respiratory tract (predominantly the larynx and trachea but it may affect the bronchi) because of **viral** infection. **(Parainfluenza virus)**
Clinical Picture:

- Harsh **barking** cough.
- Hoarse voice
- (**Inspiratory**) stridor.
- Fever



Investigation

Xray show steeple sign.

Treatment

- **Usually, most children make full recovery with or without treatment.**
- **Mild croup** is largely self-limiting, but treatment with a single dose of a corticosteroid (e.g., **dexamethasone**) by mouth may be of benefit.
- **Moderate to severe croup** (or mild croup that might cause complications such as in those with chronic lung disease, immunodeficiency, impending respiratory failure, or in children aged under 3 months) calls for hospital admission; a single dose of a corticosteroid (e.g., **dexamethasone** or **prednisolone** by mouth) should be administered while awaiting hospital admission.
- **If the child is too unwell to receive oral medication**, **dexamethasone** (by intramuscular injection) or **budesonide** (by nebulisation) are suitable alternatives while awaiting hospital admission.
- **For severe croup** not effectively controlled with corticosteroid treatment, nebulised **adrenaline/epinephrine solution with O2.**

Note for you!

- barking cough is for croup.
- Whooping cough is for pertussis.

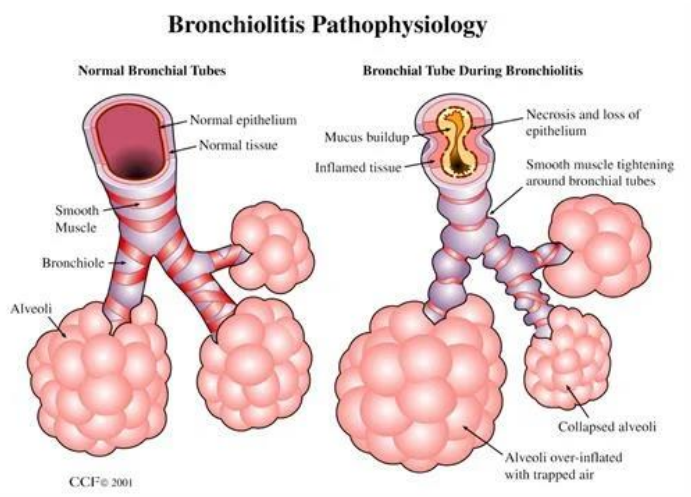
Paediatric chapter

Bronchiolitis

Bronchiolitis is an acute viral infection of the **lower respiratory** tract that occurs primarily **in the very young.**
It is a clinical diagnosis based upon typical symptoms and signs. Bronchiolitis is generally **a self-limiting** illness, and management is mostly **supportive**.
Usually Follow Acute **viral** infection of the Upper respiratory tract.
Common in children < 2 years old.

Presentation

- **Persistent cough**
- Respiratory distress
- **Expiratory Wheeze.**
- Bilateral crepitations/crackles
- Tachypnoea
- Chest retractions



Common cause: Respiratory syncytial virus (RSV)

When to consider admission of bronchiolitis patient only if

- respiratory rare > 70
- saturation<90
- clinically dehydrated.
- feeding <75%

Treatment

- Largely supportive
- Oxygen (humidified)
- Nasogastric tube for feeding.
- No role for Antibiotics.

Nice is against the following: Antibiotics, systemic or inhaled steroids, hypertonic saline, inhaled adrenaline, salbutamol, montelukast.

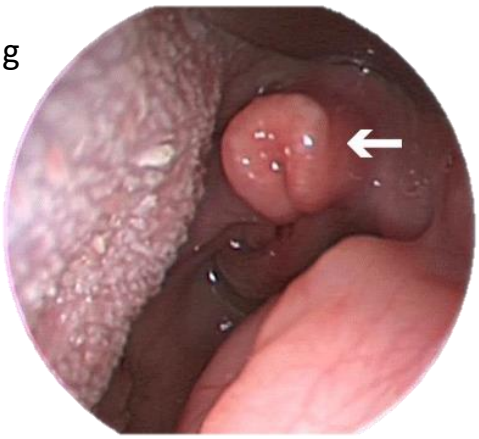
Paediatric chapter

Inhaled foreign body.

History of swollen foreign body in normal child or history of playing

- Choking
- Hoarseness or inability to speak.
- Investigation
- Laryngoscopy

Laryngomalacia



The soft tissues of the larynx fall over the airway opening and partially block it. This can result in stridor — a high-pitched sound that is heard when your child inhales.

- Most common cause of congenital stridor
- Usually, normal thriving infants
- Inspiratory stridor worsens during crying, feeding and in supine position.

Pertussis

Whooping cough caused by **Bordetella pertussis.**

Clinical features

Look for the child without immunisations who has a **bout** of cough followed by episodes of a blue face/lips.

- Paroxysmal cough
- Vomiting after coughing
- Inspiratory whoop
- Infants may not have the inspiratory whoop but may have episodes of apnoea or cyanosis.

Investigation

- Perinasal or nasopharyngeal swabs for culture and PCR

Treatment Macrolides {azithromycin or clarithromycin}

Reactive Lymphadenopathy

After an acute infection. **Reassurance** is all that is required as the lymphadenopathy will resolve over time.

There is always a transient increase in white blood cell count in any infection which would take days to return to normal.

Features of more than 1 of the following should prompt an **urgent referral** particularly where there is no evidence of a local infection:

- Non tender, firm lymph nodes.
- Hard lymph nodes.
- Lymph nodes more than 2 cm.
- Lymph nodes that are progressively enlarging.

---

*A full course of diphtheria, tetanus, and pertussis (DTaP) vaccine would be appropriate to prevent tetanus in the future. This is given as **five** doses at appropriate intervals.*
In the UK, this comes as a combination vaccine which protects against diphtheria, pertussis, Hib, hepatitis B and polio (DTaP/IPV/Hib/HepB)

schedule of primary immunisation:

Primary immunisation 3 doses each of which should be given at least 1 month. apart
***First booster** Usually given at least 3 years after completing primary immunisation.*
***Second booster** Usually given at least 10 years after completing primary immunisation.*

Gastrointestinal System disease

Oesophageal atresia

Atresia → Oesophagus ends blindly.

TOF (tracheoesophageal fistula) → Oesophagus connected with trachea.

Presentation

- Polyhydramnios during pregnancy
- Difficulty in feeding following birth.
- Associated with **VACTERL** anomalies. Or part of trisomy syndrome.

Xray no bubble sign

Complication:

- Aspiration pneumonia
- Gastric distension at birth

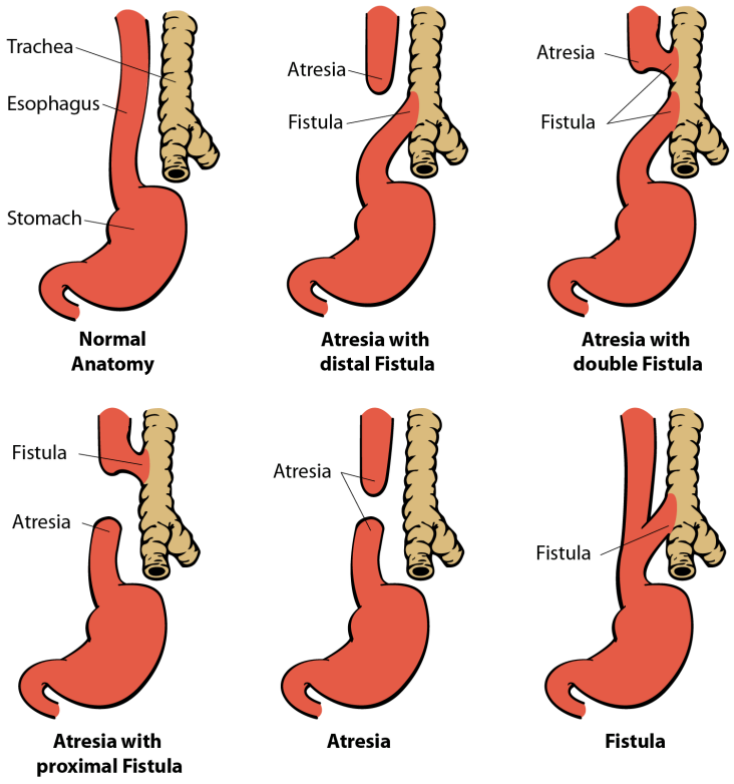
Treatment

- Surgical treatment is definitive.
- Fluid and electrolyte management

VACTERL association

refers to a combination of congenital anomalies that can include:

- **Vertebral anomalies,**
- **Anal atresia**
- **Cardiac malformations,**
- **Tracheoesophageal fistula with oesophageal atresia**
  Renal anomalies (typically structural renal anomalies)
- **Limb anomalies.**



Important Radiograph Bubble Signs

No gastric Bubble	**Oesophageal atresia**
One bubble	Gastric atresia
Double bubble	Duodenal atresia Malrotation and volvulus
Trible bubble	Jejunal atresia

Pyloric Hypertrophy Stenosis

Presentation

- **Age group 3-8 weeks**
- **Persistent non-bilious** vomiting weeks after birth Usually, an hour after feeding.
- Constant hunger, weight loss, and dehydration
- Olive shaped mass in the abdomen
- Fluid disturbance in persistent vomiting **(hypochloraemia and hypokalaemia)** result in **Metabolic alkalosis**

Diagnosis:

- **Initial** and most **urgent** investigation → **Serum K**
- **Definitive diagnosis** → Ultrasound

treatment

- Fluid replacement and correction of electrolyte imbalance (first line)
- Pyloromyotomy (definitive treatment) + nasogastric tube

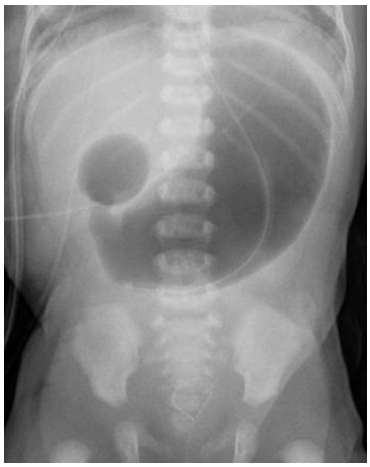
Notes:

- Vomiting in duodenal atresia occurs within hours after birth.
- Vomiting in pyloric stenosis occurs within weeks after birth.

Paediatric chapter

Congenital atresia duodenum

Presentation



- Persistent bilious or non-bilious vomiting
- abdominal distension
- Polyhydramnios
- **Double bubble** sign on abdominal X-ray
- Associated with Down's syndrome.

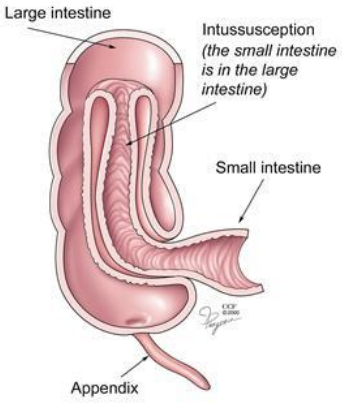
Treatment

- Abdominal decompression using NG tube.
- Fluid replacement and electrolyte monitoring
- Duodenoduodenostomy (definitive treatment)

Intussusception

Invagination or telescope of one segment of the bowel into the other

Presentation:

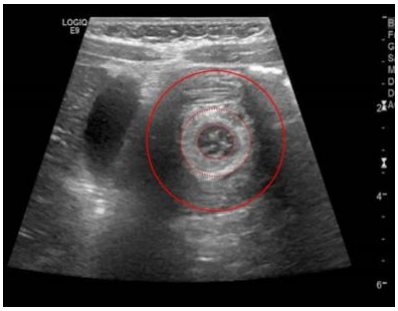


- Acute colicky abdominal pain in an infant Patient may draw knee to chest for relief.
- Abdominal distention and bilious vomiting.
- **Red-currant jelly** stool.
- right upper quadrant mass.
- Palpable sausage-shaped mass in the abdomen Folded-in Section of Bowel.
- Drawing legs up to chest.

Investigations:

- **US scan**: doughnut sign/target sign Investigation of **choice** as very effective.
- Barium enema is also an option (we say pick US first because it is less invasive).
- Abdominal X-ray: dilated gas filled abdomen with multiple air-fluid levels → Not the best test since may be normal in early stages.

Treatment



- Electrolyte and fluid correction
- Air enema (If there is no perforation, peritonitis, or shock)
- Open surgery - resection and anastomosis

Association between intussusception and HSP

- features of Henoch-Schoenlein purpura (HSP) are the purpuric rash, abdominal pain, and arthralgia.
- One of the rare complications of HSP is intussusception which can present as severe abdominal pain with rectal bleeding and fever.

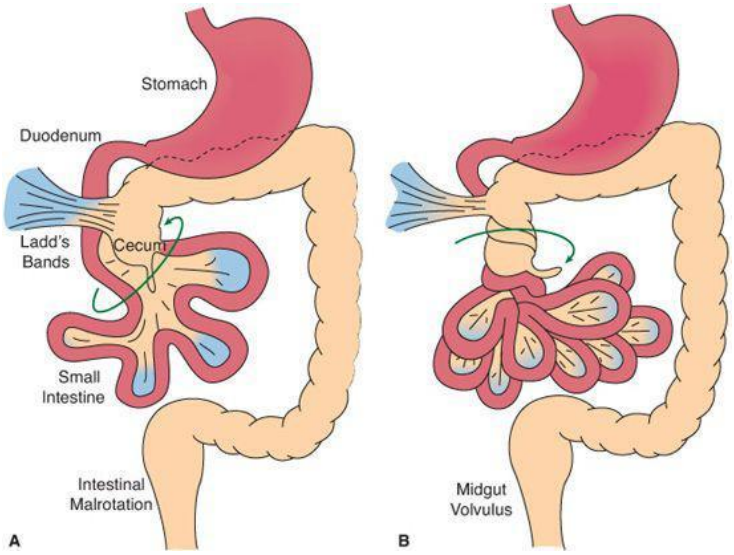
Malrotation and volvulus

Malrotation → Failure of normal sequence of rotation and fixation which results in rotation of small bowel leading to duodenal obstruction Sometimes Ladd's bands which are abnormal tissue attaches the cecum to the duodenum.

Volvulus → one of complication of malrotation results in obstruction of superior mesenteric blood vessels cutting off its own blood supply.

Presentation

- Age: neonates
- Sudden onset
- **Green, bilious vomiting**
- Blood per rectum



Diagnosis

- Abdominal x-ray "**Double bubble'** sign with distal gas
- Barium enema

Treatment:

- ABCDE protocol
- Decompression with nasogastric tube
- Referral to paediatric surgery for laparotomy and resection.

Paediatric chapter

Meckel's Diverticulum

Remember the rule of **2!**

- 2–3-year-old child mostly MALE
- 2 inches long
- 2 feet away from ileo-caecal valve

Presentation

- Most are **asymptomatic.**
- Painless rectal bleeding due to small intestine ulcers.
- If obstruction→→ Vomiting and abdominal pain

Investigations

- Initial Radioisotope scan
- Laparotomy

Treatment

- Symptomatic patients, patients with complications → Surgical resection

Complications

- Haemorrhage
- Diverticulitis
- Intestinal obstruction

GORD (Gastroesophageal Reflux)

Clinical features

- Recurrent regurgitation
- Episode of choking
- Feeding issues
- Pneumonia
- Most commonly resolves on its own by the age of 1.

Risk factors

- Premature birth
- Obesity (child)

Treatment

- Smaller and more frequent meals
- Trial of thickened formula (anti reflux formula milk or Carobel added to formula)
- Alginates therapy (infant Gaviscon)
- Proton Pump Inhibitors (omeprazole) or H2 blockers (Ranitidine) trial for 4 weeks.

Paediatric chapter

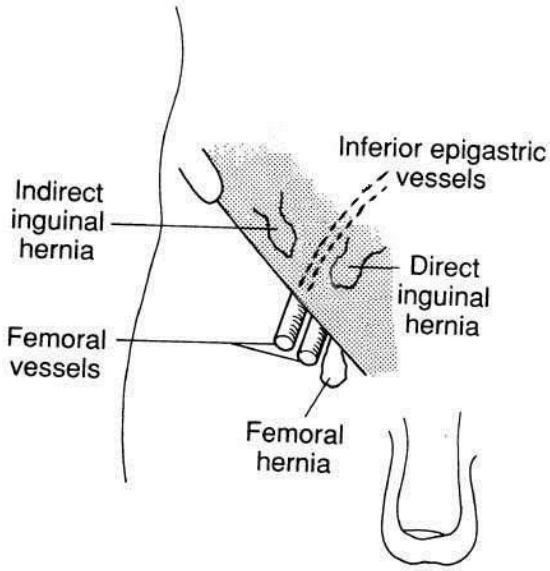
Hernia

Umbilical hernia

- Asymptomatic umbilical hernia **Reassure** (closes spontaneously by the 4th year)
- Asymptomatic umbilical hernia in **>4**-year-old→ Refer to paediatric surgeon.
- Incarcerated/strangulated hernia **Urgent referral** to paediatric / general surgery team.

Inguinal hernia

- All infants with asymptomatic inguinal hernia → Refer to **secondary** care due to high risk of **incarceration/Strangulation.**
- older children with asymptomatic inguinal hernia → **Routine** referral to secondary care
- Incarcerated or strangulated hernia → **Emergency** referral to secondary care



In secondary care

Asymptomatic inguinal hernias in neonates →Operated **before discharge** from maternity unit.

Asymptomatic inguinal hernia in <6months old →Operated on **next available** list.

Asymptomatic inguinal hernia >6 months old→ **Elective** Repair

Paediatric chapter

Necrotising Enterocolitis

- More common in **premature** infants
- **Air** in the bowel wall (on abdominal plain film)
- Bloody stools
- Cannot tolerate feeds.
- Distended abdomen

Investigations

- Abdominal x-ray (**initial**)
- blood film, culture, and coagulation studies

Treatment

- Initial Stop feeds
- NG tube free drainage and aspiration
- Fluid and electrolyte balance
- Antibiotics → **Penicillin + gentamicin +metronidazole**
- Pneumoperitoneum present → Surgery

Cow's Milk Protein Allergy (Non IgE Mediated)

Clinical features.

- Reflux
- Loose stools or constipation
- Abdominal pain
- Food aversion
- Pruritus
- Erythema
- More common in formula fed babies.

Cow's Milk Protein Allergy (IgE Mediated)

Perianal redness, loose stool, skin manifestations

Treatment

- Hydrolysed milk product (after stopping cow's milk)
- If breast-fed, mother should eliminate cow's milk in her diet.

Notes For Exam

1) **Non-bilious vomit →pyloric stenosis**
2) **Bilious vomit plus**
   - ✓ **Obstruction → duodenal atresia.**
   - ✓ **Abdominal distension + bloody stool + air in wall→ necrotising enterocolitis.**
   - ✓ **Distension + vomiting + bloody stool + mal position of intestine→ volvulus**
   - ✓ **Recurrent jelly stool →intussusception**
   - ✓ **Neonate + meconium ileus →cystic fibrosis**

Celiac disease

This is an **immune-mediated,** inflammatory systemic disorder provoked by gluten and related prolamins in genetically susceptible individuals, which can lead to malabsorption of nutrients.
Gluten is a protein found in wheat, rye, and barley.

symptoms

persistent unexplained abdominal or gastrointestinal symptoms.

- faltering growth.
- prolonged fatigue.
- unexpected weight loss.
- severe or persistent mouth ulcers.
- unexplained iron, vitamin B12 or folate deficiency.
- type 1 diabetes (at the time of diagnosis).
- autoimmune thyroid disease (at the time of diagnosis).
- Irritable bowel syndrome (IBS) - in adults.
- Who are first-degree relatives of people with coeliac disease.

Complications of coeliac disease

Complications of coeliac disease only tend to affect people who continue to eat gluten, or those who have not yet been diagnosed with the condition, which can be a common problem in milder cases.

Potential long-term complications include:

- weakening of the bones (osteoporosis)
- iron deficiency anaemia
- vitamin B12 and folate deficiency anaemia
- Less common and more serious complications include **some types of cancers, such as bowel cancer (T-Cell Lymphoma of Small Intestine)**
- **Or Hodgkin lymphoma.**
- **Dermatitis herpetiformis** (a chronic, polymorphic, pruritic skin disease) is the classic skin manifestation of coeliac disease. Almost all patients with the rash have either detectable villous atrophy or minor mucosal changes.

Investigation

You **should include gluten** in your diet when the blood test is done because avoiding it could lead to an inaccurate result.

Specific autoantibodies

Coeliac disease-specific antibodies include auto-antibodies against tissue transglutaminase type 2 (tTGA2), including endomysial antibodies (**EMAs**), and antibodies against deamidated forms of gliadin peptides (**DGPs**). These are measured in blood. NICE recommends:

For suspected coeliac disease in young people and adults:

1- **Total immunoglobulin A (IgA) and IgA tissue transglutaminase (tTG) as the first choice.**
2- **IgA EMAs if IgA tTG is weakly positive.**
3- **Consider using IgG EMA, IgG DGP, or IgG tTG if IgA is deficient.**

For suspected coeliac disease in children:

1- Total **IgA** and **IgA tTG** as the first choice.
2- Consider using **IgG EMA, IgG DGP or IgG tTG** if IgA is deficient.
3- **HLA DQ2 (DQ2.2 and DQ2.5)/DQ8** testing should only be used in the diagnosis of CD in specialist settings (e.g., children who are not having a biopsy, or people who already have limited gluten ingestion and choose not to have a gluten challenge).

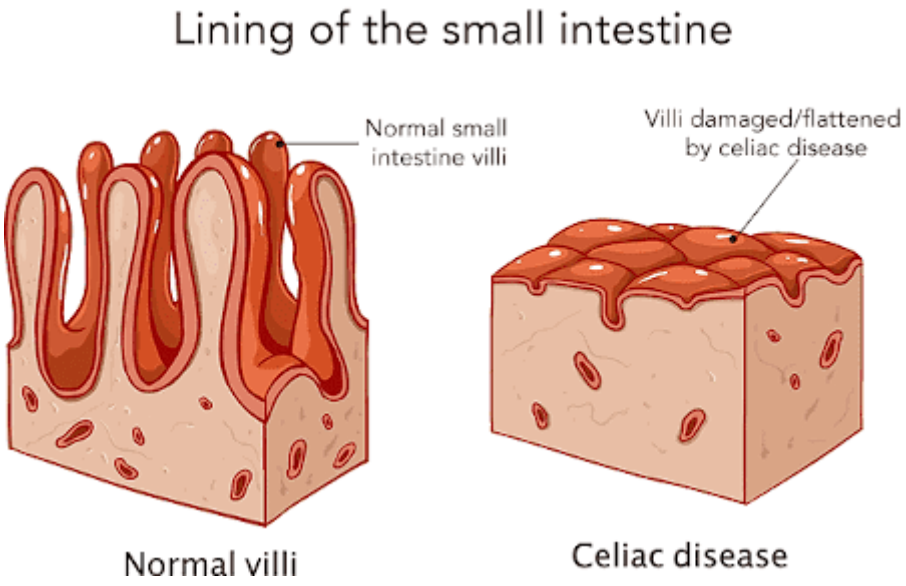
Other investigations

jejunal/duodenal biopsy

A biopsy is still needed to diagnose coeliac disease even if the antibody tests are positive for coeliac disease.

- Villous atrophy
- Crypt hyperplasia
- Increase in intraepithelial lymphocytes.

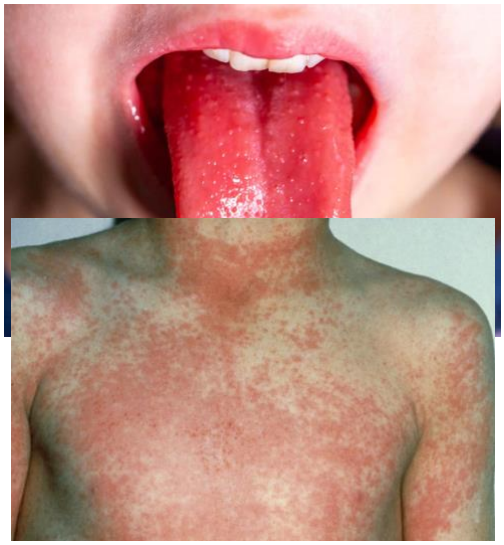
The serology tests or biopsies for coeliac disease are NOT accurate it a gluten free diet is eaten during the diagnostic process. Therefore, patients should not start a gluten-free diet until coeliac is confirmed which is often distressing to patients as they would continue to be symptomatic if patients are already taking a gluten-free diet, **advice to reintroduce gluten for at least 6 weeks prior to testing.**



Infections

- **Babies born to a highly infectious mother with hepatitis B should receive hepatitis B vaccine and immunoglobulins.**
- **Group B streptococcus pyogenes (GBS) is the infection caused by bacterium streptococcus agalactiae. the most common cause of early onset neonatal sepsis. This is associated with premature rupture of membranes.**

Scarlet fever



contagious infection that mostly affects young children. It's easily treated with antibiotics.
Cause: **group A Streptococcus pyogenes**

- Sandpaper like rash on the chest and back and then spreads to the limbs.
- Sore throat and fever
- **Strawberry tongue**
- Swollen lymph nodes (Tender)
- Blenching rash with pastie lines

Investigation

- rapid antigen test and culture

complication

- Rheumatic fever
- Post streptococcal glomerulonephritis.

Treatment

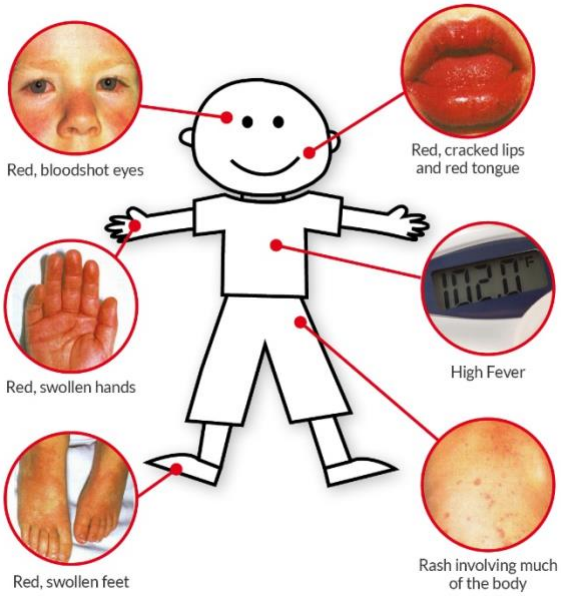
- Penicillin for 10 days
- If allergic: azithromycin for 10 days

Kawasaki Disease

Systemic vasculitis most commonly affecting the children from **6 months to 5** years of age.

Clinical features

- Conjunctivitis (non- exudative)
- Rash (polymorphous, non-vesicular)
- Cervical Lymphadenopathy (Painless).
- Strawberry tongue
- Hands (palmar erythema and swelling)
- (Fever lasting ≥ 5 days above 38C)
- desquamation or peeling = Kawasaki



Investigation

- Serial Echocardiogram

Complications (especially if untreated)

- **Coronary artery aneurysm**

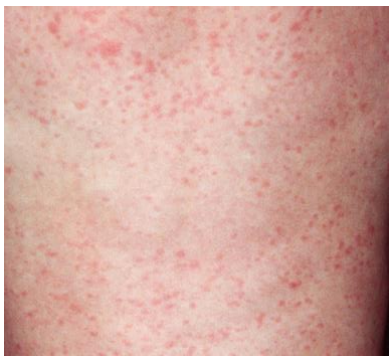
Treatment

- **High dose aspirin→ Reduces risk of thrombosis.**
  Once fever subsides and inflammatory markers fall → low dose aspirin is given until echocardiogram is performed at 6 weeks to exclude aneurysm.
- **Intravenous immunoglobulin If given within first 10 days, reduces the risk of coronary artery aneurysms**.

Roseola

Causative Organism

- Human herpesvirus 6



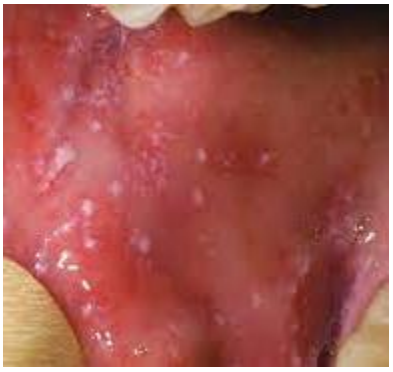
Clinical Picture

- Commonest rash of its kind **under 2 years** old (commonly seen even under 3 years of age)
- **Fever** (often 40°C) lasting 3 to 5 days may be associated with febrile seizure.
- Rash starts around 3 to 5 days after fever subsides.
- **Rose pink spots**

Management

- Supportive, no specific treatment.

Measles



Measles is an acute viral respiratory illness.

- Characterized by a prodrome of fever (as high as 105°F) and malaise, cough, coryza, and conjunctivitis -the three “C” s
- a pathognomonic enanthema (**Kolpiks spots**) followed by a maculopapular rash.

Management

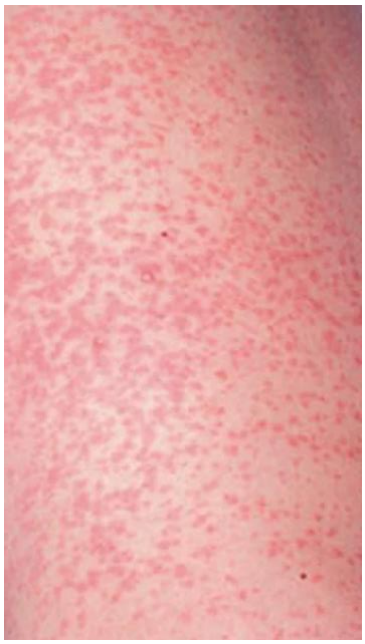
No specific treatment needed as the condition will usually improve within 7 to 10 days.

They should also be advised to stay at home and avoid contact with young children and pregnant women to avoid the spread of infection.

If the symptoms are causing discomfort, the following could be advised.

- Paracetamol (to reduce fever and pain)
- Plenty of fluids
- Calamine lotion (for itchy rash)

Rubella (German measles)



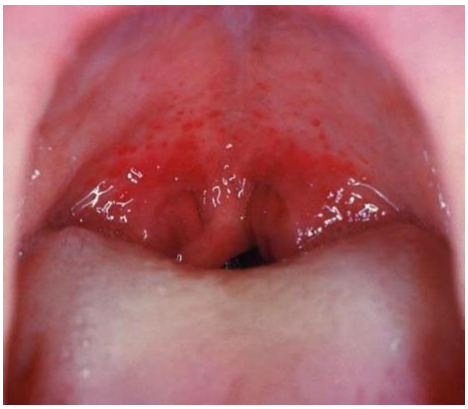
- **Pink** macules and papules starting on the forehead and spreading to the face, trunk, and extremities on the first day.
- Fades from the face on the second day and the rest of the body by the third day.
- self-limiting **viral** exanthem. Rubella is part of the UK routine immunisation programme Maternal infection in pregnancy under **20** weeks gestation.
- is associated with miscarriage and congenital rubella syndrome which can cause a spectrum of abnormalities.

Risk Factor

- Incomplete immunisation history

Paediatric chapter

Clinical Presentation



- Erythematous maculopapular rash
- Fever
- **Cervical** Lymphadenopathy
- Coryzal symptoms (bur less severe than measles)
- Conjunctivitis (but less severe than measles)
- Arthritis and arthralgia (adult symptoms)
- **Forchheimer spots**.

Investigations and Diagnosis

- NOT a clinical diagnosis and features are very nonspecific and therefore requires laboratory testing to confirm the diagnosis.
- Oral fluid sample for PCR testing
- Rubella specific serology, IgM antibody. Positive in acute rubella

Management

Notifiable disease, therefore, need to contact the local health protection team.

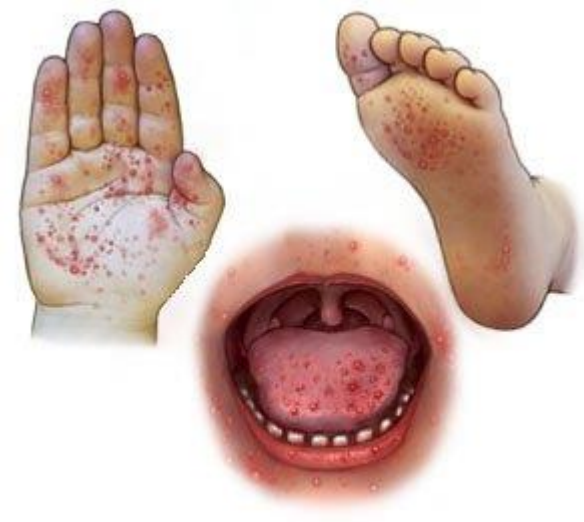
Nonpregnant or pregnant and more than 20 weeks gestation

- Self-limiting
- Typically, symptoms last for a week.
- Advised oral hydration and analgesia.
- Isolate for at least 5 days from onset of rash.

Pregnant less than 20 weeks gestation

- Refer urgently to obstetrics team for assessment and management.
- Confirm rubella immunisation status via serology.
- Vaccinate **postnatally** if nonimmune as it's attenuated vaccine!
- Pregnant women should NOT get MMR vaccine.

Hand-Foot-Mouth disease



Hand, Foot, and Mouth Disease

Viral illness which affects children

The lesions involve the hand foot and mouth obviously. It is **self-limiting**.

Caused by coxsackievirus A16 (CA15) and enterovirus 71 (EV71), it is very contagious among children.

Clinical features

- Low grade level
- Malaise
- Less of appetite
- Sore throat

Oral ulcers may be on buccal mucosa, tongue or hard palate.

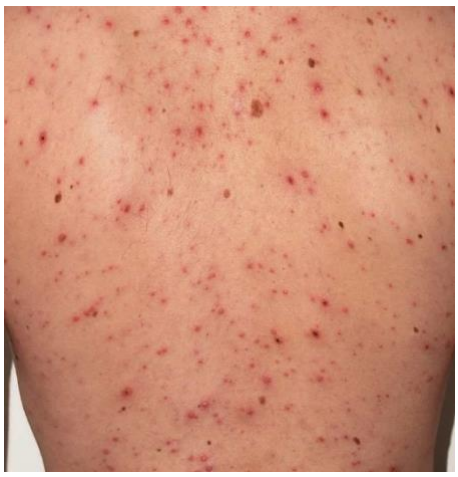
followed later by vesicles on the palms and soles of the feet.

Small erythematous **macules** on palms and soles of the feet which progress to grey **vesicles** and may last for up to 6 days.

Chickenpox

Caused by primary infection with varicella-zoster virus.

Reactivation of the dormant virus after a bout of chickenpox leads to herpes zoster (shingles) Highly infectious and its spread is via the respiratory route. Most chickenpox is mild to moderate and self-limiting but serious complications can occur in **Immunocompromised** patients.



Infectivity 2 days before rash and until 5 days after the rash first appeared.

Incubation period 10 to 21 days

Paediatric chapter

Clinical features

- Pyrexia - often the first feature
- Itchy, rash starting on head, chest and back before spreading.
- Lesions are usually most **concentrated** on the chest and back.
- Initially rash is **macular** then **popular**- then group of vesicular - then dry crust.
- Clinical features tend to be more severe in adults.

Management

Pruritus → Managed by sedating antihistamines and emollients.

Administer

1- varicella zoster immunoglobulin (VZIG)
   - new-born with peripartum exposure.
2- Acyclovir
   - Pregnant women with exposure and with no varicella antibodies (prophylactic dose)
   - Pregnant women who develop chickenpox (therapeutic dose)
   - immunocompromised with exposure and with no varicella antibodies (prophylactic dose)
   - Immunocompromised who develop chicken pox (therapeutic dose)

In summary:

1. Pregnant exposed to chicken pox Check women's history of immunity (previous infection or varicella vaccines)
2. If no history of immunity - Check serology (VZV IgG)
3. Not immune Administer oral acyclovir.
4. If develop chicken pox rash Administer oral acyclovir
   (Or IV acyclovir if severe)

Rash and School or Nursery

Chickenpox

Keep away from school and nursery until vesicles have crusted over AND at least **5 d**ays have passed from the onset of rash Keep away from pregnant women.

Impetigo

Keep away from school and nursery until lesions are crusted and healed, **or 48** hours after starting antibiotic treatment.

Scarlet fever

Keep away from school and nursery until **24 hours** from starting antibiotic treatment.

The following do NOT need to avoid school or nursery:

- Hand foot and mouth
- Cold sores (Herpes simplex)
- Molluscum contagiosum
- Roseola
- Parvovirus B19 (once the rash has developed)

The following need to be kept away from nursery or school for four days from onset of rash:

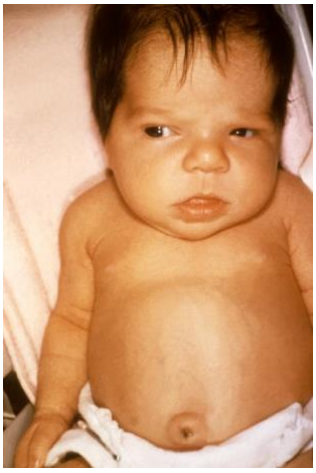
- Measles
- Rubella

Endocrine System

Congenital Hypothyroidism

Common cause: thyroid agenesis or dysgenesis

Symptoms:



- feeding difficulties, lethargy and low
- frequency of cry Signs: large fontanelles, macroglossia, jaundice, umbilical hernia, and hoarse voice
- **prolonged jaundice**
- course facial features
- thick protruded tongue

Diagnosis:

Heel prick tests are done when the new-born is 5 days old

- Routine new-born heel prick
- High TSH and low T4

Treatment

- Thyroxine hormone replacement
- Early treatment is necessary to prevent permanent neurological damage.

Neonatal hypoglycaemia

needs urgent recognition and treatment.

The British Association of Perinatal Medicine does not recommend treating blood **sugar levels > 2.0mmol/L** in well infants at risk of hypoglycaemia.

- They recommend encouraging frequent feeds (no longer than 3 hours between feeds)
- Supporting breastfeeding
- Re- checking blood sugar levels before subsequent feeds to ensure it remains above 2.0mmol/L.
- Formula should only be offered if the other chooses to give formula or is unable to breastfeed despite support.

Paediatric chapter

If blood sugar levels **are below 2.0mmol/L**, you should check closely for signs consistent with hypoglycaemia.

- If present, they may require admission and treatment with IV dextrose.
- If absent, you should consider 40% buccal dextrose gel alongside supporting feeding.

Babies who are at increased risk of hypoglycaemia are those <2nd centile (IUGR), infants to diabetic mothers, maternal beta-blocker use, and infants born prematurely.

Those babies should have routine blood glucose testing after the 1st feed but before the 2nd, within 2-4 hours of birth, and be monitored closely for signs of hypoglycaemia.

Signs of hypoglycaemia include:

- Lethargy
- High pitched cry
- Altered level of consciousness
- Hypotonia
- Seizures

Congenital Adrenal Hyperplasia

Autosomal recessive disorder and is most caused due to

21-hydroxylase deficiency.

Clinical features

- Males: hyperpigmentation and penile enlargement
- Females: ambiguous genitalia with an enlarged clitoris
- Vomiting
- Hyponatremia
- Hyperkalaemia
- Shock

Investigations

Serum 17-hydroxyprogesterone

Treatment

- Glucocorticoids - hydrocortisone and prednisolone
- Mineralocorticoid - fludrocortisone
- Surgical management for ambiguous genitalia

Pathology

Congenital adrenal hyperplasia is characterized by a deficiency in an enzyme required for cortisol biosynthesis. In most cases, it is due to 21-hydroxylase deficiency.

This results in aldosterone and cortisol deficiency. The loss of negative feedback from cortisol results in an increase of ACTH.

Now, if you divide the features down to an **increase** in ACTH, **deficiency** of 21-hydroxylase, and aldosterone deficiency, one would be able to see the associated features:

ACTH increase that results in:

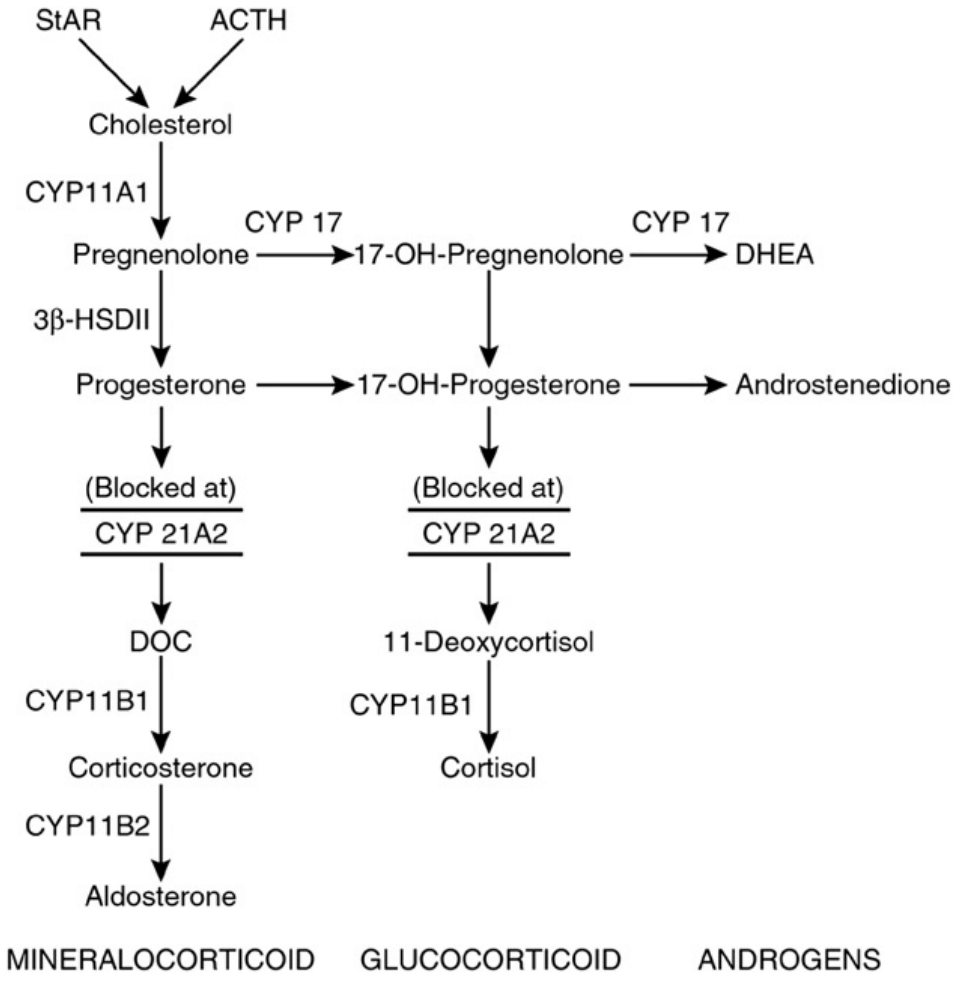
- Adrenocortical hyperplasia
- Hyperpigmentation

Deficiency of 21-hydroxylase results in:

- Accumulation of steroid precursors which are above the position where 21-hydroxylase would synthesise which includes 17-hydroxyprogesterone.
- These precursors are shunted into an androgen synthesis pathway, resulting in high testosterone and androstenedione.

Aldosterone deficiency results in:

- Hyponatraemia (salt wasting)
- Hyperkalaemia



Neurology system

Infantile Spasms or West syndrome symptoms

Start at **around 6 months.,** Also called salaam/jack-knife attacks.

Part of West syndrome MES (**spasms, developmental regression and hypsarrhythmia)**

Episodes of repetitive movements that last for a few seconds with **symmetrical contractions of neck, trunk, and extremities**.

EEG is essential, as hypsarrhythmia is crucial to the diagnosis.

First-line of treatment

- ACTH: this is effective in about 50-65% of cases. It involves a daily intramuscular (IM) injection.
- Prednisolone may be useful due to its low cost, ready availability, ease of administration, and growing evidence that it may be similar in efficacy to ACTH.
- Vigabatrin: this has a success rate of about 50%; however, vigabatrin is the treatment of choice in tuberous sclerosis.

Febrile seizure

Febrile seizures are seizures accompanied by fever in the absence of an intracranial infection. A fever in a child is when the temperature is **38°C** or more.

Key points

- Febrile seizures are not the same as epilepsy.
- Usually between 6 months to 6 years of age with peak at 14-18 months
- Usually with a positive family history
- Temperature usually increases rapidly to above 39°C.
- Typical a **generalised tonic-clonic** seizures are seen.
- Must determine cause of fever and rule out meningitis

Paediatric chapter

Types

Simple febrile seizures are the most common type and are characterised by a single generalised seizure lasting less than 15 minutes.

Complex febrile seizures include those that are focal, prolonged (more than 15 minutes), or recurrent.

Would it happen again in the future, or would it lead to Epilepsy?

- About 1 in 3 would have further episodes of febrile seizures
- The risk of epilepsy is small - Estimated to be 2% to 5%, depending on if they are simple or complex.

treatment

- Antipyretics if the child has a fever AND is uncomfortable or distressed (showing signs of pain)
- Monitor the duration of seizure.
- For seizures lasting more than 5 give benzodiazepines (i.e., buccal midazolam or rectal diazepam)
- If seizure continues 10 minutes after the first dose of rescue medication, call an ambulance.

Note

- Rectal diazepam or buccal midazolam is appropriate if the seizure is more than 5 minutes.
- Paracetamol is important but can be given after the seizure to help with the discomfort and pain. Paracetamol would NOT prevent a febrile seizure.

Seizure without fever

Start by obtaining capillary blood glucose.

As **hypoglycaemia** is a common cause of seizure in a well child

When a toddler cries after a minor injury, stops breathing and loses consciousness for a brief time followed by rapid recovery, you should be thinking two conditions:

1. Blue breath holding spells. child turns blue and then stop breathing.

2. Reflex anoxic seizures also known as reflex asystolic syncope or white breath holding. attacks reflex anoxic seizures-child stops breathing and then turns pale

Anoxic Seizure

reflex anoxic seizures-child stops breathing and then turns pale
blue breath holding spells- child turns blue and then stop breathing.

- During the episode, the child becomes suddenly pale and limp, will fall if standing and loses consciousness.
- This is followed by stiffening and clonic jerking of the limbs.
- The episode is usually brief (30-60 seconds) and recovery is rapid.
- There may also be upward eye deviation and urinary incontinence.
- On recovery, the child may feel tired and washed-out for some time.

Reflex anoxic seizures do not cause tongue-biting and this may be useful in the differentiation from epilepsy.

Management

- Reflex anoxic seizures can usually be managed just with reassurance. Drug treatment is usually not needed.
- Parents should be advised to place the child in the recovery position.
- Cheick ferritin and treat iron deficiency anaemia.

Cerebral palsy

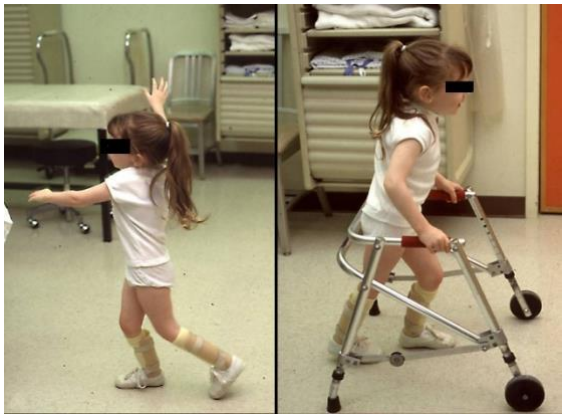
A chronic disorder of movement and/or posture which presents early in life and continues throughout life.

It usually presents before age 2 with abnormal tone and posture.

Caused by a non-progressive injury to the developing brain.

The majority are antenatal in origin and occur due to cerebrovascular haemorrhage cerebral ischaemia, cerebral structural maldevelopment.

Presentation



- Delay in motor milestones
- Abnormal limp or trunk posture and tone in infancy

categories

- Spastic (the vast majority)
- Dyskinetic
- Ataxic
- Other

clinical features of spastic cerebral palsy which are:

- Limb tone persistently increased.
- Brisk deep tendon reflexes
- In the cases which usually involve all four limbs (quadriplegia), there is likely the presence of a moderate to severe intellectual impairment.

Management

Multidisciplinary approach (involving paediatrics, physiotherapist, psychologist etc)

Treatment aimed at treating hypertonia.

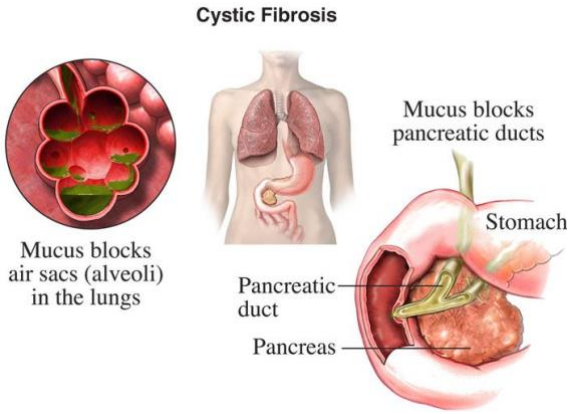
- Botulinum toxin injections
- Baclofen

Cystic Fibrosis

It is caused by **autosomal recessive mutation** **in CFTR gene** (cystic fibrosis transmembrane conductance regulator gene)

Features caused by thick mucus clogging the **lungs** and **pancreas**.

- ↑ Viscosity and thickness of body's secretion+ High chloride in the skin
- Coughing, SOB, and recurrent chest infections Malnourished, difficult to gain weight.
- Very salty sweat
- Malabsorption symptoms
  Failure to thrive.
  Greasy, bulky stools
- **Meconium ileus** (in new-borns)
- Increase incidence in developing Diabetes mellitus.
- Recurrent chest infection



Screening and testing for cystic fibrosis.

Most cases of cystic fibrosis are now detected soon after birth through the new-born blood spot test.

- **Drop of blood** from the baby's **heel** and testing it for abnormalities that could indicate cystic fibrosis (Guthrie test)
- **Sweat test** – to measure the amount of salt in sweat.
  Sweat testing confirms the diagnosis and is 98% sensitive. Chloride concentration >60 mmol/L with sodium concentration lower than that of chloride on two separate occasions.
- **Genetic tes**t – where a sample of blood or saliva is checked for the faulty gene that causes cystic fibrosis.
- **Chest X-ray**

Most common lung infections

- Staphylococcus aureus (common in children)
- Pseudomonas aeruginosa (common in adults)
- Haemophilus influenzae

Treatments for cystic fibrosis

There's no cure for cystic fibrosis, but a range of treatments can help control the symptoms, prevent, or reduce complications, and make the condition easier to live with.

Medicines for lung problems

1- **Antibiotics** to prevent and treat chest infections

medicines to make the mucus in **the lungs thinner and easier to cough up** – for example, dornase alfa, hypertonic saline, and mannitol dry powder.

medicine to help reduce the levels of mucus in the body – for example, ivacaftor taken on its own (Kalydeco)

bronchodilators to widen the airways and make breathing easier.

steroid medicine to treat small growths inside the nose (nasal polyps)

It's also important that people with cystic fibrosis are up-to-date with all **routine vaccinations** and have the flu jab each year once they're old enough.

2- **Airway clearance techniques**

A physiotherapist can also teach techniques to help keep the lungs and airways clear.

3- **Dietary and nutritional advice**

The pancreas often doesn't work properly, making it even harder to digest food.

They may recommend a high-calorie diet, vitamin, and mineral supplements, and taking digestive enzyme capsules with food to help with digestion.

4- **Lung transplants**

In severe cases of cystic fibrosis, when the lungs stop working properly and all medical treatments have failed to help, a lung transplant may be recommended.

A lung transplant is a serious operation that carries risks, but it can greatly improve the length and quality of life for people with severe cystic fibrosis.

Paediatric chapter

new-born physical examination Within 72 hours of birth and then again at 6-8 weeks

new-born hearing screening test.

- Automated otoacoustic emission test
- Usually performed before the baby is discharged.
- Ideally, the test is done within the first 4-5 week.

Conditions detected by (neonatal heel prick) test perform when the baby is 5 days old.

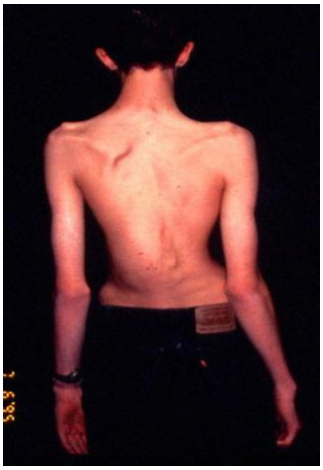
1. cystic fibrosis
2. congenital hypothyroidism
3. phenylketonuria (PKU)
4. maple syrup urine disease
5. sickle cell disease
6. homocystinuria
7. congenital adrenal hyperplasia.

Marfan Syndrome

Autosomal dominant genetic disorder caused by mutation in fibrillin gene.

Cardiovascular

- Mitral valves prolapse or regurgitation.
- Aortic dissection and aneurysm.
- cardiac dysrhythmia.



Lungs - pleural rupture causing **pneumothorax**.

Eyes

- lens dislocation
- closed angle glaucoma.
- high myopia.

Skeleton

- arachnodactyly
- hypermobility, arthralgia, joint instability, finger contractures, pectus excavatum or carinatum deformities, misshapen chest, kyphoscoliosis.

Nervous system

- Dural ectasia hernias presenting with low back pain and symptoms akin to cauda equina syndrome or chronic postural headache due to CSF leakage.

The following signs may be used to demonstrate this:

- Walker's (wrist) sign - the patient encircles the wrist of their opposite hand with the little finger and thumb, which overlap.
- Steinberg's thumb sign - a flexed thumb grasped within a clenched palm protrudes beyond the ulnar border of that hand.

Differential Diagnosis

Ehlers-Danlos syndrome

Fragile X syndrome

Homocystinuria

Osteogenesis Imperfecta

Osteogenesis imperfecta (OI) is an inherited condition **Autosomal dominant** causing increased fragility of bone. It principally affects those tissues containing the main fibrilla **collagen type I** - e.g., bone and teeth. It also affects sclerae, joints, tendons, heart valves and skin.

There are many different types of **Osteogenesis Imperfecta**

with many different presentations of each type.

- Bone Increased chance of fracture
- Blue sclerae
- Teeth imperfections
- Ear Hearing loss

Differential diagnosis

Other forms of lethal, short-limbed dwarfism including:

- Achondrogenesis
- Thanatophoric dwarfism
- Asphyxiating thoracic dystrophy

Non-accidental injury is the main differential diagnosis in childhood.

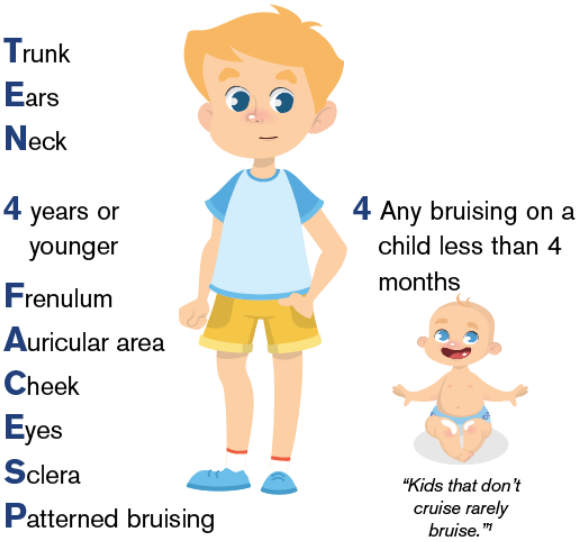
During late childhood and adolescence: idiopathic juvenile osteoporosis.

Management

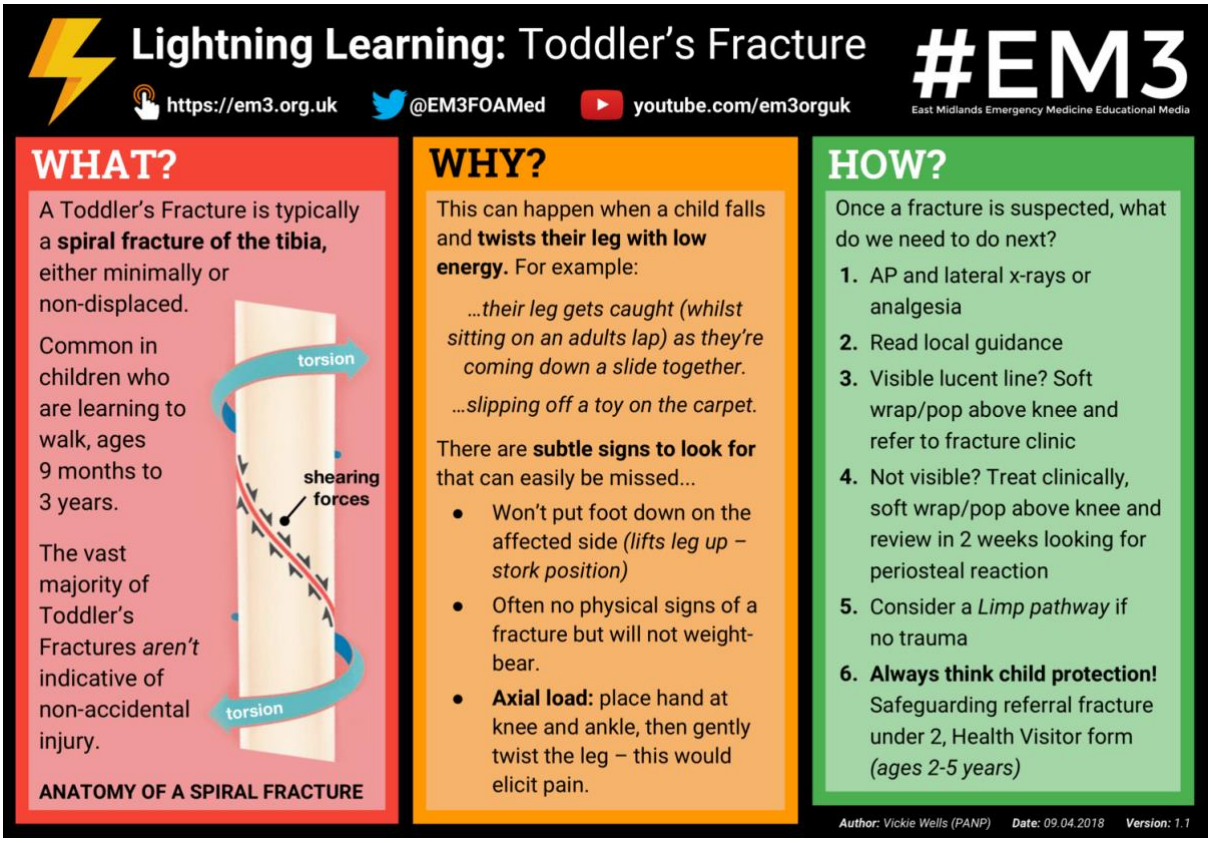
- Multidisciplinary care including physiotherapy, rehabilitation, bracing and surgical interventions.
- **Bisphosphonates** are widely used in patients with OI.
- Bisphosphonates bind to and stabilise bone by inhibiting osteoclast activity, whilst stimulating osteoblast activity
- Cyclical administration **of intravenous pamidronate** reduces the incidence of fracture and increases bone mineral density, while reducing pain and increasing energy levels.

Non-Accidental Injury

Presentation



- Delayed time to medical presentation
- Usually brought in by stepfather or boyfriend.
- Bruising-children naturally sustain bruises during minor incidents as part of growing up which are seen as bruising over the knees and shins or foreheads and chins in toddlers who fall but NAI should always be considered if there are varying degrees and colour variations of bruises or bruising at unusual sites.
- Fractures (old and new) - also consider NAI if rib and spinal fractures.
- fractures in infants who are not independently mobile or long bone fractures in children less than 3 years old.
- A spiral fracture is known as a torsion fracture.



Management

- Admit to ward and manage pain.
- A skeletal survey is a series of X-ray which is usually used in non-accidental injury. It is performed systematically to cover the entire skeleton. Typically, this includes a bilateral anteroposterior and posteroanterior views of arms, forearms, humerus, feet, legs, femur, pelvis, spine and skull. Involve the local safeguarding children team.
- Refer to social services.
- Treat any other underlying medical conditions.

Do not just think of NAI but consider the other pathological diseases that could result in

Bruising:

- Henoch-Schönlein purpura
- Haemophilia
- Idiopathic thrombocytopenic purpura
- Leukaemia

Fractures:

- Osteogenesis imperfecta

Renal System

Enuresis

Primary nocturnal enuresis:

Primary bedwetting without daytime symptoms — the child or young person has never achieved sustained continence at night and does not have daytime symptoms. This is thought to be caused by sleep arousal difficulties, polyuria, and/or bladder dysfunction.

Primary bedwetting with daytime symptoms — the child or young person has never achieved sustained continence at night and has daytime symptoms, such as wetting, urinary frequency, or urgency. This may be caused by an **overactive bladder, congenital malformations, neurological disorders, urinary tract infection (UTI), or chronic constipation.**

Secondary nocturnal enuresis:

Bedwetting in a child who has previously been dry for at least **6 months.**

Most common cause is emotional upset. Other courses include UTI, DM, Constipation**.**

Put in mind emotional upset may be due to child abuse.

Management

Primary bedwetting (without daytime symptoms)

1. Younger than 5 years Reassurance
2. Older than 5 years of age
    - If bedwetting is infrequent (less than 2x a week) → Reassurance
    - If long-term treatment required Enuresis alarm (1st line) + reward system
    - If short-term control of bedwetting is required (e.g., sleep overs) Desmopressin.

Desmopressin

- used for children above 5 years old when the alarm is undesirable. If there are signs of response, it is continued on for 3 months.

- After 3 months, desmopressin should be withdrawn gradually as a trial to reassess whether still needed. Desmopressin can be used alone or in combination with alarm therapy.
- If desmopressin is given for nocturnal enuresis, it is given sublingually or orally and NEVER nasally!
- Nasal desmopressin use increases the risk of hyponatraemia.
- If treatment has not responded to at least two complete courses of treatment with either an alarm or desmopressin Refer to secondary care.

Primary bedwetting (with daytime symptoms)

"Consider" referral for all children above 24 months with primary bedwetting and daytime symptoms to secondary care or an enuresis clinic for further investigations and assessment.

Secondary Enuresis at any age

1- Test urine sample for any infection or DM
2- If normal then, refer to secondary care for further assessment.

Over-active Bladder

Management

1- **Bladder retraining**
   It is a bladder routine that can help make voiding habits more regular. Certain tips for bladder retraining include:
   - Drinking more during the day and less during the evening/night
   - Voiding every 2 to 3 hours regularly Keeping a record of wet and dry days to monitor improvements.
   - If bladder retraining fails, the option for anticholinergic medication such as oxybutynin can be tried.
2- **Oxybutynin (Anticholinergic)**
3- **Desmopressin orally or sublingual**

Nephrotic Syndrome

Proteinuria resulting in hypoalbuminemia due to increased permeability of proteins.

Clinical features

Nephrotic syndrome is defined by the presence of:

- **Heavy proteinuria (≥3.5 g/day)**
- **Hypalbuminaemia (serum albumin ≤30* g/L)**
- **Peripheral oedema.**
- Hypercoagulability
- Hyperlipidaemia

Causes

Primary glomerular diseases

accounts for around 80% of cases

- Minimal change glomerulonephritis loss of “foot processes
- Membranous glomerulonephritis
- Focal segmental glomerulosclerosis
- Membranoproliferative glomerulonephritis

Secondary glomerular diseases

- Diabetes mellitus
- Systemic lupus erythematosus
- Amyloidosis

Most common cause of nephrotic syndrome in **children** → Minimal change disease.

Most common cause of nephrotic syndrome in **adults** → Membranous glomerulonephritis followed by focal segmental glomerulonephritis -

Investigations

- Urine dipstick analysis: proteinuria and check for microscopic haematuria.
- Blood albumin level
- Quantify proteinuria using an early morning urinary protein: creatinine ratio or albumin: creatinine ratio. ACR/24 hr
- Renal biopsy is only indicated after a trial of steroids has failed to improve the symptoms or if there is clinical suspicion of different aetiology.

Treatment

- Steroids
- Cyclophosphamide (resistant cases)

Urinary Tract Infection

Presentation

- Fever
- Abdominal pain
- Loin pain
- Dysuria
- Increased frequency

Risk factors

- Stasis of urine such as in renal calculi, VUR,
- Constipation
- Sexual abuse
- Previous history of UTI

Investigation

- Urine culture and sensitivity by either **clean catch urine sample** or catheter sample or suprapubic aspiration (Mid-stream urine) Dipstick testing - nitrites

Treatment

- Nitrofurantoin MR 100mg BD
- Trimethoprim 200 mg BD

General principles

The aims of urinary tract infection treatment are to:

- Eliminate urinary tract infection symptoms and eradicate bacteriuria.
- Prevent renal scarring.
- Prevent recurrent UTIs.
- Correct any associated urological lesions.

Carefully assess the degree of toxicity, dehydration and ability to maintain oral fluid intake. Encourage fluids, avoid or correct constipation and encourage full voiding.

If the child has been assessed at high risk of serious illness, refer urgently to secondary care.

If UTI is suspected in children aged under 3 months, refer urgently to a paediatric specialist for treatment with parenteral antibiotics, and send a urine sample for urgent microscopy and culture.

Notes For Exam

- **Always perform DMSA 4 to 6 months after any atypical or recurrent infection.**
- **DMSA during an acute infection is always the WRONG ANSWER.**
- **MCUG after 3 years old is always the WRONG ANSWER.**

Age	Straight Forward	Atypical	Recurrent
Below 6 months	1. Us within 6 weeks 2. If abnormal do MCUG	1. US during infection 2. MUCG 3. DMSA 4-6 months	1. US during infection 2. MUCG 3. DMSA 4-6 months
From 6 months to 3 years	None	1. US during infection 2. MUCG 3. DMSA 4-6 months	1. US during infection 2. MUCG 3. DMSA 4-6 months
Above 3 years	None	1. US during infection	1. US during infection 2. DMSA 4-6 months

Vesico-ureteric reflux

Vesicoureteral reflux (VUR) is the retrograde flow of urine from the bladder into the upper urinary tract.

Clinical Features

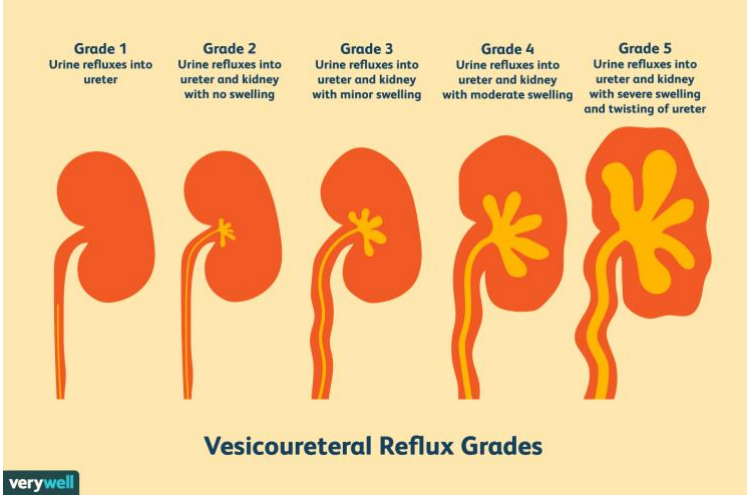
Usually, asymptomatic

May present as a UTI Symptoms such as fever, dysuria, increased frequency, and lower abdominal pain due to increased risk.

Investigations

- Initial investigations→→ Urinalysis, urine culture and sensitivity.
- Renal ultrasound (may show ureteral dilation).
- **Gold standard Micturating cystourethrogram for VUR**
- **Parenchymal damage detected→→ Technetium scan (DMSA).**

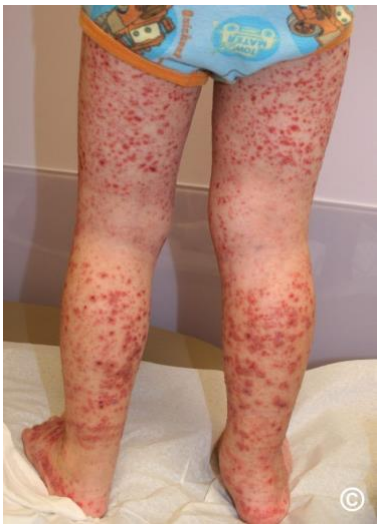
Indication	Treatment
VUR grade I-IV	Low dose antibiotic prophylaxis (trimethoprim)
Failed prophylaxis Parenchymal damage Breakthrough UTI Persistent high grade redux (grades IV-V)	Surgical correction



Henoch-Schönlein Purpura

Systemic IgA-mediated vasculitis characterised by immune-complex deposition, most seen in children.

HSP....affects children ages 2 to 11 years old (peak at 4-5)



Clinical features

- **Purpura** over the extensor surface and buttocks
- Arthralgia
- Abdominal pain
- Glomerulonephritis (haematuria, proteinuria)
- Recent history of URTI or gastroenteritis

Investigation

- Diagnosis of HSP is mainly clinical.
- elevated IGA levels and creatinine.

Other clues in the exam:

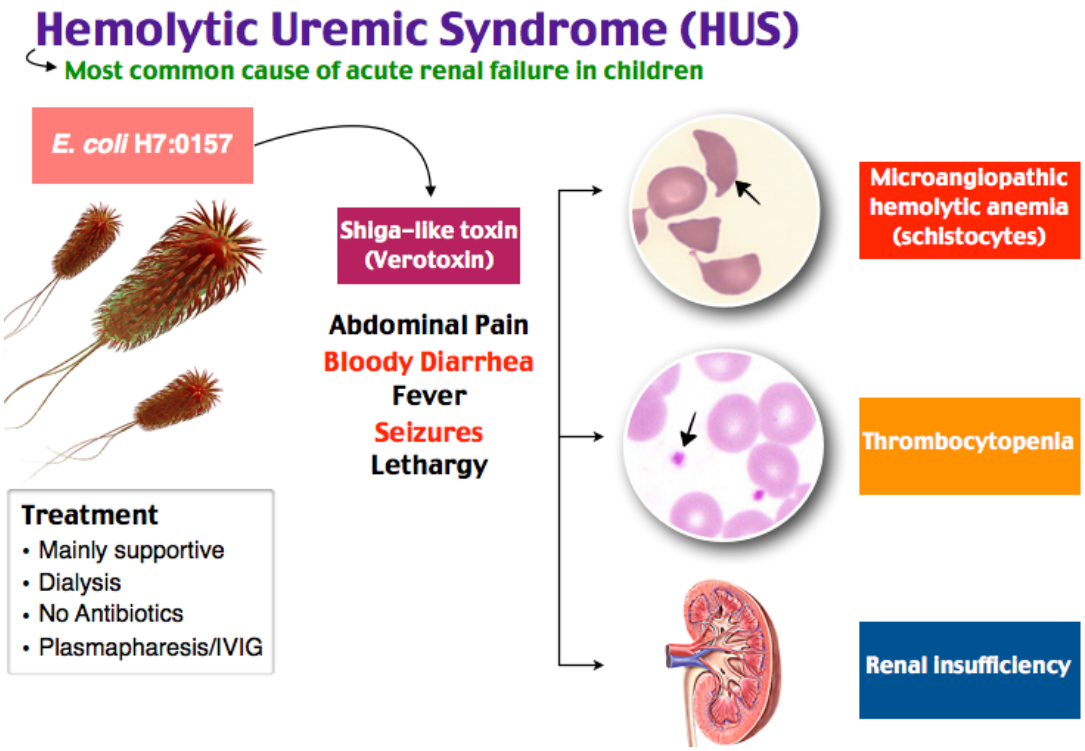
- Platelets are in the normal range.
- Usually has a history of respiratory infection.

Management

- Conservative management (most recover fully without treatment over a few months)
- NSAIDS for arthralgia pain
- Corticosteroids can improve associated arthralgia and the symptoms associated with gastrointestinal dysfunction.

Haemolytic Uraemic Syndrome

an
An



Episode of bloody diarrhoea due to **E. coli** O157:H7 Followed by

TRIAD

- Acute renal failure
- Microangiopathic haemolytic anaemia
- Thrombocytopenia

Treatment

- includes fluid and electrolyte management, antihypertensive therapy and dialysis.
- Do **not** give antibiotics to those with possible HUS because the organism may release more toxins as it dies it antibiotics are given and may worsen the disease.
- plasma exchange is reserved for severe cases of HUS not associated with diarrhoea.

Idiopathic Thrombocytopenic purpura

Most common cause of thrombocytopenia in childhood

Definitions

- Primary ITP Platelet count of <100 x 109/L in the absence of other causes or disorders associated with thrombocytopenia (remember to look for evidence to rule out SLE and lymphoma and examine for splenomegaly)
- Persistent ITP lasting more than 3 months but less than 12 months.
- Chronic ITP lasting more than 12 months.

Features

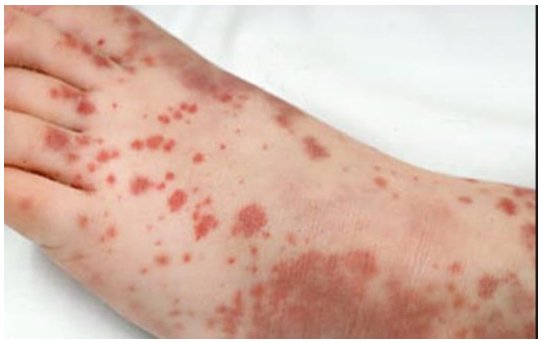
- Sudden onset of purpura in a usually well child Usually ages 2 years old to 10 years old
- Onset after 1 to 2 weeks of a viral infection (usually URTI)
- May have bleeding (epistaxis, menorrhagia, GI bleed)
- Low platelets (remaining full blood count usually normal)

Investigation

- FBC will show isolated thrombocytopenia.

Management

- Prednisolone→ First line if treatment required.
- IVIG If bleeding and or unresponsive to corticosteroids.
- Platelet transfusion Only in life-threatening bleeding.



What is a life-threatening bleed?

Intracranial haemorrhages or high-volume bleeding resulting in hypotension or prolonged capillary refill and requiring fluid resuscitation or blood transfusion.

Idiopathic Thrombocytopenic Purpura (ITP) management

Most children with acute or chronic ITP will require only advice, support and observational monitoring. Management is based on symptoms rather than platelet count.

Paediatric chapter

Minimal risk patients

- E.g., petechiae or large bruises without any active bleeding
- Can be managed as outpatient without any treatment at all.
- Perform a full blood count in a week for follow up.

Moderate risk patients

- E.g., epistaxis that last for more than 5 minutes Admit to hospital.
- Oral prednisolone for a few days.
- IVIG if platelet count fails to rise with oral prednisolone.

Severe risk patients

- E.g., suspected internal haemorrhage (intracranial, muscle, joints etc)
- Admit to hospital.
- IV methylprednisolone

It is worth remembering that we should aim to treat the patient rather than the platelet count.

whatever the platelet counts, concentrate on the presence of any bleeding.

Platelet transfusions are reserved for life-threatening bleeds as they only transiently raise platelets for a few hours to stop the bleed.

ITP is a diagnosis of exclusion, so always consider the other differentials.

Acute leukaemia	Lymphadenopathy+ anaemia or hepatosplenomegaly
Aplastic anaemia	Features of anaemia + recurrent infections
Henoch-Schönlein purpura (HSP	Abdominal and joint pain as well
Haemolytic uraemic syndrome	Diarrhoea + anaemia, and oliguria
Meningococcal septicaemia	Systemic upset + fever

New-born Jaundice

Neonatal jaundice causes

Physiological jaundice

- is results from increased erythrocyte breakdown and immature liver function.
- It presents at 2 or 3 days of age, begins to disappear towards the end of the first week and has resolved by day 10.
- The bilirubin level does not usually rise above 200 µmol/L and the baby remains well.
- However, the bilirubin level may go much higher if the baby is premature or if there is increased red cell breakdown - e.g., extensive bruising, cephalohematoma.

Pathological jaundice

1- Early neonatal jaundice

- Presents **within 24** hrs and or persists even after 2 weeks after birth.
- Very high bilirubin level

Causes

- **Haemolytic** disease: e.g., haemolytic disease of the new-born (rhesus), ABO incompatibility, glucose-6-phosphate dehydrogenase deficiency, spherocytosis.
- **Infection**:congenital (e.g., toxoplasmosis, rubella, cytomegalovirus (CMV), herpes simplex, syphilis) or postnatal infection.
- Increased **haemolysis** due to haematoma.
- Maternal autoimmune **haemolytic anaemia:** e.g., systemic lupus erythematosus.
- Crigler-Najjar syndrome or Dubin-Johnson syndrome.
- Gilbert's syndrome.

2- Prolonged jaundice

Jaundice lasting for longer **than 14 days** in term infants and 21 days in preterm infants:

- Infection - e.g., urinary tract infection.
- Hypothyroidism, hypopituitarism.
- Galactosaemic.
- Breast milk jaundice: the baby is well, and the jaundice usually resolves by six weeks but occasionally continues for up to four months.
- Gastrointestinal (GI): biliary atresia, choledochal cyst, neonatal hepatitis.

3- Conjugated hyperbilirubinemia

- Infection.
- Parenteral nutrition.
- Cystic fibrosis.
- Metabolic: alpha-1-antitrypsin deficiency, galactosaemic, aminoaciduria's
- GI: biliary atresia, choledochal cyst, neonatal hepatitis.
- Endocrine: hypothyroidism, hypopituitarism.

Treatment

- Depends upon the bilirubin level and the age of the
- baby Phototherapy if bilirubin is mildly above the
- cut-off for age Exchange transfusion if bilirubin is highly elevated above the cut-off for age.

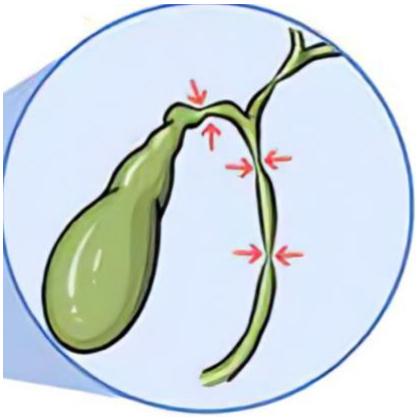
4- Jaundice beyond 2 weeks

Needs urgent paediatric assessment Bilirubin:

- Unconjugated Mostly →Think of breast milk jaundice.
- Conjugated Mostly → Think of biliary atresia.

Biliary Atresia

Obstructive- conjugated -dark urine – pale stool.



- Jaundice with pale stools and dark urine
- Presents in 3-4 weeks of life.
- Hepatomegaly
- Splenomegaly in late presentation

Diagnosis

- Conjugated hyperbilirubinemia
- Raised GGT
- Abdominal ultrasound
- Cholangiogram
- Percutaneous biopsy (definitive diagnosis)

Treatment

- Kasai procedure (hepatoportoenterostomy)
- Late presentation more than 100 days need Liver transplant in the first year of live due to advanced liver disease.

Galactosemia

unconjugated bilirubin+ pale urine

- Prolonged jaundice and Vomiting
- **Liver enlargement**
- Yellow stools
- Pale urine
- Low weight for age and poor feeding
- Cataract

Management:

Offer Galactose-free diet.

Breast Milk Jaundice

- Most common cause of prolonged **unconjugated** hyperbilirubinemia
- Infants become jaundiced in the 2nd week of life. They are usually **well**.
- Jaundice resolves within 6 weeks but may continue up to 4 months.

Investigation

split bilirubin test (shows increased unconjugated bilirubin levels)

Management

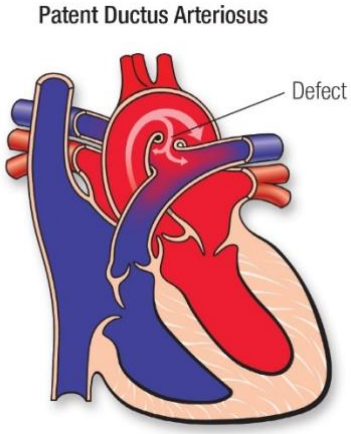
- Occasionally, breastfeeding may be stopped for 24 hours, and formula is given till the diagnosis is established.
- In majority of infants, interrupting breastfeeding is not necessary or advisable.

ABO Incompatibility Vs Rhesus haemolytic disease

Both are a cause of early onset jaundice (<24 hours) but of course it can also be picked up on day 2 or 3 when jaundice becomes more obvious.
Causes haemolytic jaundice →So haemoglobin expected to be low, reticulocytes high, bilirubin very high.

ABO Incompatibility	RH haemolytic disease
More common	Less common
Less severe	More severe
Haemoglobin normal or slightly reduced.	Haemoglobin very low
Can occur in any pregnancy including first pregnancy.	Occurs after 1st pregnancy as requires isoimmunisation.
Mother: Group O	Mother: **RH -**
Infant: Group A, B, AB	Infant **RH +**
DAT weak positive	DAT strong positive

Patent Ductus Arteriosus



Common in preterm infants

Clinical features

May be asymptomatic or:

- Apnoea
- Bradycardia
- hypoxia
- Bounding peripheral pulses
- Continuous murmur

Diagnosis Echocardiography

Management

- May close spontaneously.
- Indomethacin or ibuprofen (effective in majority of the cases)
- Surgery

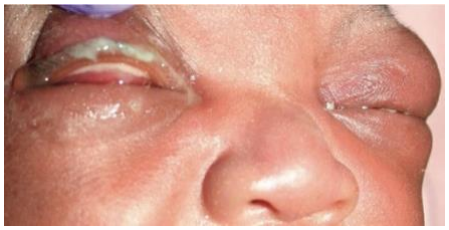
Pathological murmurs	Innocent Murmur
Holosystolic (pansystolic) murmur.	Short duration
Heard over upper left sternal border.	Sensitive (changes with position or respiration) Supine (murmur is heard loudest in supine position)
Harsh murmur	Soft
Abnormal heart sounds.	Single (no associated clicks or gallops)
Early or mid-systolic click	Systolic
Grade 3 murmur or greater	Sweet (not harsh sounding)
	Small (murmur limited to a small area and not radiating).

Lateral Neck Masses

Cystic hygroma	Branchial cyst
• Fluctuating lump • transilluminates	• Non-translucent • Doesn't move on swallowing. • Fluctuant

Neonatal Conjunctivitis

- Sticky red eyes in neonates Refer to secondary care.
- Purulent discharge + lid swelling in neonates.
- Refer to secondary care.



Congenital CMV is the leading non-genetic cause of sensorineural hearing loss.

Investigations

1- CMV antibody: IgM and IgG:

- Recent CMV infection causes an increased IgM level and a four-fold increase in IgG.
- The diagnosis of maternal primary CMV infection in pregnancy is based on positive CMV IgG

2- PCR is the fastest and most sensitive method used to detect CMV in blood and tissue samples. It is positive before the antigenemia test in patients with viraemia who have received transplants.

Tourette's Syndrome

- Young, mostly male (6-8 years old)
- Tics Repetitive movements or gestures that
- are disruptive in the classroom Jerks, blinks, sniffs, nods, and obscene verbal ejaculations.

Treatment

- Behavioural therapy (habit-reversal)
- Risperidone and haloperidol may also be tried.

Asperger syndrome

- The question would mention impaired social skills (helps differentiate it from Tourette's syndrome)
- Repetitive behavioural patterns
- Normal IQ and language

Dysgraphia

learning disability that affects writing abilities.
Educational psychologist help create a therapy plan for children to improve their coordination and handwriting skills. They consult with multidisciplinary teams to advise on the best approach to help the child's development.

Note for EXAM

- **Talk Therapy for a child with Diabetes mellitus is very important so start with physiologist. If become more complicated or need drug so, refer to psychiatrist.**
- **If teenage on Maximum dose of medication and still not working cheek compliance and adherence to medication.**

Notes for Exam

when you find symptoms mixed of different system think of:

- Chest and GIT → **CF**
- Chest and Liver → **Alpha 1 antitrypsin deficiency**
- Chest and Kidney → **Goodpasture syndrome**
- Kidney and Brain → **polycystic Kidney**
- Brain and Liver → **Wilson's Disease**
- Haematuria + sensorineural hearing loss → **Alport syndrome**

Apgar Score

Apgar scoring is recorded in all new-born infants at 1 minute and 5 minutes.

SCORE	0 points	1 point	2 points
Appearance (Skin color)	Cyanotic / Pale all over	Peripheral cyanosis only	Pink
Pulse (Heart rate)	0	<100	100-140
Grimace (Reflex irritability)	No response to stimulation	Grimace or weak cry when stimulated	Cry when stimulated
Activity (Tone)	Floppy	Some flexion	Well flexed and resisting extension
Respiration	Apneic	Slow, irregular breathing	Strong cry

Perforated Hymen

Important Clinchers

- Horse riding + Red staining of underpants.

Next most appropriate action

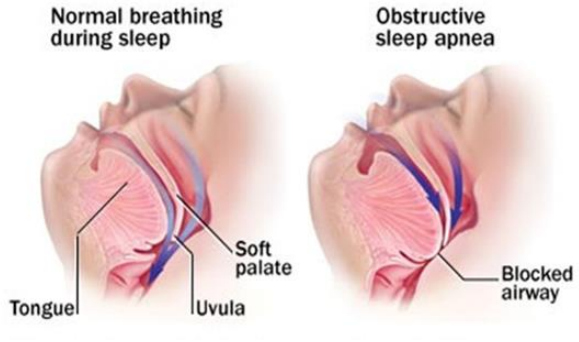
- Examination of genitalia in clinic (without anaesthesia)
- Stop the examination if the child becomes uncomfortable or withdraws permission to continue.

When to consider general anaesthesia?

- If the child refuses examination and requires medical attention, such as bleeding or a foreign body, are suspected.

Obstructive Sleep Apnoea Syndrome in Children

Occurs due to enlarged tonsils and adenoids.



Clinical features

- Snoring
- Mouth breathing
- Witnessed apnoeic episodes.
- Nasal speech
- Sleep deprived children tend to be hyperactive with reduced attention spans, in contrast with adults who often fall asleep during the day.

Investigation

- Gold standard instrument→→ Overnight in-laboratory polysomnography (PSG).
- Single most appropriate action → Refer to ENT surgeon.

Weight Loss In Infant in The First Few Days of Life

- Weight loss is common in the first few days of life.
- If the weight loss is more than 10% of birth weight or the weight does not return to birth weight by week 3, one would consider feeding difficulties or look for an underlying cause.
- Otherwise, in a healthy infant, (or one who has regained weight by week 3) just reassurance is required.

Sudden Infant Death Syndrome

To reduce the risk of sudden infant death syndrome (SIDS), advise parents the following:

- Avoid smoking near infants!
- Put infants to sleep on their backs (not their front or sides)
- Avoid overheating by heavily wrapping infants!
- Blankets should not be higher than their shoulders.
- Infants should be placed with their feet at the foot of the cot.
- Avoid bringing baby into the bed after parents have consumed alcohol or sedative medications.
- Avoid sleeping with infant on sofa.
- Avoid using a pillow.
- Use sheets and blankets rather than a duvet.

Normal Developmental Milestone

baby development milestone

Month	Motor development	Sensory development	Language development	Feeding development
0-3 months	- Throws her hands and legs - Move fists	- Calms down on rocking or gentle music - Tracks toys visually when moved side-to-side	- Responds by smiling - Notices sounds - Responds to different faces - Makes eye contact	- Needs to be fed about 6 times a day - Reaches to nipple or bottle - Begins to suck and swallow
4-6 months	- Sits with support - Rolls on tummy and back - Grabs both feet while lying down	- Brings hands to mouth - Understands gestures like calming and rocking	- Starts babbling - Reacts to specific noises - Notices toys with sounds	- Open mouth when food is brought near - Can eat purees
7-9 months	- Sits without using support - Reaches out for toys without falling - Picks up objects	- Explores objects with both hands - Takes notice of surroundings - Enjoys specific playing movements; like jumping, rolling	- Babbles extensively - Responds when spoken to - Nods or uses simple gestures - Repeats some syllables	- Holds bottle - Enjoys chewing teethers - Reaches out for food
9-12 months	- Stand alone - Move using support - Maintains balance	- Enjoys music - Responds to favorite objects	- Says 'mama' or 'papa' - Listens to instructions; like come here or sit down	- Uses fingers to eat by self - Eats soft cooked foods - Uses open cup

If a certain milestone is not reached by the respective date, you should refer for a specialist community paediatric assessment:

- Unable to **sit** unsupported at 12 months of age.
- Unable to **walk** by 18 months of age.
- Unable to **run** by 2.5 years of age**.**
- **No speech** at 18 months of age (at 15 months onwards, if unable to speak monosyllabic words and difficulty understanding speech, consider arranging hearing test)
- Unable to **put** two words together (e.g., push car) by 2 years of age.
- Unable to **hold** objects placed in hand by 5 months of age.
- Unable to **reach** for objects by 6 months of age.

Normal Puberty

Normal puberty age

- Girls →8-13 years old
- Boys→ 9-14 years old

First sign of puberty

- Females→ Breasts begin to develop.
- Males →Testicular enlargement.

Early or precocious puberty

- Females → Before 8 years of age
- Males → Before 9 years of age

Delayed puberty

- Females → No breast development till 13 years or breasts developed but no periods till 15 years.
- Males→ No testicular development till 14 years

is constitutional delay in growth and puberty, is the Most common cause of delayed puberty and short stature. Do X ray on left wrist bone for bone age.

Contraindications to vaccination

Generally, vaccination is contraindicated when:

- History of confirmed **anaphylactic reaction** to a previous dose of the vaccine.
- History of confirmed anaphylactic reaction to a component of the vaccine.

Live vaccines are contraindicated in:

- Immunosuppressed patients
- Pregnancy

Delay vaccination if the child has a febrile illness (With a high temperature) or has an infection.

Remember that the baby can still be vaccinated if:

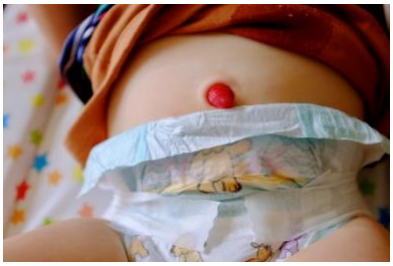
- The baby has a minor illness without temperature - such as a cold.
- The baby has allergies, asthma, eczema, and food intolerances.
- Baby was born prematurely.

Two vaccines in the UK schedule contain small amounts of egg protein:

- MMR vaccine
  - Grows on cells from chick embryos.
  - Does not trigger an allergic reaction.
  - Can receive MMR vaccine (even if allergic to egg)
- Flu vaccine
  - Grows on hens' eggs.
  - Can trigger an allergic reaction.
  - To give egg-free inactivated flu vaccine (if allergic to egg)

Umbilical Granuloma

An umbilical granuloma is an overgrowth of scar tissue during the healing process of the umbilicus. It usually looks like a soft pink or red lump.

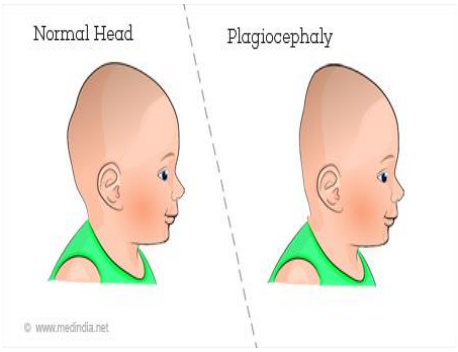


If not infected, there are two options for treatment:

- Table salt usually started first.
- Silver nitrate

Plagiocephaly

Condition where an infant's head becomes deformed as the result of external forces applied.



Usually from lying down in one head position for extended time (months and years)

What needs to be done?

- Reassurance
- Encourage changing baby's position when lying down.
- Encourage infant to sit up or have more tummy time during waking hours.

Intraosseous access

- Useful in Major burns, septic shock, and cardiac arrest when it is difficult to place an intravenous line.
- **place 2.5cm below** the tibial tuberosity at the proximal tibia
- AVOID THE EPIPHYSEAL GROWTH PLATE WHEN USING THIS METHOD

Vitamin D Supplementation

All children and adults living in the UK are advised to take daily vitamin D supplementation of **400** IU throughout the year.
Children aged 0-1 year are advised to taken vitamin D supplements at slightly lower doses of 340-400 IU.

IV Fluids

1-Routine Maintenance

- Indicated if current oral intake is **insufficient** to remain hydrated.
- Maintenance fluid over 24 hours (child >28 days age):
  - ✓ **100 mL/kg for the first 10 kg**
  - ✓ **50 mL/kg for the next 10 kg**
  - ✓ **20 mL/kg for remaining kg**
- Divide the total by 24 for the hourly rate.
- Replace over 24 hours unless in hypernatremia, replace over 48 hours.
- **Use sodium chloride 0.9% + glucose 5%**
- Reduce by ⅓ if there is a risk of inappropriate ADH secretion.

2-IV Fluids – Replacement

Indicated when there is existing fluid deficit, and the oral route is not possible.

Red flags: sunken eyes, lethargic, tachycardia, tachypnoea, reduced skin turgor

Use sodium chloride 0.9% + glucose 5% add in potassium 10 mmol/L (in diarrhoea/vomit)

Step 1:

Calculate % dehydration: clinically or by weight.

- ✓ Without red flags = 5%
- ✓ With red flags/shock = 10%

If well weight is known:

$$= \frac{\text{Well weight} - \text{Current weight}}{\text{Current weight}} x\ 100\%$$

Step 2:

Fluid deficit = % dehydration x weight x 10

Total fluid needed: maintenance fluid + fluid deficit.

IV Fluids – Resuscitation

Indicated when the patient is shocked.
For moderate to severe dehydration, correct with IV fluid resuscitation.
IV fluids boluses for paediatric shock should always be a balanced crystalloid solution (eg Plasmal-Lyte, Hartmann's solution, Ringer's lactate)
IV bolus: 10 mL/kg over <10 minutes
The exception to this is if there is suspected congenital heart disease, where fluid resuscitation may cause deterioration. In this instance, 5ml/kg fluid blouses should be given, with immediate review following administration.
If treating with resuscitation IV bolus, the fluid deficit and 24-hour maintenance fluid should be calculated in the same way. Do not subtract the resuscitation boluses.
Percentage dehydration would be at 10% if resuscitation fluid was required.
Fluid deficit = 10% x weight x 10
Total fluid requirement for the following 24 hours = Fluid deficit + maintenance fluid

Abdominal Migraine

Functional pain >> reassurance

Child + recurrent central abdominal pain >1 hour+ interferes with school + episodic.

headaches + well in between episodes

obtain a further history from teachers and family to draw a conclusion if this is behavioural related and linked to attending school.

There is no doubt that a recent cancer diagnosis in the family is a trigger for a change of behaviour and can often affect children in school as well.

Causes of recurrent abdominal pain in children:
1) Abdominal migraine.

2) Paediatric IBS: abdominal pain which improves after defecation, child sits in toilet for a long time.
3) Post prandial pain syndrome: Post prandial fullness even after regular meals. child is not able to finish the regular meal. associated with bloating, nausea and early satiation.

4) Epigastric pain syndrome: epigastric pain not relieved by defecation or passing flatus.

Abdominal migraines are a type of functional pain. It is usually characterised by having:

- Paroxysmal episodes of intense, acute periumbilical pain lasting hours
- Pain is dull.
- The pain interferes with normal activities (child may miss school)
- The pain may be associated with nausea and vomiting.
- Not attributed to another disorder

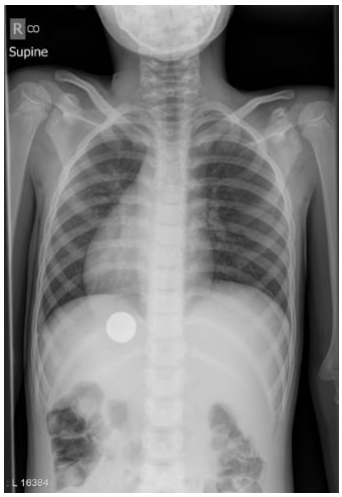
Examination FBC, urinalysis, Normal

TTG IgA and faecal calprotectin test: Negative

Treatment

Reassure, no further investigations or treatment needed.

X-ray and Coins



Coins are the most swallowed foreign objects in toddlers.

If the coin is seen below the diaphragm on X-ray e.g., stomach, small intestines) in an asymptomatic toddler **Reassurance** is all that is required.

You DO NOT need to perform another X-ray later nor check stools if the patient remains asymptomatic.

Traffic Light System

	Green – low risk	Amber – intermediate risk	Red – high risk
Colour (of skin, lips or tongue)	• Normal colour	• Pallor reported by parent/carer	• Pale/mottled/ashen/ blue
Activity	• Responds normally to social cues • Content/smiles • Stays awake or awakens. quickly • Strong normal cry/not crying	• Not responding normally to social cues • No smile • Wakes only with prolonged stimulation. • Decreased activity	• No response to social cues • Appears ill to a healthcare professional. • Does not wake or if roused does not stay awake • Weak, high-pitched or continuous cry
Respiratory		• Nasal flaring • Tachypnoea: – RR >50 breaths/ minute, age 6–12 months – RR >40 breaths/ minute, age >12 months • Oxygen saturation ≤95% in air • Crackles in the chest	• Grunting • Tachypnoea: RR >60 breaths/minute • Moderate or severe chest indrawing
Circulation and hydration	• Normal skin and eyes • Moist mucous membranes	• Tachycardia: – >160 beats/minute, age <12 months – >150 beats/minute, age 12–24 months – >140 beats/minute, age 2–5 years • CRT ≥3 seconds • Dry mucous membranes • Poor feeding in infants • Reduced urine output	• Reduced skin turgor
Other	• None of the amber or red symptoms or signs	• Age 3–6 months, temperature ≥39°C • Fever for ≥5 days • Rigors • Swelling of a limb or joint • Non-weight bearing limb/not using an extremity	• Age <3 months, temperature ≥38°C* • Non-blanching rash • Bulging fontanelle • Neck stiffness • Status epilepticus • Focal neurological signs • Focal seizures
CRT, capillary refill time; RR, respiratory rate * Some vaccinations have been found to induce fever in children aged under 3 months			
This traffic light table should be used in conjunction with the recommendations in the NICE guideline on fever in under 5s.			

New-born Life support

Baby born in distress condition:

1) Dry and stimulate the baby, keep warm many babies will respond to vigorous rubbing with warm towel.
2) if unsuccessful, next is 5 inflation breaths last 2- 3 seconds (keep an eye on chest inflation)
3) give 30 seconds of ventilation breaths at rate of 30 breath/minute.
4) reassessed if not improved and chest compression started in a ratio of 3:1 if heart beat undetectable of less than 60bpm
5) If heartbeat is above 60 beats/ minutes ventilation breaths should continue with reassessment of heart rate respiratory effort every 30 second

Once CPR has begun, obtain IV access and give resuscitation drugs.

Resuscitation Council UK

GUIDELINES 2021

Newborn life support

(Antenatal counselling)
Team briefing and equipment check

Preterm < 32 weeks

Place undried in plastic wrap + radiant heat

Inspired oxygen
28–31 weeks 21–30%
< 28 weeks 30%

If giving inflations, start with 25 cm H_2O

Acceptable pre-ductal SpO_2	
2 min	65%
5 min	85%
10 min	90%

TITRATE OXYGEN TO ACHIEVE TARGET SATURATIONS

Birth
Delay cord clamping if possible

↓

Start clock / note time
Dry / wrap, stimulate, keep warm

↓

Assess
Colour, tone, breathing, heart rate

↓

Ensure an open airway
Preterm: consider CPAP

↓

If gasping / not breathing
- **Give 5 inflations (30 cm H_2O) – start in air**
- Apply PEEP 5–6 cm H_20, if possible
- Apply SpO_2 +/- ECG

↓

Reassess
If no increase in heart rate, look for chest movement

↓

If the chest is not moving
- Check mask, head and jaw position
- 2 person support
- Consider suction, laryngeal mask/tracheal tube
- Repeat inflation breaths
- Consider increasing the inflation pressure

↓

Reassess
If no increase in heart rate, look for chest movement

↓

Once chest is moving continue ventilation breaths

↓

If heart rate is not detectable or < 60 min^{-1} after 30 seconds of ventilation
- Synchronise 3 chest compressions to 1 ventilation
- Increase oxygen to 100%
- Consider intubation if not already done or laryngeal mask if not possible

↓

Reassess heart rate and chest movement every 30 seconds

↓

If the heart rate remains not detectable or < 60 min^{-1}
- **Vascular access and drugs**
- Consider other factors e.g. pneumothorax, hypovolaemia, congenital abormality

↓

Update parents and debrief team
Complete records

APPROX 60 SECONDS

MAINTAIN TEMPERATURE

AT ALL TIMES ASK **"IS HELP NEEDED"**