# BABIES

- A baby is a neonate for its first 4 weeks and an infant for its first year.

Neonates are classified by birthweight or gestational age:

- Extremely low: <1000 g
- Very low: <1500 g
- Low: <2500 g
- Normal: ≥2500 g

Extremely preterm: <28 weeks
Preterm: <37 weeks
Term: 37-42 weeks
Post-term: >42 weeks

## APGAR score

≥7 NORMAL 4-6 LOW ≤3 CRITICAL

| SCORE | APPEARANCE | PULSE | GRIMACE | ACTIVITY | RESPIRATION |
|---|---|---|---|---|---|
| 0 | Blue all over | No pulse | No response to stimulation | No movement | No respiration |
| 1 | Blue extremities | <100 beats/min | Grimace on stimulation | Some flexion | Weak, irregular, slow |
| 2 | No blue colouration | >100 beats/min | Cry on stimulation | Flexed limbs that resist extension | Strong cry |

neonates commonly score 8–10 at 1 and 5 minutes. The score predicts the need for, and efficacy of, resuscitation. A low score should increase with time; a decreasing score is a cause for concern. Persistently low scores at 10 minutes predict death or later disability. Neonates with scores of less than 8 at 5 minutes require continued evaluation until it is clear they are healthy.

## The history

Ask the mother and look in the maternal notes for relevant history:

**Pregnancy history**

- How was maternal health?
- Did the mother take medications or other drugs?
- What did antenatal screening tests show?

**Birth history**

- What was the birthweight, gestation at birth and mode of delivery?
- Was there prolonged rupture of the fetal membranes or maternal pyrexia?
- Was there a non-reassuring fetal status during delivery or meconium staining of the amniotic fluid?
- Was resuscitation required after birth?
- What were the Apgar scores and the results of umbilical cord blood gas tests?

**Infant's progress**

- Has the infant passed meconium and urine since birth?
- In later infancy, what are the specific signs and systems and developmental progress, depending on the presenting problem?

**Maternal history**

- Is there a family history of significant illness (e.g. diabetes, hereditary illnesses)?
- What were the outcomes of any previous pregnancies?

## Presenting problems and definitions

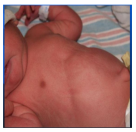
Infants cannot report symptoms, so you must recognize the presenting problems and signs of illness, which are non-specific in young infants. Always take the concerns of parents seriously.

**1- pallor**

Always investigate pallor in a newborn, as it implies **anemia** or **poor perfusion**. Newborn infants have **higher hemoglobin levels** than older children and are not normally pale. Hemoglobin levels of <120 g/L **(<12 g/dL)** in the perinatal period are low.

Preterm infants look red because they lack subcutaneous fat.

Presenting problems and definitions

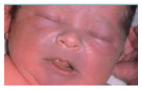


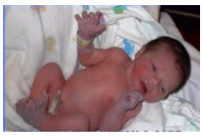
**2- Respiratory distress**

Respiratory distress is tachypnea (respiratory rate) >60 breaths per minute with intercostal and subcostal indrawing, sternal recession, grunting, nasal flaring and the use of accessory muscles.

**3- Cyanosis**

Bluish discoloration of the lips and mucous membranes due to **hypoxia** is difficult to see in newborn infants unless oxygen saturation **(SpO2) is <80%** (normal is >95%). Causes include congenital heart disease and respiratory disease, and cyanosis always needs investigation.





**4-Acrocyanosis**

Acrocyanosis is a bluish-purple discoloration of the hands and feet and is a normal finding, **provided the newborn is centrally pink.**

**5-Jaundice**

Many newborns develop jaundice in the days after birth. Look for **yellow sclera** in newborns with colored skin or you may miss it. Examine the baby in bright normal light. Normal physiological jaundice cannot be distinguished clinically from jaundice from a pathological cause. Do not use clinical estimates instead of measurements to evaluate jaundice

**6- Jitteriness**

Jitteriness is high-frequency tremor of the limbs, and is common in term infants in the first few days. It is stilled by stimulating the infant and is not associated with other disturbance. If jitteriness is **excessive**, exclude hypoglycemia, polycythemia and neonatal abstinence syndrome (drug withdrawal).

Infrequent jerks in light sleep are common and normal; regular **clonic** jerks are abnormal.

**7- Dysmorphism**

Identifying abnormal body structure (dysmorphism) is **subjective** because of human variability. Individual features may be minor and isolated, or may signify a major problem requiring investigation and management.

A recognizable pattern of several dysmorphic features may indicate a '**dysmorphic syndrome**' such as Down's syndrome.
Use caution and sensitivity when discussing possible dysmorphism with parents of a newborn child.

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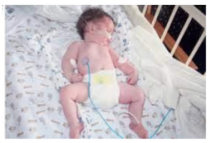


**8- Hypotonia**

Hypotonia (reduced tone) may be obvious when you handle an infant. Term infants' muscle tone normally produces a flexed posture at the hips, knees and elbows. Hypotonic infants may lack this flexion. Hypotonia can occur with **hypoxia, hypoglycemia or sepsis**, or may be due to a specific **brain, nerve or muscle problem**.

**Preterm infants** have lower tone than term infants and are less flexed.

# The physical examination of newborns

**Timing and efficacy of the routine neonatal examination:**

- Examine a newborn with the parents present.

- There is no ideal time. If it is performed on day 1, some forms of congenital heart disease **may be missed** because signs have not developed. If it is delayed, some babies will present before the examination with illness that may have been detectable earlier.

-Around 9% of neonates have an identifiable congenital abnormality but most are not serious. Always record your examination comprehensively to avoid problems if illness or physical abnormality is identified later.

-Fewer than half of all cases of **congenital heart disease or congenital cataract are detected by newborn examination.**

## Skin

**Abnormal findings**

-Document any trauma such as scalp cuts or bruising.

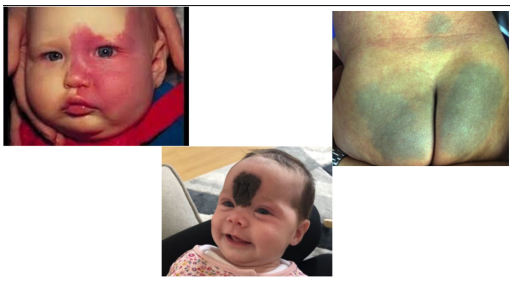
-**Dense capillary hemangiomas** (port wine stains) will not fade. Referral to a dermatologist is advisable, as **laser** treatment may help in some cases. Around the eye they may indicate **Sturge–Weber syndrome** (a facial port wine stain with an underlying brain lesion, associated with risk of later seizures, cerebral calcification and reduced cognitive function).

-**Melanocytic naevi** require follow-up and treatment by a plastic surgeon or dermatologist.

-**A Mongolian blue** spot is an area of bluish discoloration over the buttocks, back and thighs. Easily mistaken for bruising, it usually fades in the first year.

**General examination**

Examine babies and infants in a warm place on a firm bed or examination table. Have a system to avoid omitting anything, but avoid an overly rigid approach as you may be unable to perform key elements if you unsettle the baby. Do things that may disturb the baby later in the examination.



**Examination sequence** (Growth → Vital signs → General apperance)

- Observe whether the baby looks well and is well grown.
- Look for:
- cyanosis • respiratory distress • pallor • plethora (suggesting polycythaemia).
- Note posture and behaviour. • Note any dysmorphic features.
- Auscultate the heart and palpate the abdomen if the baby is quiet.
- If the baby cries, does the cry sound normal?

- There are **three components** for growth measurements in neonates
- Weight \ Length \ Head circumference

* AI should be plotted on standardized growth curves for the infant's gestational age

1- Weight

- Weight of F.T infants at birth is **2.6- 3.8kg.**
- Babies **less than 2.5 kg** are considered low birth weight.
- Babies loose 5- 10% of their birth weight in the first few days after birth and regain their birth weight by 7- 10 days.
- Weight gain varies between **15-20 gm/day**.

2. Length

**Crown to heel length** should be obtained on admission and weekly

Acceptable newborn length ranges from **48-52 cm at birth**

3. Head Circumference

Head circumference should be measured on admission and weekly

Using the measuring paper tape around **the most prominent** part of the **occipital** bone and the **frontal** bone

- Acceptable head circumference at birth in term newborn is **33-38 cm**

V.S

1- T° ⇒ Axillary (36.5° – 37.5°)

* Axillary is 0.5–1° less than rectal

2- HR ⇒ 120–160 BPM Counted for a full minute.

3- RR ⇒ 40–60 /minute ≤ ≤ ≤ ≤

* Newborns have periodic rather than regular

4- Capillary refill time ⇒ < 3 sec over trunk
< 4 sec on extremities

5- BP, $O_2$ sat.

## Skin

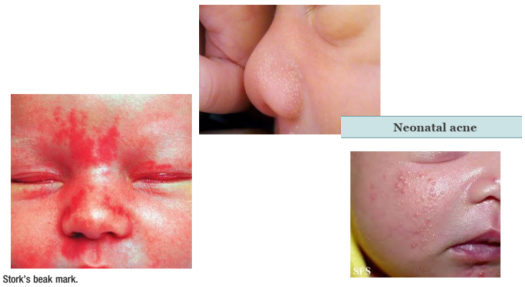
**Normal findings**

- The skin may look normal, dry, wrinkled or vernix-covered in healthy babies. There may be meconium staining of the skin and nails.

-**Prominent capillaries** commonly cause pink areas called **'stork's beak marks'** at the nape of the **neck, eyelids and glabella**. Facial marks fade spontaneously over **months**; those on the neck often persist.

-**Milia** (fine white spots) and **acne neonatorum** (larger cream-coloured spots) are collected glandular secretions and disappear within **2–4 weeks.**

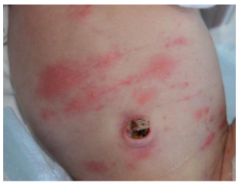
-**Erythema toxicum** is a common fleeting, blanching, idiopathic maculopapular rash of no consequence, affecting the trunk, face and limbs in the first few days after birth.



Stork's beak mark.

Neonatal acne

Vernix caseosa



# Head

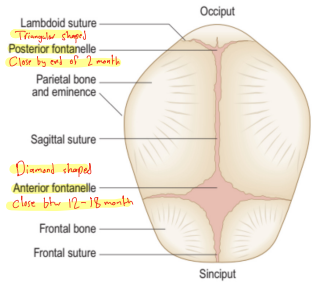



Fig. 15.3 The fetal skull from above.

1-Feel the anterior fontanelle. Is it sunken, flat or bulging?

2-Palpate the cranial sutures.

Separated cranial sutures with an obvious gap indicate **raised intracranial pressure.** Rarely, the cranial sutures are prematurely fused **(synostosis)**, producing ridging, and the head shape is usually abnormal.
Abnormal head size requires detailed investigation, including **neuroimaging**.

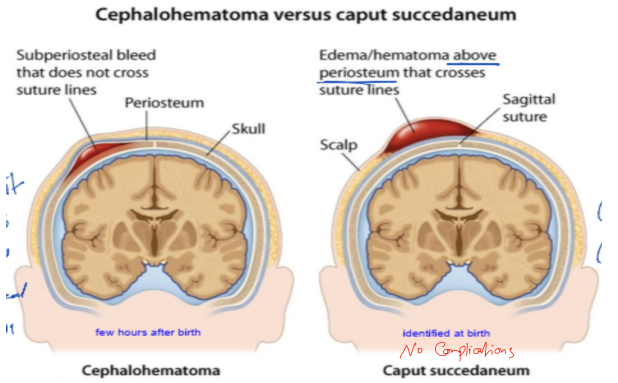
3- Note the baby's head shape and any swellings.

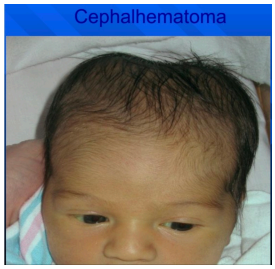
**Normal findings**

Transient **elongation** of the head is common from **moulding** during birth.
**Caput succedaneum** is soft-tissue swelling over the **vertex** due to pressure in labour. Overriding cranial sutures have a palpable step.

**Abnormal findings**

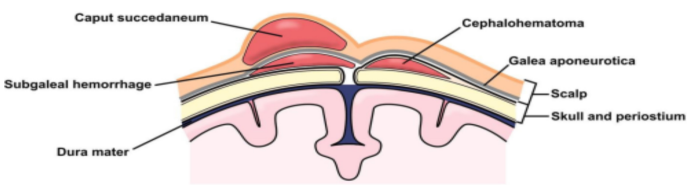
**Cephalhaematoma** is a **firm**, **immobile**, usually **parietal** swelling caused by a localized hemorrhage under the cranial periosteum. **It may be bilateral**, and periosteal reaction at the margins causes a raised edge. No treatment is required. Do not confuse this with the boggy, mobile, poorly localized swelling of **subgaleal hemorrhage** (beneath the flat sheet of fibrous tissue that caps the skull), which can conceal a **large blood loss and is life-threatening** if unrecognized.





## Neonatal Extracranial Injuries




| Head shape | Description |
|---|---|
| Microcephalic (small-headed) | Small cranial vault |
| Megalencephalic (large-headed) | Large cranial vault |
| Hydrocephalic (Water-headed) | Large cranial vault due to enlarged ventricles |
| Brachycephalic (short-headed) | Flat head around the occiput |
| Dolichocephalic (long-headed) | Head that looks long relative to its width |
| Plagiocephalic (oblique-headed) | Asymmetrical skull |

## Eyes: Usually edematous eye lids / Pupil react to light / Can't follow obj.

**Examination sequence**

- Inspect the eyebrows, lashes, lids and eyeballs.
- Gently retract the lower eyelid and check the sclera for jaundice.
- Test ocular movements and vestibular function:
- Turn the newborn's head to one side; watch as the eyes move in the opposite direction. These are called **doll's-eye movements** and disappear in infancy.

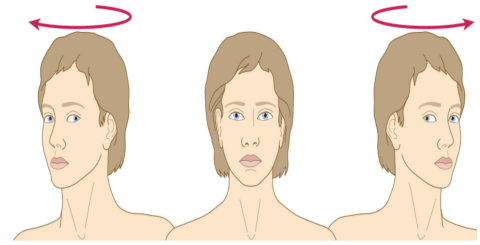
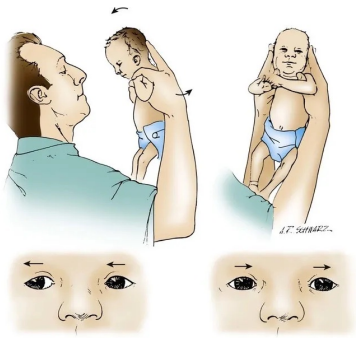


Fig. 8.15 Oculocephalic reflex. Move the head in the horizontal plane. Note that the eyes move in the opposite direction to head movement.

Hold the infant upright at arm's length and move in a horizontal arc. The infant should look in the directionl of movement and have **optokinetic nystagmus**. This response becomes damped by 3 months.



## Ophthalmoscopy

**Examination sequence**

- Hold the baby in your arms. Turn your body from side to side so that the baby will open their eyes.
Look at each pupil **from about 20 cm** through the ophthalmoscope. You should see the **red reflex** of reflected light from the retina.

**Normal findings**

**Puffy eyes** in the first days after birth impede the examination.

If this happens, always examine again later because failure to detect and treat a cataract will cause permanent **amblyopia**.

**Abnormal findings**

An **absent red reflex** suggests cataract; refer to an ophthalmologist

**Normal findings**

Harmless yellow crusting without inflammation is common after birth in infants with narrow lacrimal ducts.

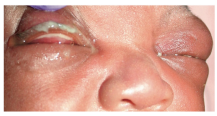
Term infants usually fix visually.

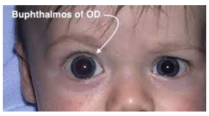
**Abnormal findings**

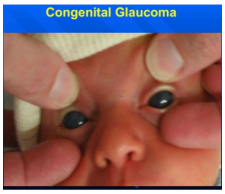
Eye infection gives a red eye and purulent secretions.

An abnormal pupil shape is usually a **coloboma** (a defect in the iris inferiorly that gives the pupil a keyhole appearance). This can also affect deeper structures, including the optic nerve, and lead to visual impairment. It can be associated with syndromes, as can microphthalmia (small eyeballs).

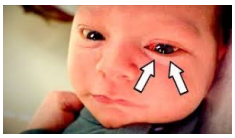
Large eyeballs that feel hard when palpated through the lids suggest congenital glaucoma (buphthalmos).





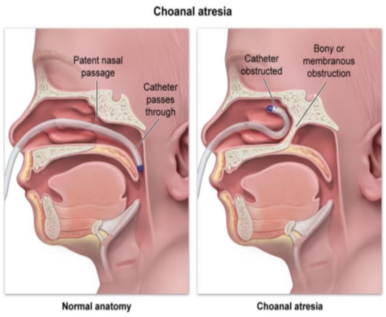


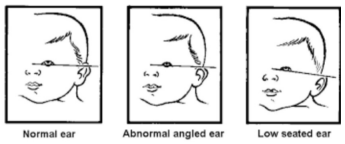
## Nose

**Examination sequence**

•Exclude obstructed nostrils (**choanal atresia**) by blocking each nostril in turn with your finger to check that the infant breathes easily through the other.


## Ears




**Examination sequence**

•Note the **size**, **shape** and **position**.

•The helix should attach above an imaginary line through the inner corners of the eyes.

•Check that the external auditory meatus looks normal.

**Normal findings** : Pinna flexible / Cartilage present / Moro reflex

The helix can be temporarily folded due to local pressure in utero.

Pre-auricular skin tags do not require investigation.

**Abnormal findings**

Abnormal ear shape and position is a feature of some syndromes.

## Mouth

* Cheeks : Have a chubby appearance due to development of Fatty Sucking pads that help to create -ve pressure inside the mouth which facilitates sucking.

**Examination sequence**

•Gently press down on the lower jaw so that the baby will open their mouth. Do not use a wooden tongue depressor, as this may cause trauma or infection.

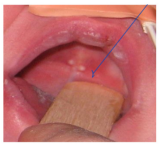
•Shine a torch into the mouth and look at the tongue and palate.

•Palpate the palate using your fingertip.

**Normal findings**

- Epstein's pearls are small, white mucosal cysts on the palate that disappear spontaneously.

- White coating on the tongue that is easily scraped off with a swab is usually curdled milk.



**Abnormal findings**

**- Ankyloglossia (tongue tie)** is when the lingual frenulum joining the underside of the tongue to the floor of the mouth is abnormally short, which may interfere with **feeding**.

-A white coating on the tongue, which is not easily removed and may bleed when scraped, is caused by Candida albicans (thrush).

-Macroglossia (a large protruding tongue) occurs in **Beckwith–Wiedemann syndrome.**

- A normal-sized tongue protrudes through a small mouth in **Down's syndrome (glossoptosis).**

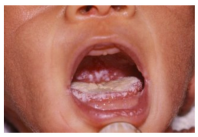
- **Cleft palate** may involve the soft palate or both hard and soft palates. It can be midline, unilateral or bilateral and may also involve the gum (alveolus).

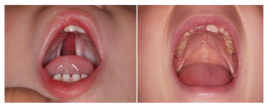
**Cleft lip** can appear in isolation or in association with it. Refer affected infants early to a specialist multidisciplinary team.

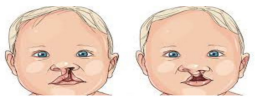
- **Micrognathia** (a small jaw) is sometimes associated with **cleft palate** in the **Pierre Robin syndrome**, with posterior displacement of the tongue and upper airway obstruction.

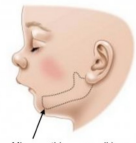
- A **ranula** is a mucous cyst on the floor of the mouth that is related to the sublingual or submandibular salivary ducts.
Congenital ranulas may resolve spontaneously but sometime require surgery.

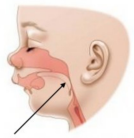
- Teeth usually begin to erupt at **around 6 months but can be present at birth.**

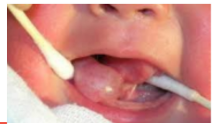






## Neck

**Examination sequence**

• Inspect the neck for **asymmetry**, **sinuses** and **swellings**.

•Palpate any masses. interpret your findings.

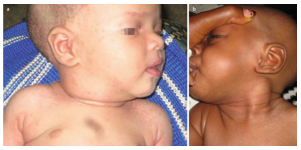
• Transilluminate swellings. Cystic swellings glow, as the light is transmitted through clear liquid. Solid or blood-filled swellings do not.

**Normal findings**

One-third of normal neonates have palpable cervical, inguinal or axillary lymph nodes. Neck asymmetry is often due to fetal posture and usually resolves.

**Abnormal findings**

A lump in the sternocleidomastoid muscle **(sternomastoid 'tumour')** is caused by a **fibrosed haematoma** with resultant **muscle shortening**. This may produce **torticollis**, with the head turned in the **contralateral** direction.



# Cardiovascular examination

**Examination sequence**

•Observe the baby for pallor, cyanosis and sweating.

•Count the respiratory rate.

•Palpate for the apex beat with your palm in the mid-clavicular line in the fourth or fifth intercostal space.

•Note if the heart beat moves your hand up and down (parasternal heave) or if you feel a vibration (thrill).

•Count the heart rate for 15 seconds and multiply by 4.

•feel the femoral pulses by placing your thumbs or fingertips over the mid-inguinal points while abducting the hips.

•Auscultate the heart. Start at the apex using the stethoscope bell (best for low-pitched sounds). Then use the diaphragm in all positions for high-pitched sounds and murmurs.

•Describe the heart sounds S1 and S2, any additional heart sounds and the presence of murmurs. **The fast heart rate of a newborn makes it difficult to time additional sounds.** Take time to tune into the different rate of the harsh breath Sounds of a newborn, as they are easily confused with a murmur

## Cardiovascular examination

•Do not measure the blood pressure of healthy babies. In ill babies, cuff measurements overestimate the values when compared with invasive measurements. The cuff width should be at least two-thirds of the distance from the elbow to the shoulder tip.

•Palpate the abdomen for hepatomegaly (see later).

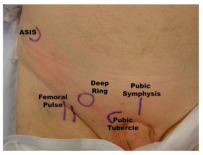



Fig. 15.5 **Palpating the femoral pulses.** The pulse can be difficult to feel at first. Use a point halfway between the pubic tubercle and the anterior superior iliac spine as a guide.

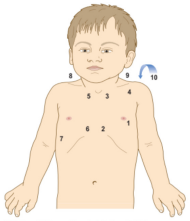
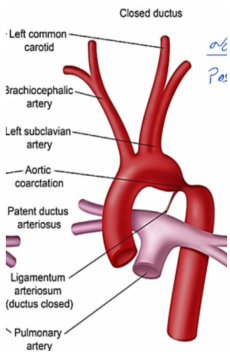
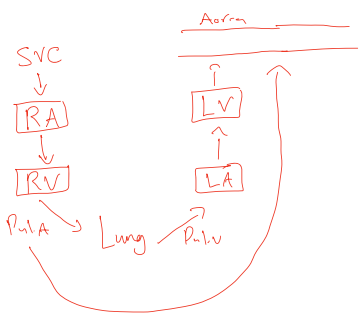


Fig. 15.6 **Auscultation positions in infants and children.** Recommended order of auscultation: **1**, apex; **2**, left lower sternal edge; **3**, left upper sternal edge; **4**, left infraclavicular; **5**, right upper sternal edge; **6**, right lower sternal edge; **7**, right mid-axillary line; **8**, right side of neck; **9**, left side of neck; **10**, posterior.




**Normal findings**

In the early newborn period the femoral pulses may feel normal in an infant who later presents with coarctation because an open ductus arteriosus can maintain flow to the descending aorta.
Routine measurement of postductal oxygen saturation is increasingly popular as an additional newborn screening test for congenital heart disease. Lower limb SpO2 should be 95% or higher.

Heart rates between 80 and 160 beats per minute (bpm) can be normal in the newborn, depending on the arousal state

| Sign | Preterm neonate | Term neonate |
|---|---|---|
| HR (BPM) | 120-160 | 100-140 |
| RR (BPM) | 40-60 | 30-50 |

**Abnormal findings**

Infants with heart failure typically look **pale** and **sweaty**, and have **respiratory distress**.

If the apex beat is displaced **laterally**, there may be cardiomegaly, or mediastinal shift due to contralateral pneumothorax or pleural effusion.

**Weak or absent femoral pulses** suggest coarctation of the aorta. Radiofemoral delay is not identifiable in the newborn.

Patent ductus arteriosus may cause a **short systolic murmur** in the early days of life because the pulmonary and systemic blood pressures are similar, which limits shunting through the duct.

The murmur progressively lengthens over subsequent weeks or months to become the **continuous 'machinery' murmur** recognized later in childhood.

Transient murmurs (short, small, soft) are heard in up to 2% of neonates but only a minority have a structural heart problem. **An echocardiogram is needed to make a structural diagnosis.**

# Respiratory examination

**Examination sequence**

•Note chest **shape** and **symmetry** of chest movement.

•Count the respiratory rate (for 15 seconds and multiply by 4).

• Listen for additional noises with breathing.

•Look for signs of respiratory distress: tachypnoea; suprasternal, intercostal and subcostal recession; grunting, flaring of the nostrils.

•Remember that **percussion of the newborn's chest is not helpful.**

•Use the diaphragm to auscultate **anteriorly**, **laterally** and **posteriorly**, **comparing the sides**. Breath sounds in the healthy newborn have a **bronchial** quality compared with older individuals.

**Normal findings**

Male and female newborn infants at term have small buds of palpable breast tissue. Small amounts of fluid are sometimes discharged from the nipple in the early days after birth.

**Abnormal findings**

**Stridor** indicates large airway obstruction and is predominantly inspiratory. Stridor and indrawing beginning on days 2–3 of life in an otherwise well baby may be due to **laryngomalacia** (softness of the larynx).
Causes of respiratory distress include **retained lung fluid, infection, immaturity, aspiration, congenital anomaly, pneumothorax, heart failure and metabolic acidosis.**

* Respiratory is chiefly Abdominal
* Cough reflex is absent at birth, Present 1-2D Post natally
* Signs of RDS are very important
  - Retraction
  - Grunting
  - Flaring
  - tachypnea
  - Cyanosis

# Abdominal examination

**Examination sequence**

•Remove the nappy.

•Inspect the abdomen, including the umbilicus and groins, noting any swellings.

•From the infant's right side, gently palpate with the flat of your warm right hand. Palpate superficially before feeling for deeper structures.

•Palpate for splenomegaly. In the neonate the spleen enlarges down **the left flank**, not towards the right iliac fossa.

•Palpate for hepatomegaly:

•Place your right hand flat across the abdomen beneath the right costal margin.

•Feel the liver edge against the side of your index finger.

•If you feel more than the liver edge, measure the distance in the mid-clavicular line from the costal margin to the liver edge. Describe it in fingerbreadths or measure it with a tape in centimetres.

•Check that the anus is **present**, **patent** and normally **positioned.**

•Digital rectal examination is usually unnecessary and could cause an anal fissure. **Indications** include **suspected rectal atresia or stenosis and delayed passage of meconium.** Put on gloves and lubricate your little finger. Gently press your fingertip against the anus until you feel the muscle resistance relax and insert your finger up to your distal interphalangeal joint.

**Normal findings**

Abdominal distension from a feed or swallowed air is common.

You may see the contour of individual bowel loops through the thin anterior abdominal wall in the newborn, particularly with intestinal obstruction.

The umbilical cord stump usually separates after 4–5 days. A granuloma may appear later as a moist, pink lump in the base of the umbilicus. **A small amount of bleeding** from the umbilicus is common in the neonate.

The liver edge is **often palpable** in healthy infants.

In the neonate the kidneys are often palpable, especially if ballotted.

**Abnormal findings**

**In excessive umbilical bleeding**, check that the infant received vitamin K and consider factor XIII deficiency. Spreading **erythema around the umbilicus** suggests infective omphalitis and requires urgent treatment.

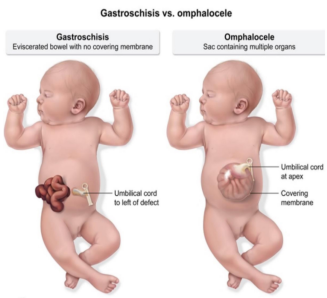
Umbilical hernias are common; they are easily reduced, have a very low risk of complications and close spontaneously in infancy.

An **omphalocoele**, or **exomphalos**, is a herniation through the umbilicus containing intestines and other viscera, covered by a membrane that includes the umbilical cord. It may be associated with other malformations or chromosomal abnormality.

**Gastroschisis** is a defect in the anterior abdominal wall with intestines herniated through it, without a covering membrane. The most common site is above and to the right of the umbilicus.

**Inguinal hernias** are common in the newborn, especially in boys and preterm infants.

Meconium in the nappy **does not guarantee** that the baby has a patent anus because meconium can be passed through a rectovaginal fistula.



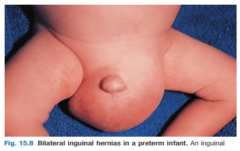
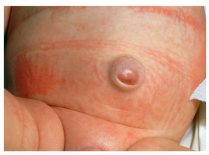
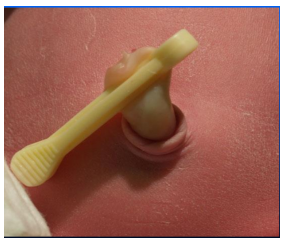



Fig. 15.8 Bilateral inguinal hernias in a preterm infant. An inguinal






# Perineum

**Examination sequence**

**Female**

•Abduct the legs and gently separate the labia.

•In preterm infants the labia minora appear prominent, giving a **masculinised** appearance that resolves spontaneously over a few weeks.

•**Milky vaginal secretions** are normal. Later in the first week, there is sometimes **slight vaginal bleeding** (pseudomenses) as the infant uterus 'withdraws' from maternal hormones.

•Vaginal **skin tags** are common and do not require treatment.

**Male (3 things to comment)**

•**Do not attempt to retract the foreskin.** It is normal for it to be adherent in babies.

•Check that the urethral meatus is at the tip of the penis.

•Note the shape of the penis.

•Palpate the testes.

•If you cannot feel the testes in the scrotum, assess for undescended, ectopic or retractile testes. Palpate the abdomen for smooth lumps, moving your fingers down over the inguinal canal to the scrotum and perineum.

•A retractile testis just below the inguinal canal may be gently milked into the scrotum. Re-examine at 6 weeks if there is any doubt about the position of the testes.

•Transilluminate any large scrotal swellings using a torch to see if the light is transmitted through the swelling. This suggests a **hydrocoele** but can be misleading, because **a hernia of thin-walled bowel** may transilluminate.

•An inguinal hernia usually produces a groin swelling but, if large, this may extend into the scrotum. Try to reduce it by gently pushing the contents upwards from the scrotum through the inguinal canal into the abdomen.

# Perineum

**Normal findings**

The testes are smooth and soft, and measure 0.7×1 cm across.

The right testis usually descends later than the left and sits higher in the scrotum.

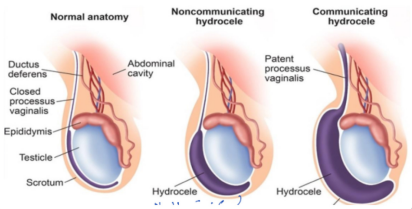
**Abnormal findings**

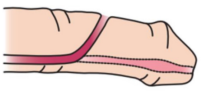
A **hydrocoele** is a collection of fluid beneath the tunica vaginalis of the testis and/or the spermatic cord. Most resolve spontaneously in infancy.

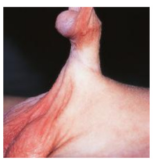
In **hypospadias** the meatal opening is on the ventral aspect of the glans, the ventral shaft of the penis, the scrotum or more posteriorly on the perineum.

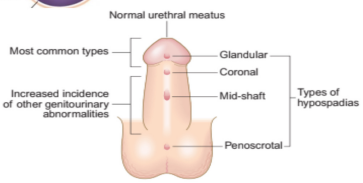
In **epispadias**, which is rare, it is on the dorsum of the penis.

**Chordee** is curvature of the penis and is commonly associated with hypospadias and tethering of the foreskin

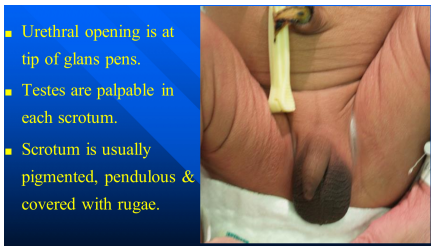











# Spine and sacrum

**Examination sequence**

•Turn the baby over.

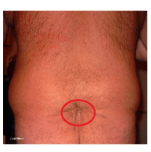
•Inspect and palpate the entire vertebral column from neck to sacrum for neural tube defects.

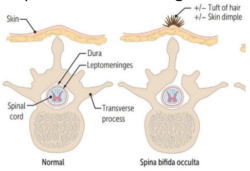
**Normal findings**

Sacral dimples are common and unimportant, provided the dimple base has **normal skin** and they are **single**, **<5 mm in diameter** and **<2.5 cm from the anus.**

**Abnormal findings**

Pigmented patches may indicate spina bifida occulta. Dimples above the natal cleft, **away from the midline**, or **hairy or pigmented** patches with a base that cannot be visualised require further investigation.





# Neurological examination

**This includes tone, posture, movement and primitive reflexes.**

**General neurological assessment**

**Examination sequence**

- Look for **asymmetry in posture and movement**, and **for muscle wasting.**
- To assess **tone**, pick the baby up and note if they are stiff or floppy. Note any difference between each side.
- Power is difficult to assess and depends on the state of arousal. Look for strong symmetrical limb and trunk movements and grasp.
- Tendon reflexes are of value only in assessing infants with neurological or muscular abnormalities.
- Check **sensation** by seeing whether the baby withdraws from gentle stimuli. Do not inflict painful stimuli or use a pin or needle.
- Check eyesight by carrying the alert baby to a dark corner. This normally causes the **eyes to open wide.** In a bright area the **baby will screw up their eyes**. Ideally, electronic audiological screening should also be performed in the newborn period.

## Normal findings

Movements should be equal on both sides.

Tone varies and may be floppy after a feed.

Reflexes are brisk in term infants, often with a few beats of clonus.

The plantar reflex is normally extensor in the newborn.


**Abnormal findings**

Hypotonic infants may have a 'frog-like' posture with abducted hips and extended elbows. Causes include **Down's syndrome, meningitis and sepsis.**

Increased tone may cause back and neck arching and limb extension; the baby feels stiff when picked up. Causes include **meningitis, asphyxia and intracranial haemorrhage**.

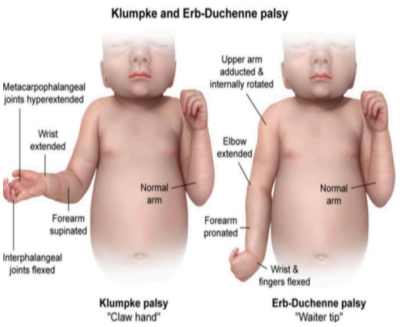
Brachial plexus injuries include Erb's palsy, which affects brachial plexus roots C5 and C6, producing reduced movement of the arm at the shoulder and elbow, medial rotation of the forearm and failure to extend the wrist.

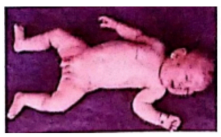
Klumpke's palsy may be seen **after breech delivery** due to damage to roots C8 and T1, with weakness of the forearm and hand.

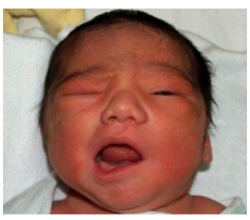
These injuries can be associated with ipsilateral Horner's syndrome and/or diaphragmatic weakness in severe cases.

Most perinatal brachial plexus injuries **recover over subsequent weeks**.

**Facial nerve palsy** causes reduced movement of the cheek muscles, and the side of the mouth does not turn down when the baby cries. Most cases are transient.



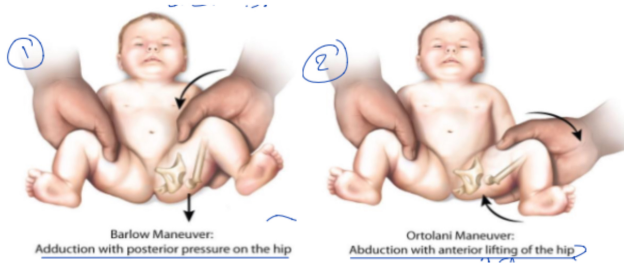





# Limbs

**Examination sequence**

- Inspect the **limbs** and count the **digits**.
- If the foot is abnormally positioned, gently try to place it in a normal position. If the abnormal position is at all fixed, refer to a specialist.
- Examine the hips to check for developmental dysplasia of the hip (DDH):
- Lay the baby supine on a firm surface.
- Inspect the **skin creases** of the thighs for symmetry.
- Examine each hip separately. Hold the thigh with the knee and hip flexed and your thumb on the medial aspect of the thigh.
- Move the proximal end of the thigh laterally and then push down towards the examining table (BarlowManœuvre) a clunk indicates that the hip is dislocatable.
- Now abduct the thigh; if you feel a clunk, this is the head of the femur returning into the acetabulum (Ortolani manœuvre). If the femoral head feels lax and you feel a clunk with an Ortolani manœuvre without first performing the Barlow manœuvre, then the hip was already dislocated.




**Normal findings**

A small percentage of normal babies have **single palmar creases** but this is also associated with Down's syndrome and other chromosomal abnormalities.

Tibial bowing is common in the newborn.

It is common to hear or feel minor ligamentous clicks during hip examination. These are of no consequence and feel quite different to the dislocation and relocation of DDH. If in any doubt, obtain an expert opinion. Never use the term 'clicky hips'.

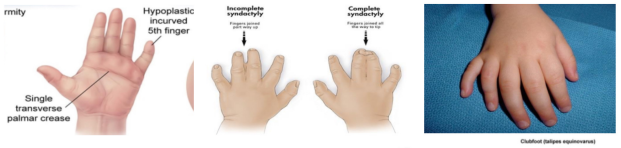
**Abnormal findings**

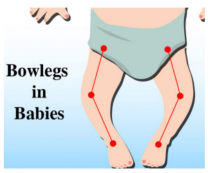
**Oligodactyly** (too few digits), **polydactyly** (too many) or **syndactyly** (joined digits) may occur.

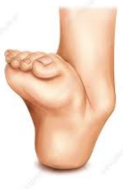
In **talipes equinovarus** the foot is plantar-flexed and rotated, with the sole facing medially. In **talipes calcaneovalgus** the foot is dorsiflexed so that the heel is prominent and the sole faces laterally.

Many cases of DDH have associated risk factors, including a family history, breech delivery, positional talipes (especially calcaneovalgus) or oligohydramnios.

Some centres offer hip ultrasound screening.



# Primitive reflexes in newborn and young infants

The primitive reflexes are lower motor neurone responses that are present at birth but that become suppressed by higher centres by 4–6 months. They may be **absent** in infants with neurological depression or **asymmetrical** in infants with nerve injuries. **Persistence** into later infancy may indicate neurodevelopmental abnormality. There are many examples and there is no need to elicit them all because their individual value is limited.

**Grasp responses** 36 w → 4 m

•Gently stimulate the palm or sole with your finger to produce a palmar or plantar grasp.

Absent → CNS depression
Persist → CNS damage


**Root-and-suck responses** 32 w → 4 m

•Gently stroke the baby's cheek. The baby turns to that side and their mouth opens, as though looking for a nipple. This is 'rooting'. If you place your finger in a healthy infant's mouth, they will suck it vigorously.

**Ventral suspension/pelvic response to back stimulation**

•Hold the baby prone and look for neck extension. Stroke the skin over the vertebral column to produce an extensor response with pelvic elevation.

**Place-and-step reflexes** 36 w → 8 w

•Hold the baby upright and touch the dorsum of their foot against the edge of a table. The baby will flex the knee and hip, placing their foot on the table.

•Lower the upright baby towards the table surface. When the feet touch the surface, a walking movement occurs.

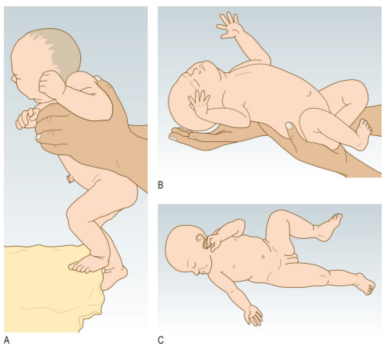
**Moro reflex**

•Support the supine baby's trunk and head in a semi-upright position. Let their head fall backwards slightly. The baby will quickly throw out both arms and spread their fingers.

4 w → 6 m

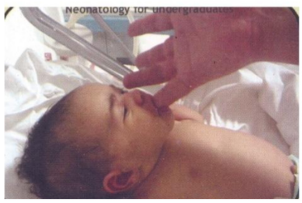
**Asymmetric tonic neck reflex** (Fencing Posture)

•Turn the supine infant's head to the side. The arm and leg on the same side will extend and the arm and leg on the opposite side will flex. This reflex is present at term and maximal at 1 month.




**Suckling Reflex**

- When a finger or nipple is placed in the mouth the NL infant will start to suck vigorously
- appears at 32 w → 4 M



Red Flags:
- Sit unsupported 1 year
- Run → 2.5 Years
- No speech 18 m
- Sentence of 2 words by 2 years
- Hold object → 5 month Reach → 8 month
  Pincer grasp → 9 month
- smile → 8 weeks

# Weighing and measuring

**Examination sequence**

•Weigh the infant fully undressed using electronic scales accurate to 5 g.

•Use a paper tape to measure the maximal occipitofrontal circumference round the forehead and occiput. Repeat the measurement three times, noting the largest measurement to the nearest millimetre.

•Measure the crown–heel length using a neonatal stadiometer. Ask a parent or assistant to hold the baby's head still and stretch out the legs until the baby is fully extended (the least reproducible of the three measurements).

•Record the results on a centile chart appropriate to the infant's ethnic background.

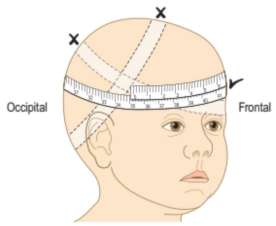



Fig. 15.15 Measurement of head circumference.

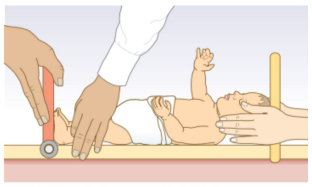


Fig. 15.16 Measuring length accurately in infants.

# The physical examination of infants beyond the newborn period

Examination of young infants beyond the newborn period is similar to the newborn examination. Transient neonatal findings will no longer be present. Older infants are usually happier when examined on their parent's lap than on an examination table.

The examination of the ears should include otoscopy.

You should check the hips whenever you examine an infant until they are walking normally. After the first few months the Ortolani and Barlow manœuvres cannot be performed and the most important signs are limitation of abduction in the hip, and thigh skin crease asymmetry.

Neurological history and examination should take account of the developmental stage of the child. The primitive reflexes disappear by 4–6 months. In later infancy, ask additional questions to obtain information about neurodevelopmental progress.

| Skills | 4 months | 6 months | 10 months | 1–2 years | 2–3 years | 3–5 years |
|---|---|---|---|---|---|---|
| Gross motor | Has good head control on pull to sit<br>Keeps back straight when held in sitting position | Supports weight on hands when laid prone<br>Rolls front to back | Sits unsupported<br>Pulls to stand | Walks without support | Runs<br>Bounces on trampoline | Pedals a tricycle |
| Fine motor | Opens hands<br>Holds objects placed in hand | Transfers objects from hand to hand and to mouth | Uses pincer grip bilaterally without hand preference | Holds a crayon and scribbles | Can draw a circle | Can draw a cross, square, face/person |
| Personal social | Shows interest in toys<br>Laughs, vocalises | Has a variety of speech noises<br>Plays peep-bo | Starts to understand some words<br>Claps hands | Has 10–20 recognisable words | Can communicate verbally | Has 500–1500 words<br>Is dry by day |