Pediatric general history and exam

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Children are not small adults

Newborn: till age of 7 days
Neonate: up to 28 days
Infant: from 1 month to 1 year
Toddler: from 2 to 3 years
Preschooler: from 1 to 4 years
Schoolchildren
Adolescents
Teenagers or young adults

BABIES

Neonates are classified by age or birthweight

15.1 Classification of newborn infants

Birthweight

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

Gestational age

- Extremely preterm: <28 weeks
- Preterm: <37 weeks (<259th day)
- Term: 37–42 weeks
- Post-term: >42 weeks (>294th day)

The history

Maternal history
Pregnancy history
Birth history
Infant's progress

Maternal history:

-FHX of significant illness: diabetes, hereditary illnesses

-The outcome of any previous pregnancy

Pregnancy history:

-Maternal health
-Medications or any drugs
-What did antenatal screening test show

Birth history:

-Birth weight, gestational age, mode of delivery
-Prolong rupture of membrane ,or maternal pyrexia, or rash
-Non-reassuring fetal status during delivery, meconium staining of amniotic fluid
-Resuscitation required after birth
-APGAR score, umbilical cord blood gas test

Infant progress:

-Passage of meconium and urine

-In later infancy: specific signs and symptoms and developmental progress, depending on presenting problem

Presenting problems and definitions:

Pallor
Respiratory distress
Cyanosis
Acrocyanosis
Jaundice
Jitteriness
Dysmorphism
Hypotonia
APGAR score

Pallor:

-Should be always be investigated in newborn
-Anemia or poor perfusion
-Normally have higher Hb than older children, so not normally pale
-Hb level of >12 g/dl (>120g/L) is low in perinatal period
-Preterm infants looks red due lack of SC fat

Respiratory distress:

-Tachypnea: RR > 60 breaths per minute
-Intercostal and subcostal indrawing
-Sternal recession
-Nasal flaring
-Use of accessory muscles
-Grunting
-Central cyanosis

Cyanosis:

-Bluish discoloration of the lips and the mucus membranes due hypoxia

-Seen when oxygen saturation (SpO2) <80% (NL>95%)

-Causes:

Heart diseases

Respiratory diseases

-Always need investigations

Acrocyanosis:

-Bluish-purple discoloration of the hands and feet
-Normal finding ,provided the newborn is centrally pink

Jaundice:

-Many newborns develop jaundice in the days after birth

-Look for yellow sclera in bright normal light

-Can not distinguish normal physiological jaundice from pathological ones

-Do not depend on clinical estimation

Jitteriness:

-High frequency tremor of limbs
-Common in first few days in term infants
-Stills by stimulation of the infants
-Not associated with other disturbances
-If excessive; exclude: hypoglycemia, polycythemia, neonatal abstinence syndrome(withdrawal)
-Infrequent jerks in light sleep are common and normal
-Regular clonic jerks are abnormal

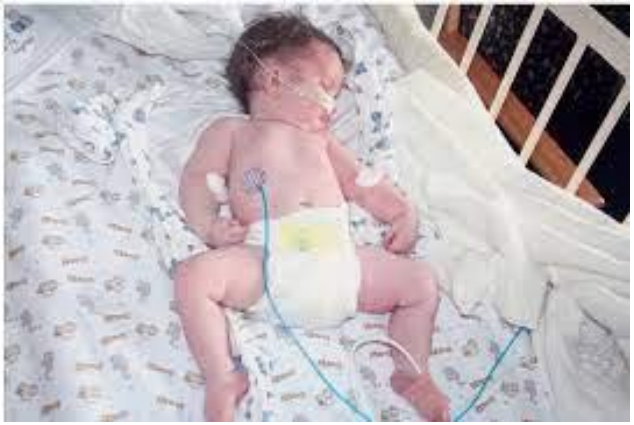
Dysmorphism:

-Abnormal body structure (subjective, because of normal human variability)

-Individual features may be minor and isolated, or signify major problem, and require investigation and management

-Dysmorphic syndrome: recognizable pattern of several dysmorphic features, ex: Down's Syndrome

-Use caution and sensitivity when discussing possible dysmorphism with parents



Hypotonia (reduced tone):

-May be obvious when handling an infant

-Term infants : flexed posture of hips, knees and elbows

-Causes: hypoxia, hypoglycemia, sepsis, specific brain, nerve, or muscle problem,..

-Preterm infants have lower tone than term infants and are less flexed

APGAR score:

-The first clinical assessment of a neonate immediately at birth
-Tone, color, breathing, heart rate, and response to stimulation (0,1,2)
-Maximum total score 10
-Predict the need for and the efficacy of resuscitation
-Healthy :score 8-10 at 1 and 5 minutes
-Persistent low score at 10 minutes predict death or later disability

15.2 Apgar score

Clinical score	0	1	2
Heart rate	Absent	<100 bpm	>100 bpm
Respiratory effort	Absent	Slow and irregular	Good: strong
Muscle tone	Flaccid	Some flexion of arms and legs	Active movement
Reflex irritability	No responses	Grimace	Vigorous crying, sneeze or cough
Colour	Blue, pale	Pink body, blue extremities	Pink all over

Physical examination of newborns

Timing and efficacy of the routine neonatal examination:

-Examine a newborn with parent present
-No ideal time
-Some of congenital heart diseases may be missed on day 1 because signs have not developed
-If delayed some might develop a disease that can be detected earlier
-9% of neonates have an identifiable congenital abnormality , but most are not serious
-Always record your examination to avoid problems..
-Fewer than half of all cases of congenital heart disease or congenital cataract are detected by newborn examination

General examination:

-Warm place
-Firm bed or examination table
-good normal light
-Have a system to avoid omitting anything
-Be opportunistic
-Do things that disturb the baby later in examination

Examination sequence

-Observe if looks well and well grown

-Look for color (cyanosis, pallor, plethora, jaundice) Click to add text

-Look for respiratory distress

-Note posture and behavior

-Note any dysmorphic feature

-Auscultate the heart and palpate the abdomen if the baby is quiet

-Look for abnormal sound or if cry sounds normal

skin

Normal findings:

-Normal, dry, wrinkled, or vernix covered
-May be meconium staining of the skin and nails
-Stork's beaks marks
-Milia, acne neonatrum (disappear within 2-4 weeks
-Erythema toxicum (appears in first few days after birth)

Vernix caseosa

milia

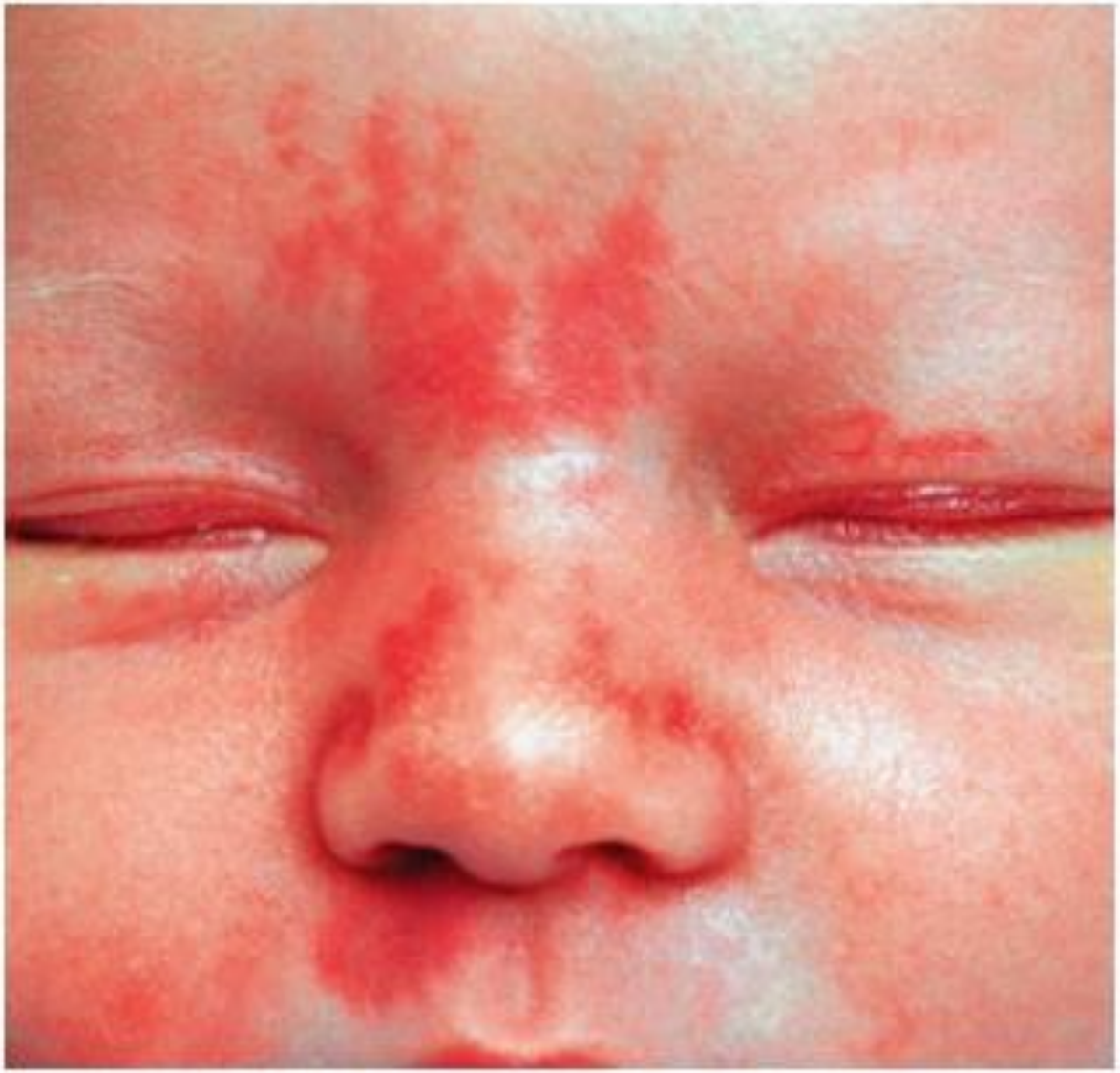


Fig. 15.1 Stork's beak mark.

Erythema toxicum

Neonatal acne

Abnormal findings:

-Trauma: scalp cuts or bruising

-Dense capillary haemangioma (port wine stain) will not fade

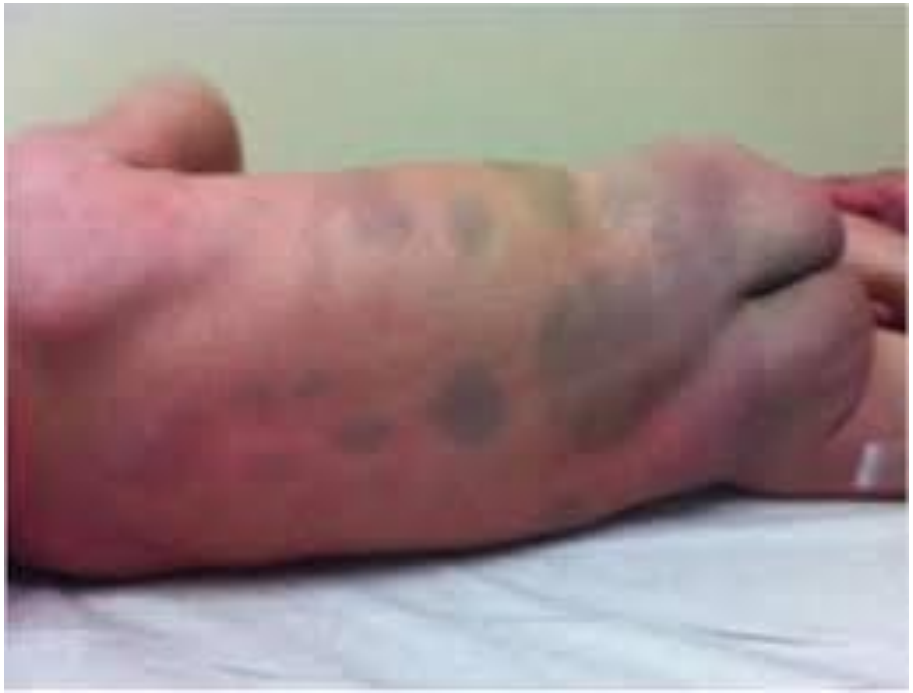
-If around the eyes (sturge-Weber syndrome, underlying brain lesion), seizure, cerebral calcification, reduced cognitive function

-Mongolian spot: fades in the first year

-SC fat necrosis

-Blisters or bullae are usually pathological

Mongolian spot



Sturge Weber

Head

Note the baby head shape and any swelling
Feel the anterior fontanel
Palpate the cranial sutures

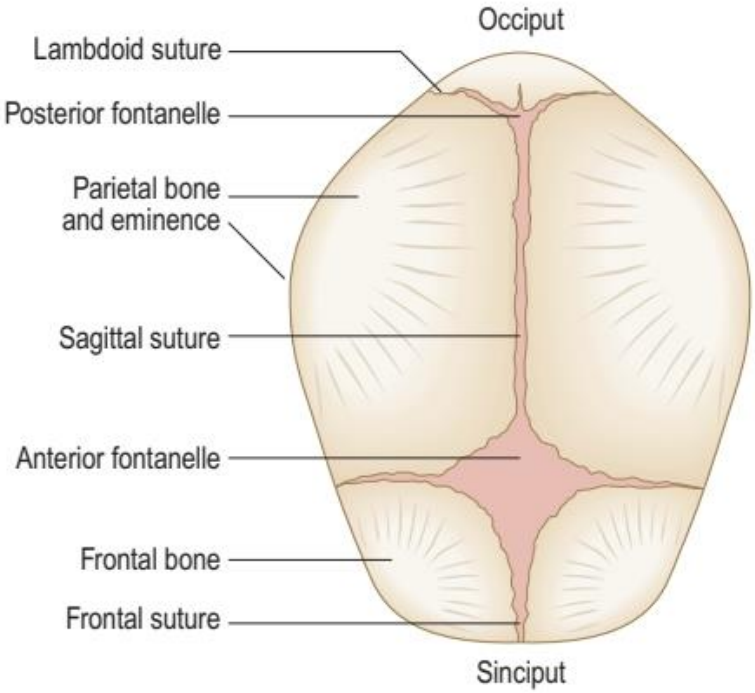


Fig. 15.3 The fetal skull from above.

15.3 Neonatal head shapes

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

Normal findings:

-Transient elongation of the head
-Caput succedaneum
-Overriding sutures

Abnormal findings:

-Cephalhaematoma
-Separate cranial sutures with wide gap
-Fused sutures (synostosis)
-Abnormal head size (might need neuroimaging)

Difference Between Caput Succedaneum and Cephalhematoma

INDICATORS	CAPUT SUCCEDANEUM	CEPHALHEMATOMA
Location	Presenting part of the head	Periosteum of skull bone and bone
Extent of Involvement	Both hemispheres; CROSSES the suture lines	Individual bone; DOES NOT CROSS the suture lines
Period of Absorption	3 to 4 days	Few weeks to months
Treatment	None	Support

Eyes

Inspect eyebrows, lashes, lids, eye balls
Check for jaundice in the sclera
Doll's eye movement; disappear in infancy
Optokinetic nystagmus, damped by 3 months

Normal findings:

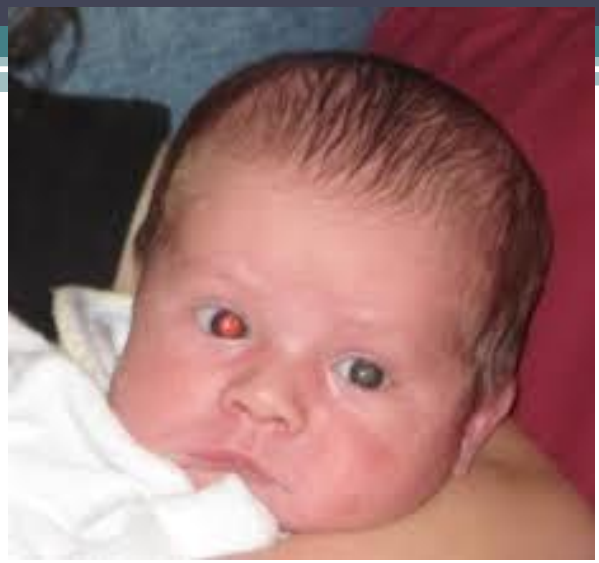
-Harmless yellow crusting without inflammation after birth

-Term infants usually fix visually

-Puffy eyes in first days

Abnormal findings:

-Eye infection: red purulent secretion
-Abnormal pupil shape(coloboma)
-Large eye balls: congenital glaucoma (buphthalmus)



Ophthalmoscopy:

-Turn baby from side to side that the baby open their eyes

-Look for the red reflex, if absent this suggests cataract, so refer to ophthalmologist

Nose

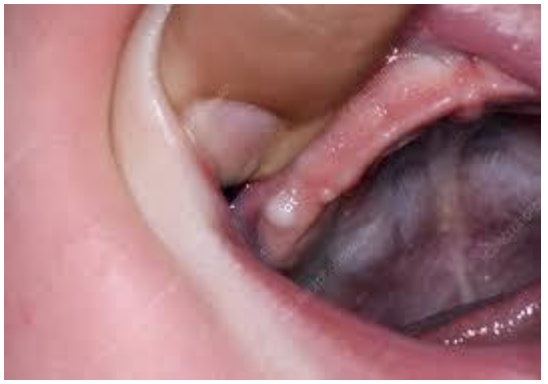
Exclude obstructed nostrils (coanal atresia)

Mouth

Do not use wooden tongue depressor
Gently press down on the lower jaw
Use torch to look at the tongue and the palate
Palpate the palate by your fingertip

Normal findings:

-Epstein's pearls
-White coating on the tongue??

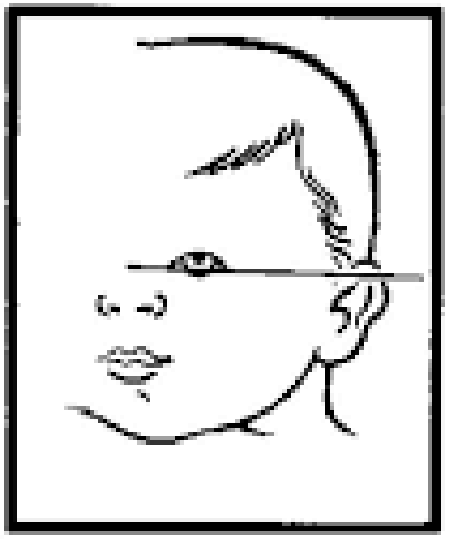


Abnormal findings:

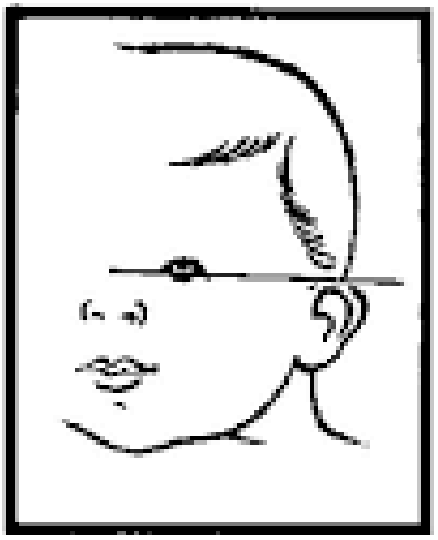
-Ankyloglossia(tongue tie) ,interfere with feeding
-White coat on tongue??(thrush)
-Macroglossia (beckwith-wiedemann syndrome)
-Glossoptosis (Down's syndrome)
-Cleft palate and/or cleft lip
-Micrognathia (if with cleft palate: pierre Robin syndrome)
-Ranula
-Teeth

Ears

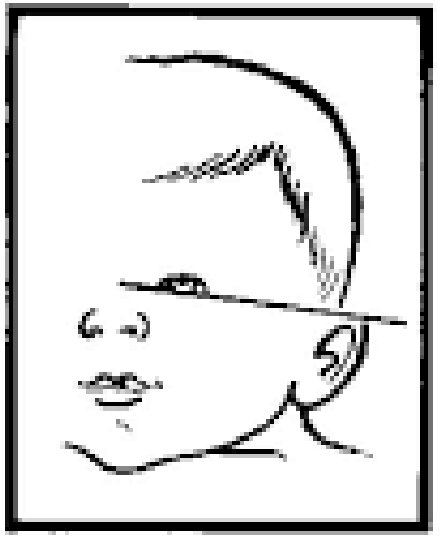
Note the size ,shape, and position
Check for normal external auditory meatus



Normal ear



Abnormal angled ear



Low seated ear

Normal finding:

-Temporary folded helix
-Preauricular skin tag

Abnormal findings:

-Abnormal ear shape
-Abnormal position

Neck

Inspect for asymmetry, sinuses and swelling

Palpate any mass

Transilluminate any swelling (cystic vs. solid or blood filled)

Normal findings:

-1/3 have palpable cervical,inguinal, or axillary LN
-Neck asymmetry due abnormal fetal posture

Abnormal findings:

Lump in sternocledomastoid muscle(torticollis, with head turned in the contralateral direction)

Cardiovascular examination

Observe for pallor, cyanosis or sweating
RR
Palpate the apex beat
Look for Heaves or thrills
Count HR for 15 seconds and multiply by 4
Feel the femoral pulses
Auscultate the heart
Do not measure BP for healthy babies
Palpate the abdomen for hepatomegaly

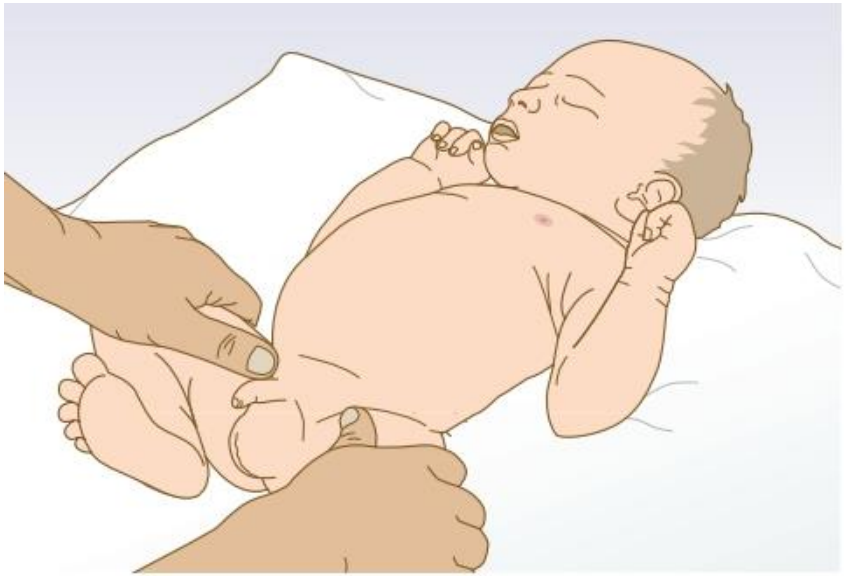


Fig. 15.5 Palpating the femoral pulses. The pulse can be difficult to feel at first. Use a point halfway between the pubic tubercle and the anterior superior iliac spine as a guide.

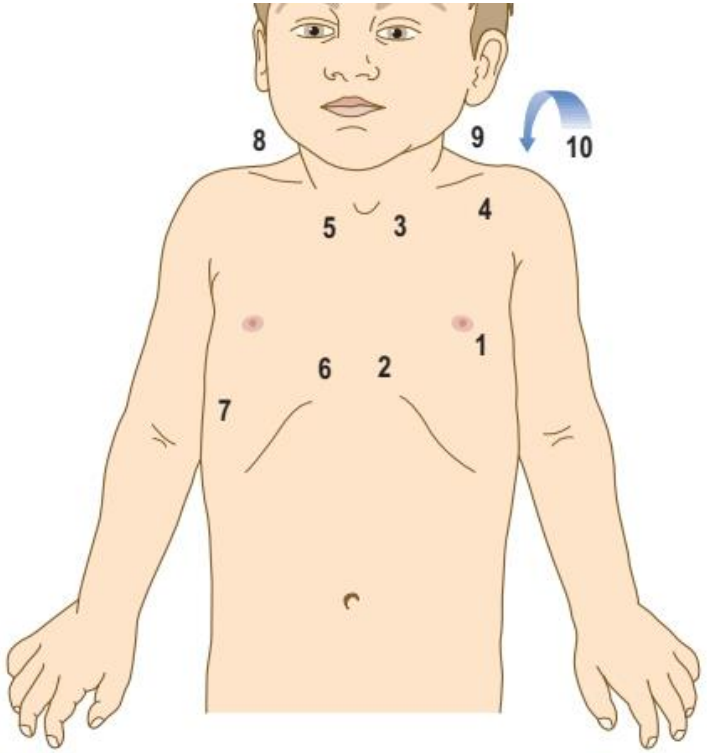


Fig. 15.6 Auscultation positions in infants and children. Recommended order of auscultation: **1,** apex; **2,** left lower sternal edge; **3,** left upper sternal edge; **4,** left infraclavicular; **5,** right upper sternal edge; **6,** right lower sternal edge; **7,** right mid-axillary line; **8,**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

Normal findings:

-Normal femoral pulses in early newborn period of an infant with Coarctation of aorta

-HR 80-160 bpm

15.4 Normal ranges for heart and respiratory rate in the newborn

Sign	Preterm neonate	Term neonate
Heart rate (beats per minute)	120–160	100–140
Respiratory rate (breaths per minute)	40–60	30–50

Abnormal findings:

-Heart failure: pale, sweaty, respiratory distress

-Displaced apex beat laterally: cardiomegaly, contralateral pneumothorax or plural effusion

-Weak or absent femoral pulse: Coarctation of aorta(radiofemoral delay not identifiable in newborn)

-Short systolic murmur in early days of PDA, then become machinery in childhood

-Transient murmurs(2% of neonates),minority have structural heart problem, need Echo.

Respiratory examination

-Note chest shape, and symmetry of chest movement
-Count RR for 15 sec the multiply by 4
-Listen for additional noises with breathing
-Signs of respiratory distress: tachypnea, flaring of nostrils, substernal Intercostal and subcostal recession
-Do not do percussion for the chest in newborns
(Note: do not percuss the chest before age of 5 years)
-Auscultation (use the diaphragm): anterior, lateral and posterior, comparing sides; breath sounds have bronchial quality

Normal findings:

-Small buds of palpable breast tissues (in males and females)

-Small amount of fluids are discharged from the nipples in early days after birth

Abnormal findings:

-Stridor: large airway obstruction, inspiratory
If begin in first 2-3 days in otherwise well baby: laryngomalacia (softness of the larynx)

-Causes of respiratory distress : lung fluid, infection, immaturity, aspiration, congenital anomaly, pneumothorax, hearts failure, and metabolic acidosis

Abdominal examination

-Inspection(including the umbilicus and the groins, remove the nappy)

-From the right side with warm hands ,do superficial and deep palpation

-Palpate for splenomegaly (left flank)

-Palpate for hepatomegaly

-Check for the anus (presence, patency, position)

-Digital rectal examination in: suspected rectal atresia or stenosis and delayed passage of meconium

Normal findings:

-Abdominal distension

-You may see the contour of the individual bowel loops especially in intestinal obstruction

-Umbilical cord stump separates after 4-5 days, granuloma might appear, and small amount of bleeding

-Palpable liver edge in neonates especially if balloted

Abnormal findings:

-Excessive umbilical bleeding(check for receiving vitamin K and consider factor XIII deficiency)

-Spreading erythema around the umbilicus: suggest infective omphalitis

-Umbilical hernias are common

-Omphalocele or exomphalo (herniation through the umbilicus covered by membrane), might associated with other malformations or chromosomal abnormalities

-Gastroschisis:defect in anterior abdominal wall without covering membrane; most common site is above and to the right of the umbilicus

-Inguinal hernia, common especially in boys and preterms

-Meconium in the nappy dose not guarantee anal patency, it can be passed through rectovaginal fistula

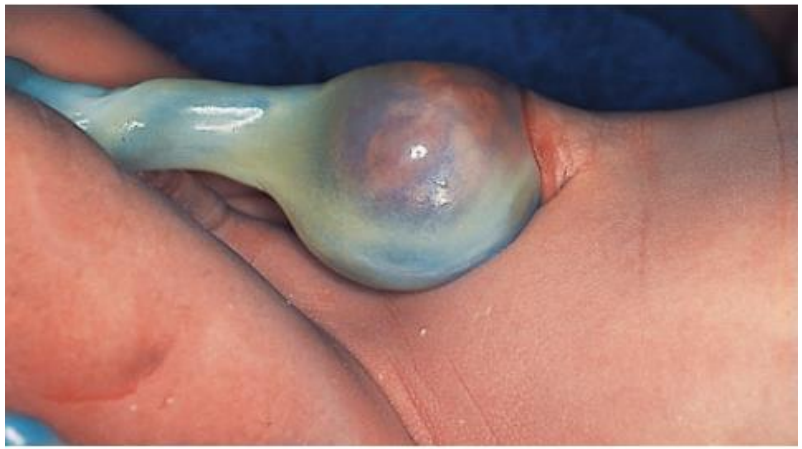


Fig. 15.7 Small exomphalos with loops of bowel in the umbilicus.

Perineum

Female:

-Abduct the legs and separate the labia
-If preterm: labia minora appears prominent, resolves over weeks
-Milky vaginal secretions are normal
-Slight vaginal bleeding(pseudomenses)
-Vaginal skin tag

Male

Do not attempt to retract the foreskin

Check: the urethral meatus at the tip of the penis

Note the shape of the penis

Palpate the testes in the scrotum. Undescended, retractile, ectopic; re-examine after 6 weeks

Transilluminate any large scrotal swelling: hydrocele, hernia.

Inguinal hernia: try to reduce it into the abdomen

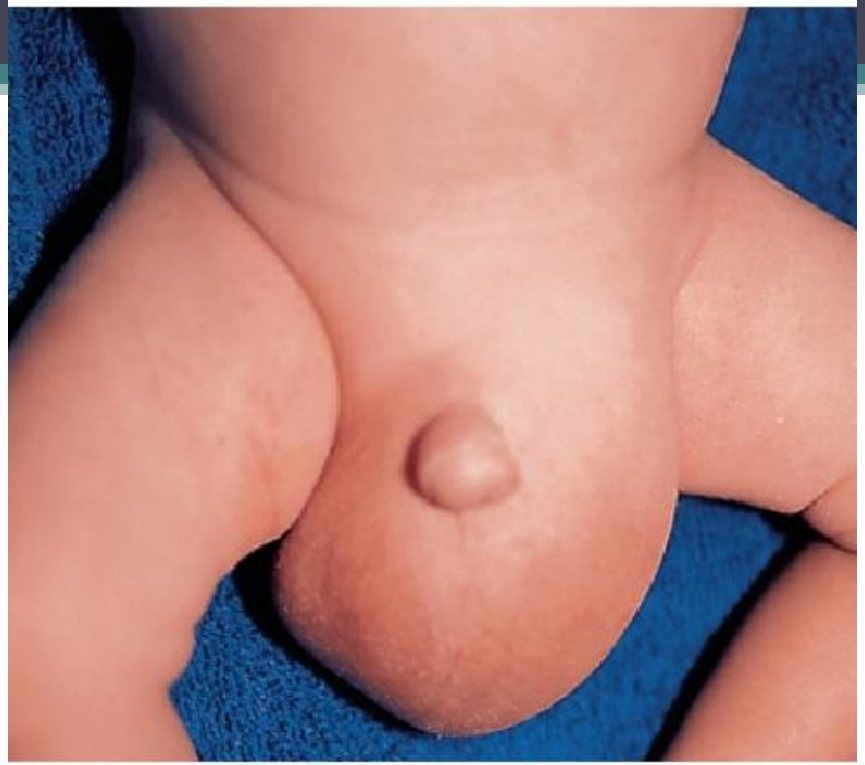
Normal findings:

-The testes are smooth and soft 0.7*1 cm

-Right testes usually descends later and sits higher than the left

Abnormal findings:

-Hydrocele : fluid beneath tunica vaginalis of the testes and/or the spermatic cord, most resolves spontaneously
-Hypospadius (ventral)
-Epispadius (dorsal, rare)
-Chordae; a curvature of the penis and often associated with hypospadius and tethering of the foreskin



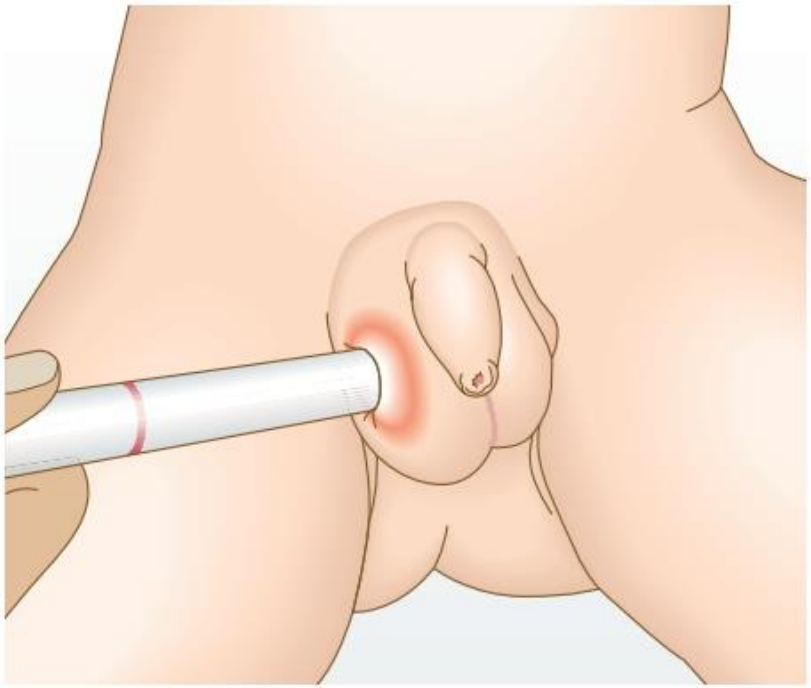
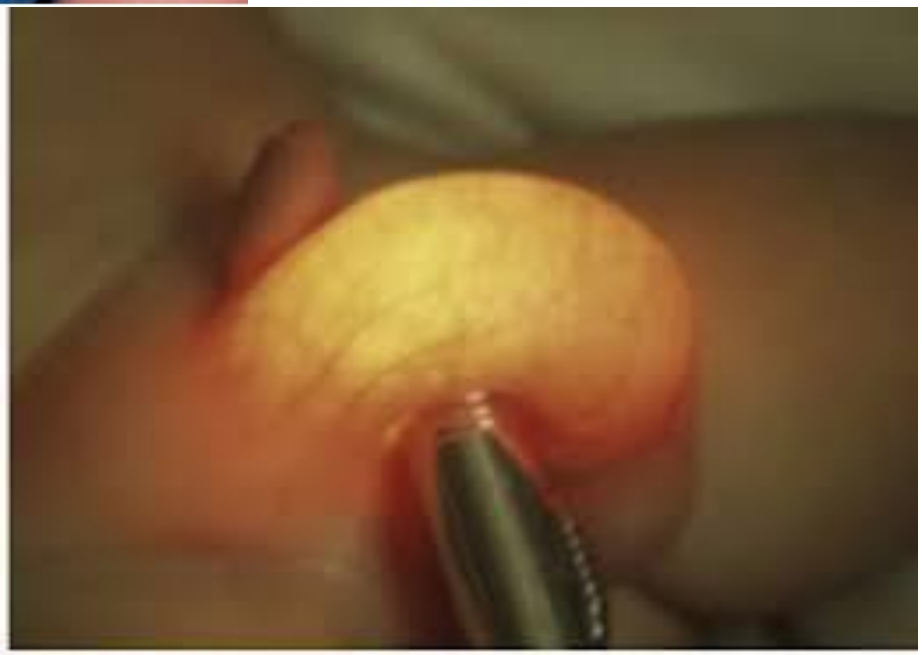


Fig. 15.9 How to transilluminate a scrotal swelling.



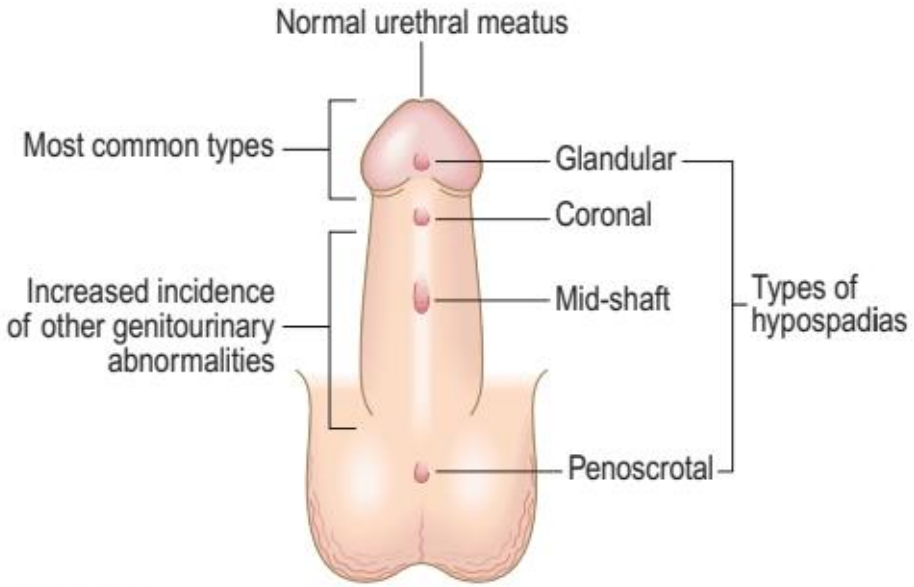
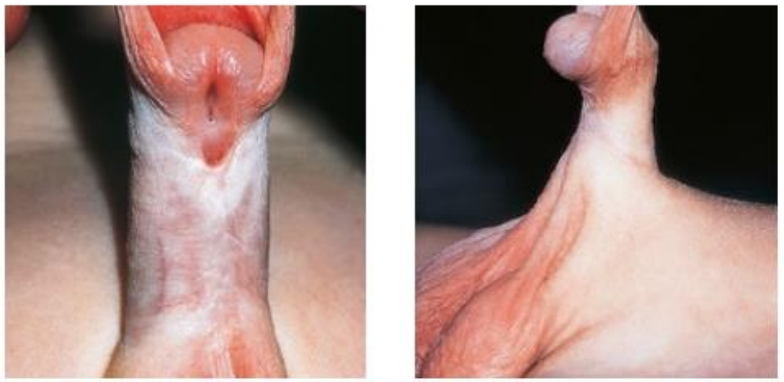


Fig. 15.10 **Varieties of hypospadias.**



A B

Fig. 15.11 **Hypospadias and chordee.** A Penile shaft hypospadias. B Lateral view showing the ventral curvature of the penis (chordee). *From Lissauer T, Clayden G. Illustrated Textbook of Paediatrics. 2nd edn. Edinburgh: Mosby; 2001.*

Spine and sacrum

Turn the baby over

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

Normal findings:

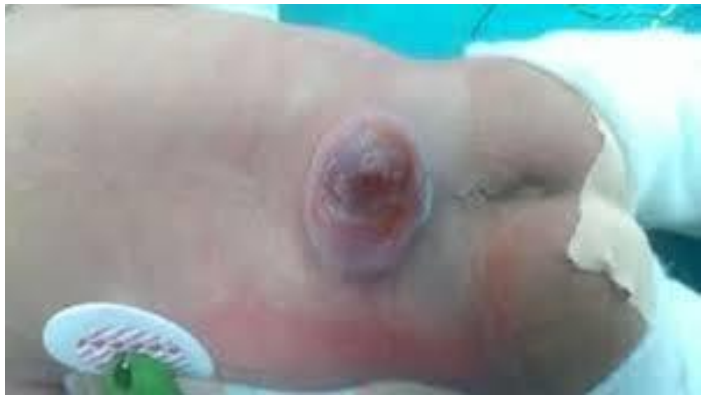
Sacral dimples are common and unimportant if:

- Dimple has normal skin
- Single
- <5 mm in diameter
- 2.5 cm from the anus

Abnormal findings:

-Pigmented patches (spina bifida occulta)

-Dimples above the natal cleft, away from midline or hairy or pigmented patches with a base that cannot be visualized (further investigation is needed)



Neurological examination

-Look for asymmetry in posture and movement, and for muscle wasting

-Tone: pick the baby up :stiff or floppy??

-Note any difference in each side

-Power is difficult(arousal)look for strong symmetrical limb and trunk movements and grasp

-Tendon reflexes(in neuromuscular abnormalities)

-Sensation(withdraw from gentile stimuli)

-Eyesight (dark corner: wide open eyes

-Electronic audiologic screening

Normal findings:

-Symmetrical movement
-Tone varies, may be floppy after feed
-Reflexes are brisk in term infants, often with beats of clonus
-Planter reflex is normally extensor in newborn

Abnormal findings:

-Hypotonic: frog-like posture with abducted hips and extended elbows(Down's, meningitis, sepsis)

-Increased tone: back and neck arching, limb extension, stiff baby; meningitis, asphyxia, intracranial hemorrhage

-Brachial plexus injuries:

--Erb's palsy C5,C6; reduced movement of the arms and elbow, medial rotation of the arm and failure of wrist extension

--Klumpke's palsy: breech delivery: C8,T1 : weakness of forearm and hand

--These injuries can be associated with Horner's syndrome and/or diaphragmatic weakness

--Most of them recover over subsequent weeks

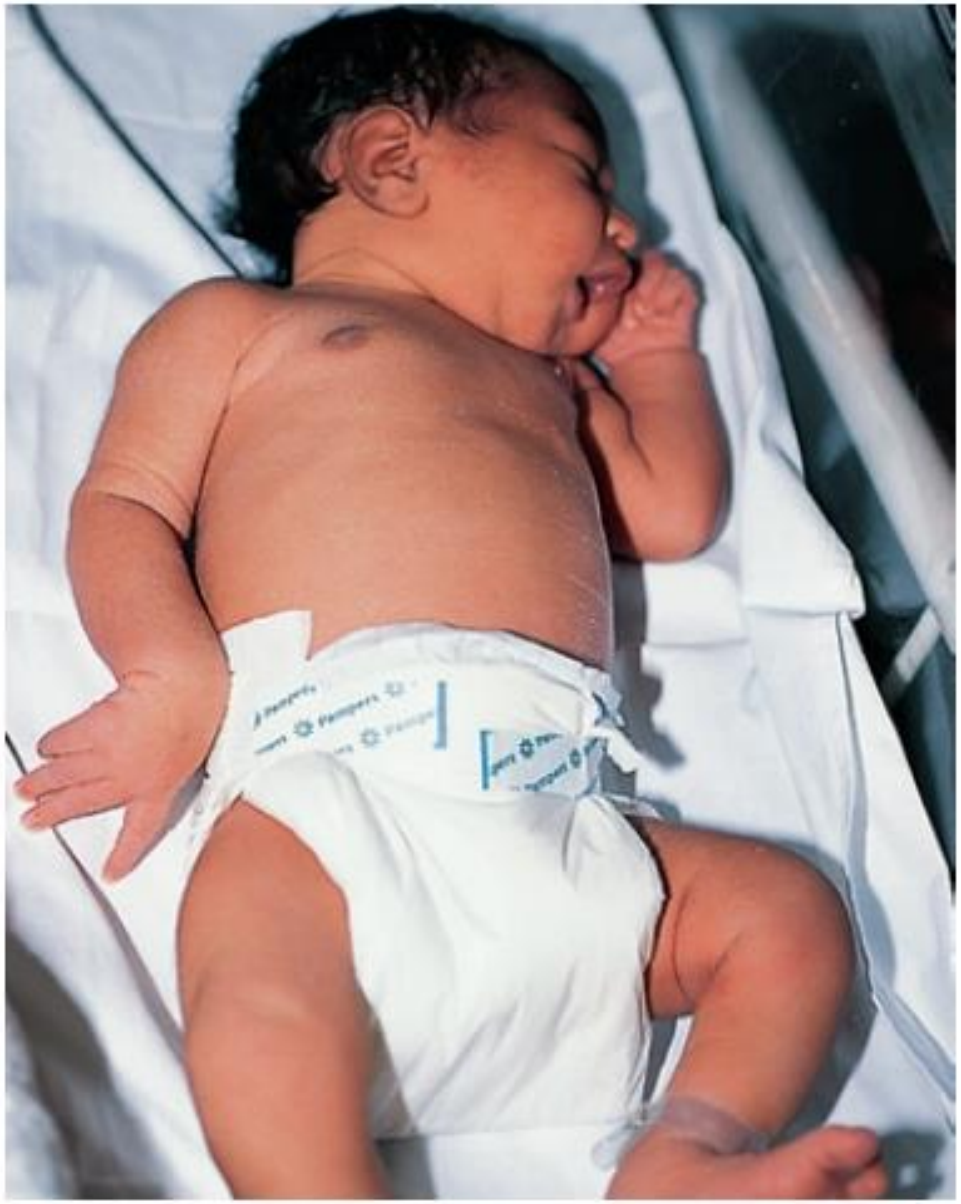


Fig. 15.12 Erb's palsy. The right arm is medially rotated and the wrist is flexed. *From Lissauer T, Clayden G. Illustrated Textbook of Paediatrics. 2nd edn. Edinburgh: Mosby; 2001.*

-Facial nerve palsy: reduce movement of cheek muscles, the side of the mouth does not turn down when crying, most cases are transient

Primitive reflexes:

-Lower motor neuron responses that are present at birth but become suppressed by higher centers by 4-6 months

-May be absent in infant with neurological depression, or asymmetrical in nerve injuries

-Persistent may indicate neurodevelopment abnormalities

Grasp responses

Ventral suspension/pelvic response to back stimulation

Place and step reflexes

Moro reflex

Root and suck responses

Asymmetric tonic neck reflexes

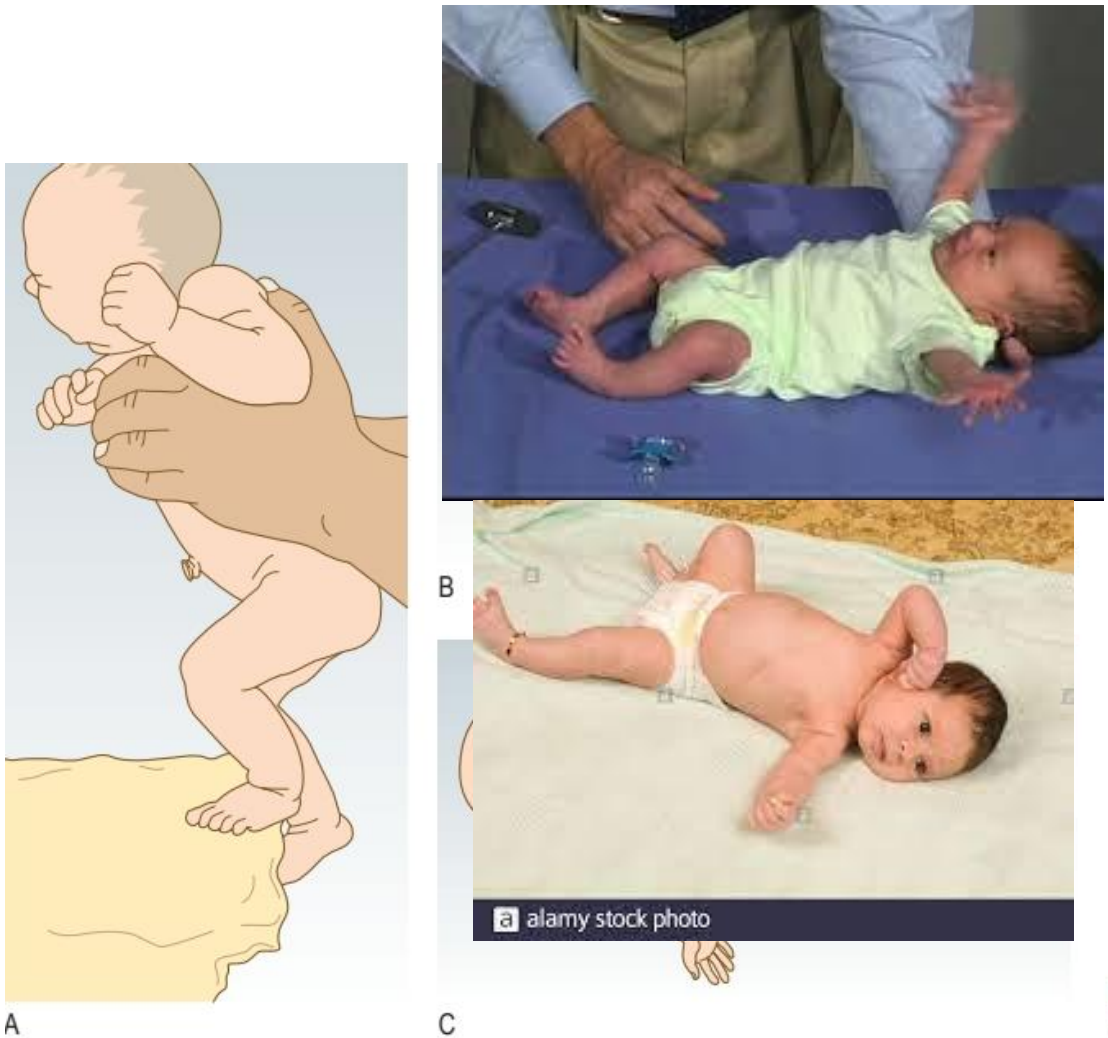


Fig. 15.13 Primitive reflexes. A Placing reflex. B The Moro reflex. C Tonic neck reflex.

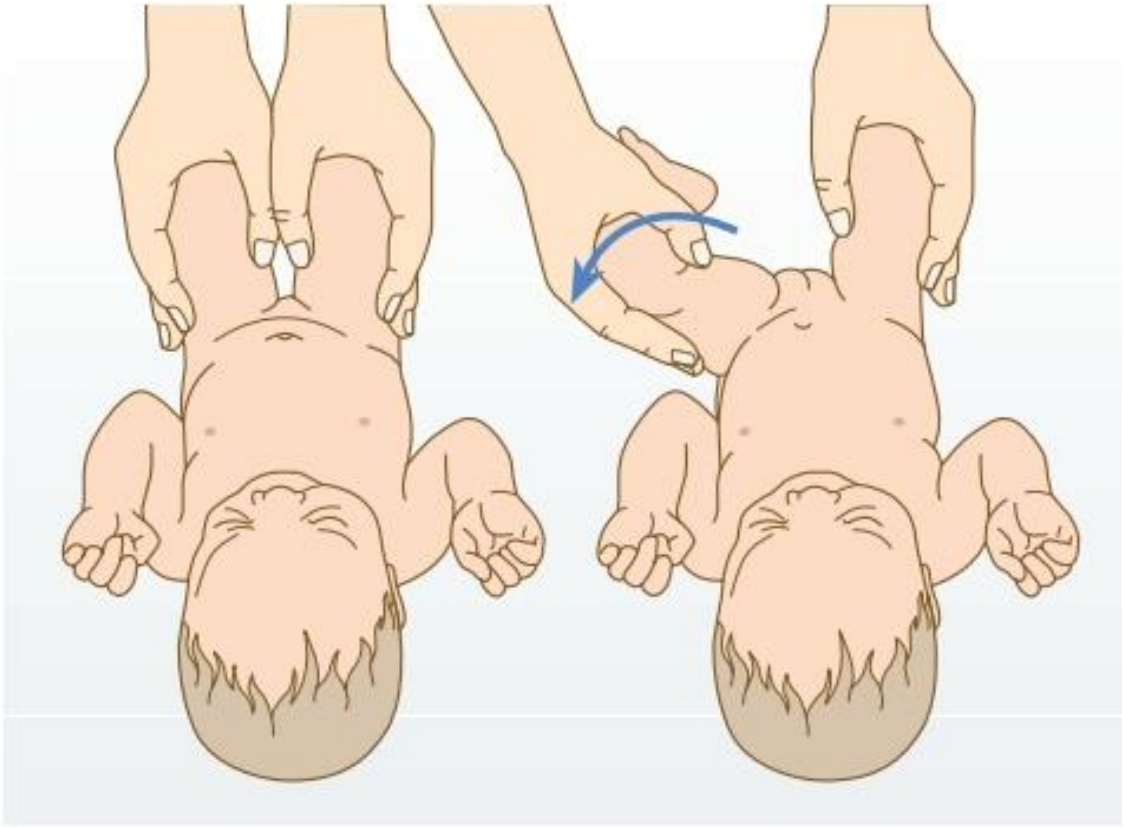
Limbs

Inspect the limbs and count the digits

Fixed abnormal foot position, refer to specialist

Hips: developmental dysplasia of the hip (DDH):

- Lay baby on firm surface (supine)
- Symmetry of thigh skin creases
- Examine each hip separately
- Barlow manoeuvre
- Ortolani manoeuvre



A B

Fig. 15.14 Examination for developmental dysplasia of the hip. A The hip is dislocated posteriorly out of the acetabulum (Barlow manœuvre). B The dislocated hip is relocated back into the acetabulum (Ortolani manœuvre).

Normal findings:

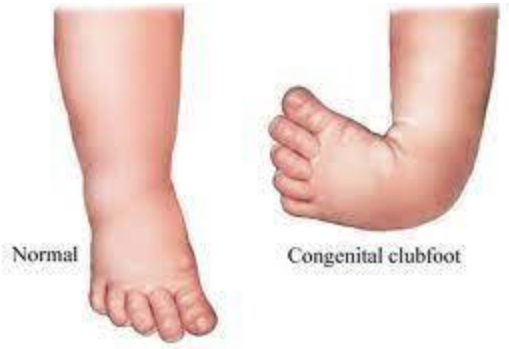
-Single palmar crease(small percentage of normal babies, Down's, other chromosomal abnormalities)

-Tibial bowing is common in newborn

-To hear minor ligamentous click during hip examination

Abnormal findings:

-Oligodactyly, polydactyly, syndactyly
-Talipes equinovarus(rotated planter –flexed foot)
-Talipes calcaneovalgus (dorsiflexed foot)
-DDH: risk factors:
Family history
Breech delivery
Positional talipes (especially calcaneovalgus
Oligohydramnios
----hip ultrasound screening



Weighing and measuring

Weighing: Fully undressed infant, Electronic scales accurate to 5 grams

Occipitofrontal circumference: paper tape

Crown-heel length: neonatal stadiometer

Record the results on a centile chart appropriate to the infant's gender, age, and ethnic background

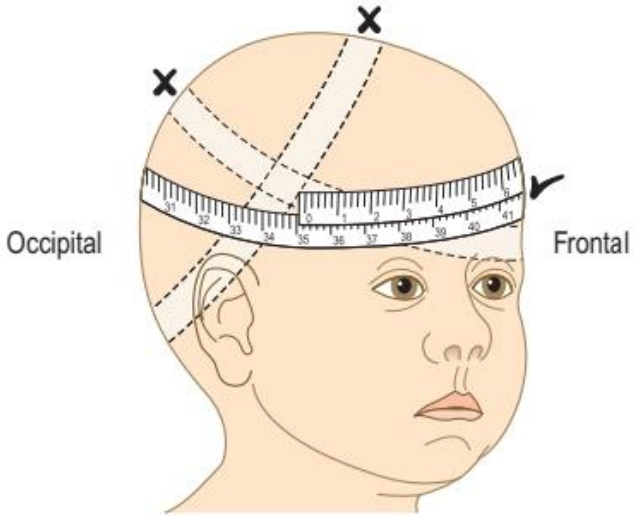


Fig. 15.15 Measurement of head circumference.

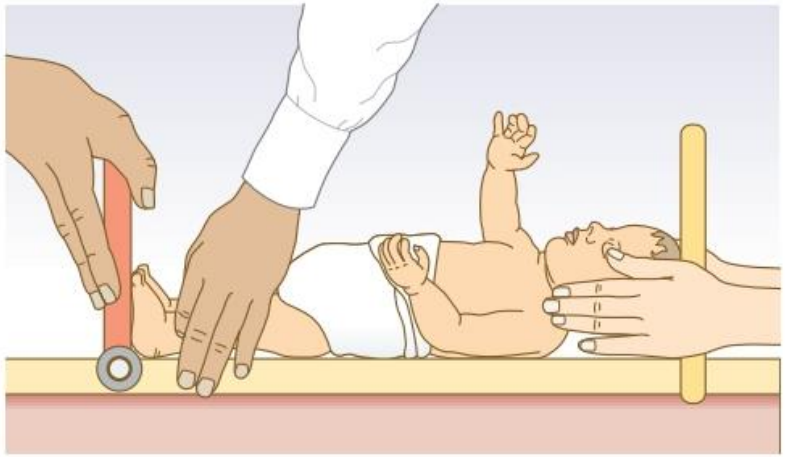


Fig. 15.16 Measuring length accurately in infants.

Final inspection

Perform a final tip to toe inspection:
-To avoid missing anything
-To allow parents a further opportunity to ask questions

The physical examination of infants beyond the newborn period

-Similar to newborn examination
-Transient newborn findings no longer present
-Better to examine the infant in their parents lap
-Use otoscope to examine the ears
-Check the hips until they are walking
-Limitation of abduction of the hips and asymmetry of hip creases in DDH
-Neurological history and examination should include the developmental stage of the child
-Primitive reflexes disappear by 4-6 months

Older children

Individuals between 12 months and 16 years

There are similarities in taking history from a child child and from adult

Introduce yourself to the child and the accompanying care-giver

Begin to observe the child

Start with open-ended questions

Enable the parent to explain their perspective on their child

Once the presenting symptoms have been outlined, put the deferential diagnosis

Respect age ability to recall events

Adopt balanced perspective on whether answers from parents are more likely to be accurate than those from the child

In history taking, include reflecting summing up

-Defers from adult history in:

Obstetric, Developmental, Immunization histories

-Systematic inquiry has different components

-Differential diagnosis may include conditions only seen in children: abdominal migraine, toddler diarrhea, croup, viral wheeze, febrile convulsion,..

-Diagnosis is built on pattern of symptoms

-Rarely will any symptom or sign lead to a spot diagnosis

-Think about differential diagnosis

-Any symptom:

Onset

Frequency

Severity

Duration

Aggravating and relieving factors

Associated features

Impact on function

Pain and need of analgesia can be difficult in young children

15.6 Pain assessment tool: FLACC scale

	0	1	2
Face	No particular expression or smile	Occasional grimace or frown, withdrawn, uninterested	Frequently or constantly quivering chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting back and forth, tense	Arched, rigid or jerking
Cry	No cry (awake or asleep)	Moans or whimpers, occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging or being talked to, distractible	Difficult to console or comfort

Each category is scored on a 0–2 scale to give a total score of 0–10: 0 = no pain; 1–3 = mild pain; 4–7 = moderate pain; 8–10 = severe pain.

Most common presenting problems affecting:

Respiratory system

Gastrointestinal system

Nervous system

skin

15.7 Respiratory system

Symptom[a,b]	Frequency	Diagnostic significance	Significance heightened if associated with	Differential diagnosis
Acute				
Short of breath at rest (SOBar)	***	High (indicates loss of all respiratory reserve)		LRTI, asthma, acute episodic wheeze, inhaled foreign body. Rarely, supraventricular tachycardia, congenital heart disease, heart failure or muscular weakness
Cough	***	Low	SOBar, fever	LRTI, asthma, acute episodic wheeze, foreign body
Wheeze	***	Moderate	SOBar, fever	LRTI, asthma, acute episodic wheeze, foreign body
Chest pain	*	High	Exercise Fever	Musculoskeletal pain, empyema, reflux oesophagitis, cardiac ischaemia
Stridor	***	High	URTI, high fever, choking	Croup, foreign body, epiglottitis (if not immunised)
Chronic				
Short of breath on exercise (SOBoe)	**	Low	Cough, wheeze, failure to thrive	Lack of fitness, respiratory pathology, cardiac pathology, neurological weakness
Cough	***	Low	Wheeze, SOBoe, failure to thrive	Isolated cough with sputum suggests infection, commonly bronchitis, rarely bronchiectasis, cystic fibrosis, inhaled foreign body. If also wheezy, consider asthma or viral-induced wheeze
Wheeze	***	Moderate	SOBoe, failure to thrive	Isolated, persistent 'wheeze' usually arises from the nose (stertor, e.g. adenoidal hypertrophy) or the largest airways (stridor, e.g. laryngomalacia). Episodic wheeze with cough suggests asthma or viral-induced wheeze
Chest pain	*	High	Exercise	Non-specific chest pain, musculoskeletal chest pain, very rarely cardiac ischaemia

[a]Respiratory sounds: clarify what noise the parent or child is describing. The history sometimes reveals the source, e.g. nose (stertor), throat (stridor) or chest (rattle or

15.8 Gastrointestinal system

Symptom	Frequency	Diagnostic significance	Significance heightened if associated with	Differential diagnosis
Acute				
Vomiting	***	Low: a very non-specific symptom in children	Fever, drowsiness, dehydration[a]	Acute gastritis/gastroenteritis, any infection (otitis media, pneumonia, urinary tract infection, meningitis), head injury, encephalitis
Diarrhoea	***	Moderate	Fever, dehydration[a]	Acute gastroenteritis/colitis, appendicitis
Abdominal pain[b]	**	Moderate	Fever, bloody stools	Acute gastroenteritis/colitis, acute surgical causes, e.g. appendicitis, intussusception
Chronic				
Vomiting	***	Moderate	Failure to thrive[c] Headache	Gastro-oesophageal reflux (rare in older children compared with infants), raised intracranial pressure, food allergy
Diarrhoea	***	Moderate	Failure to thrive[c]	Commonly toddler's diarrhoea, also lactose intolerance. If failure to thrive, consider coeliac disease, inflammatory bowel disease
Abdominal pain[b]	***	Low	Pain that is not periumbilical Headaches Diarrhoea and vomiting Failure to thrive[c]	If isolated and periumbilical, non-specific abdominal pain is common and other diagnoses include abdominal migraine, renal colic. If associated with other symptoms and/or failure to thrive, consider coeliac disease, inflammatory bowel disease, constipation

[a]Symptoms of dehydration include dry mouth, foul-smelling breath, anuria and lethargy. [b]Abdominal pain can be difficult to identify in young children who are not able to express themselves. [c]Coexisting failure to thrive or weight loss always increases the significance of any symptom.

15.9 Nervous system

Symptom	Frequency	Diagnostic significance	Significance heightened if associated with	Differential diagnosis
Acute				
Headache	**	Low	Vomiting, fever, neck stiffness, photophobia	Acute (simple) headache, migraine, meningitis/ encephalitis
Unsteady gait	*	High		Varicella encephalomeningitis, vestibular neuronitis
Seizure[a]	*	High		Febrile seizure, meningitis/encephalitis Epilepsy, metabolic disorder
Disturbed level of consciousness	*	High		Encephalitis, intoxication/drug ingestion (accidental/ deliberate)
Chronic				
Headache[b]	**	Low	Vomiting Abdominal pain	Brain tumour, migraine, chronic non-specific headache
Failure to pass developmental milestones	*	Moderate	Widening gap between age and age when 'normal' milestone should have been passed	Cerebral palsy, neglect
Developmental regression	*	High		Muscular dystrophy, inborn error of metabolism, neurodegenerative conditions
Seizure	*	High		Epilepsy; rarely, long QT syndrome or inborn error of metabolism

[a]An acute seizure can be confused with a rigor in a febrile child. A seizure involves slow (1 beat per second), coarse, jerking that cannot be stopped, loss of consciousness and postictal drowsiness. A rigor is characterised by rapid (5 beats per second), fine jerking that can be stopped by a cuddle with no loss of consciousness. [b]Chronic headache can also arise from the mouth (e.g. dental abscess) or face.

Skin symptoms:

Acute vs. chronic

Acute-onset rash can be described using same terminology as for adult

Most rashes are viral and resolve spontaneously

Rash with blister is often itchy: urticarial(environmental, viral, food, medicine triggers), or insect bite.

Blister with yellow crusting: may be infected bollus impetigo (staph aureus)

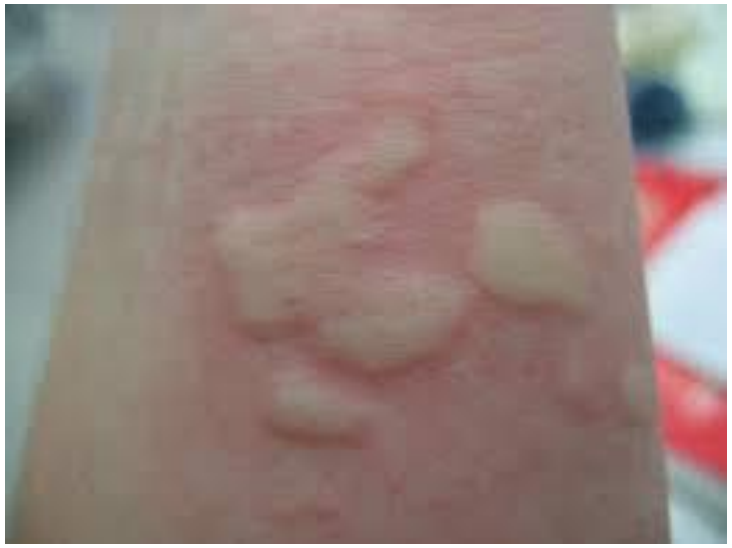
Red circular lesions with pink center, erythema multiforme

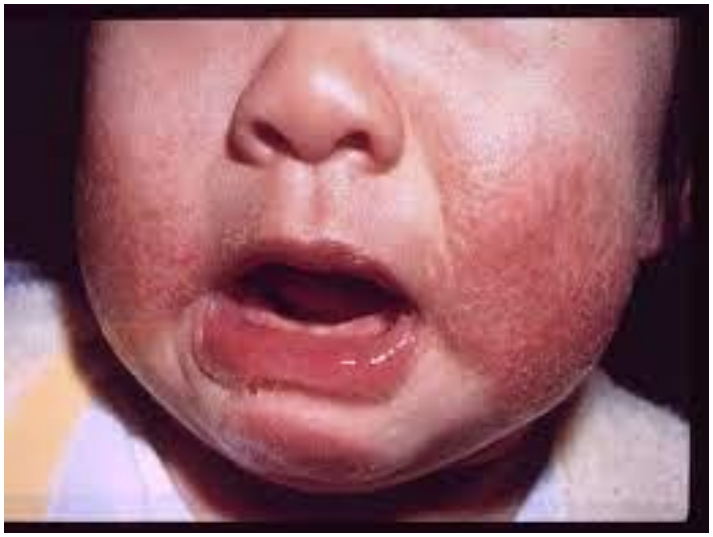
Petichial or purpuric rash(not blanch on pressure): concern, can be viral , but think about meningococcal disease (fever)

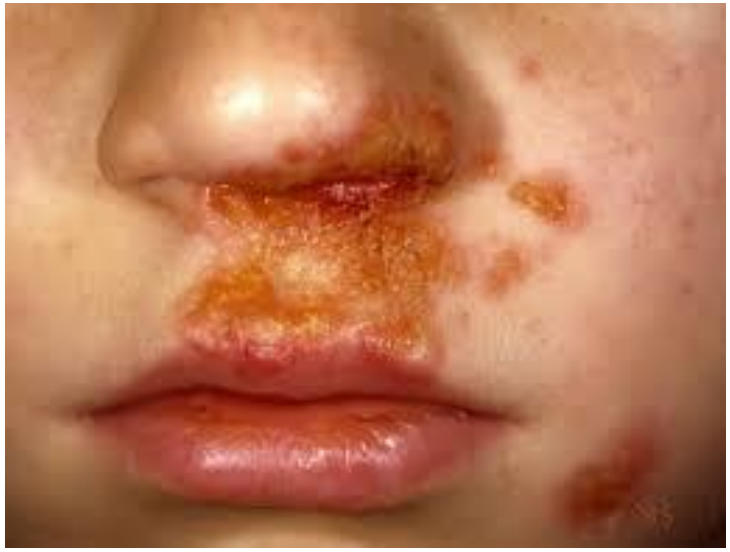
Chronic skin excoriation, on flexure: eczema

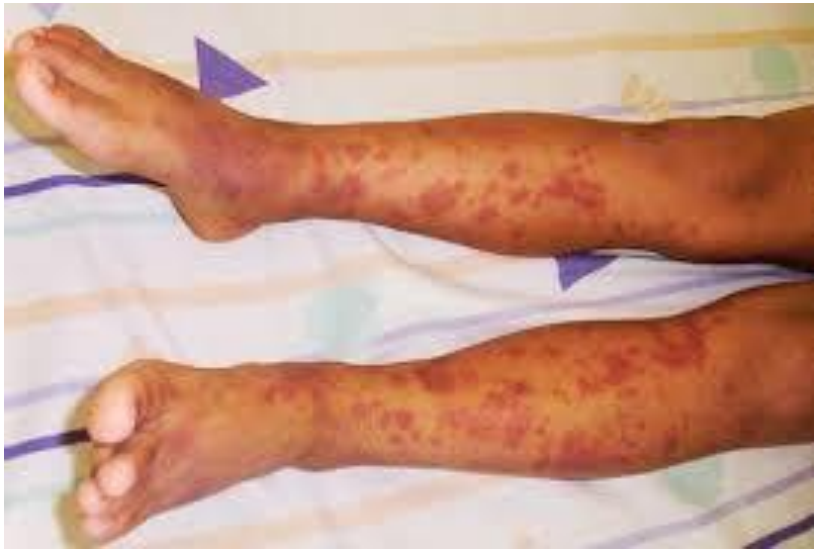
Plaque on elbows and knees: psoriasis

Hair loss is distressing in child, if with itchiness: tinea capitis. With history of preceding illness, hair loss is a likely cause









Past medical history

-Current or past regular healthcare profession visits

-Currently taking any regular medication

-Previous hospitalization, why?

Drug history

Medicine

Dose

Frequency

Enquire about any difficulties in taking medication to establish adherence

Any adverse or allergic reaction to medications

Birth history

the impact of preterm birth goes beyond early childhood

Born at term or preterm(what gestation)

Neonatal period :normal, need special care neonatal unit

If under 3 year old: birthweight, complications during pregnancy

Vaccination history

Which country specific schedule

Up to age? If not :why? Consider how to encourage catch-up

Any added vaccines

Any complications

The Jordanian national immunization program/2020	
Age	**Recommended vaccines**
First month	BCG
61 days	(HEXA = DaPT1 +IPV1 + HiB1 +HepB1)+ RV1
91 days	DaPT2 +IPV2 + HiB2 +HepB2 + RV2 + OPV
121 days	DaPT3 +IPV3 + HiB3 +HepB3 + RV3+ OPV
271 days	Measles + OPV +Vitamin A 100,000IU
12 months	MMR 1
18 months	MMR2 +OPV + DPT + Vitamin A 200,000 IU
6 years	Td +OPV
15 years	Td

Developmental history

Important for children under 3 years, and for those with possible neurodevelopmental delay

15.5 Developmental attainment of preschool children at different ages*

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 Keeps back straight when held in sitting position	Supports weight on hands when laid prone Rolls front to back	Sits unsupported Pulls to stand	Walks without support	Runs Bounces on trampoline	Pedals a tricycle
Fine motor	Opens hands 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 Laughs, vocalises	Has a variety of speech noises Plays peep-bo	Starts to understand some words Claps hands	Has 10–20 recognisable words	Can communicate verbally	Has 500–1500 words Is dry by day

**Development is extremely variable and failure to attain only one milestone is of little significance whereas failure to attain several milestones is cause for concern.*

Family and social history

-Who lives in the family home, who cares for the child
-Any smokers
-Any pets, any symptoms related to pet contact
-Similar symptoms in 1st or 2nd degree relatives
-Family pedigree (step-parents, step-siblings, parental consanguinity; not uncommon)
-Several caregivers: risk of neglect
-Chronic symptoms: anxiety, or child secondary gain
-Look to child facial expression, eye contact, body language while asking questions
-School and social interactions, school avoidance:

Systematic inquiry

Screen for symptoms and illnesses under 12 years ask age-related questions

ENT: hearing ability: reduced in chronic OM, regular snoring or struggle to breath (symptomatic obstructive sleep apnea)

GI: growth as expected, pain, constipation

Respiratory : regular cough when otherwise healthy, recurrent wheezes(asthma)

Urinary: primary nocturnal enuresis in 15% children under 5 years

Physical examination

Normal growth and development

-Understanding child development is vital to identify whether symptoms and signs are consistent with age

-Premature infants: do correction till age of 2 years

-Premature born infants are at increase risk of impaired growth and development, most develop normally

Growth

-After infancy is extremely variable
-Use gender and ethnic-specific charts
-Each child should grow along a centile line for height and weight throughout childhood
-Failure to thrive: failure to attain the expected growth trajectory
-Child's height is relate to average parent heights centile +_2 standard deviation (normal range is 10 cm above and below parent's average centile)

Weight:

Normal BW: 2.5-4 kg

Lose up to 10% during 1st 10 days

At age 10 days= BW

2-3 months: Gain 20-30 g/day

Then gain 15-20 gram/day

Double BW 4-5 months

Triple BW at 12 months

Quadruple: 2 years

Then: (age*2) +8

Length:

At birth : 50 cm

1 year: 75 cm

4 years: double birth length

Head circumference:

Birth : 35 cm plus/minus 2 cm

Gain 12 cm in 12 months:

-1st 3 months :2 cm for each

-2nd 3 months: 1 cm for each

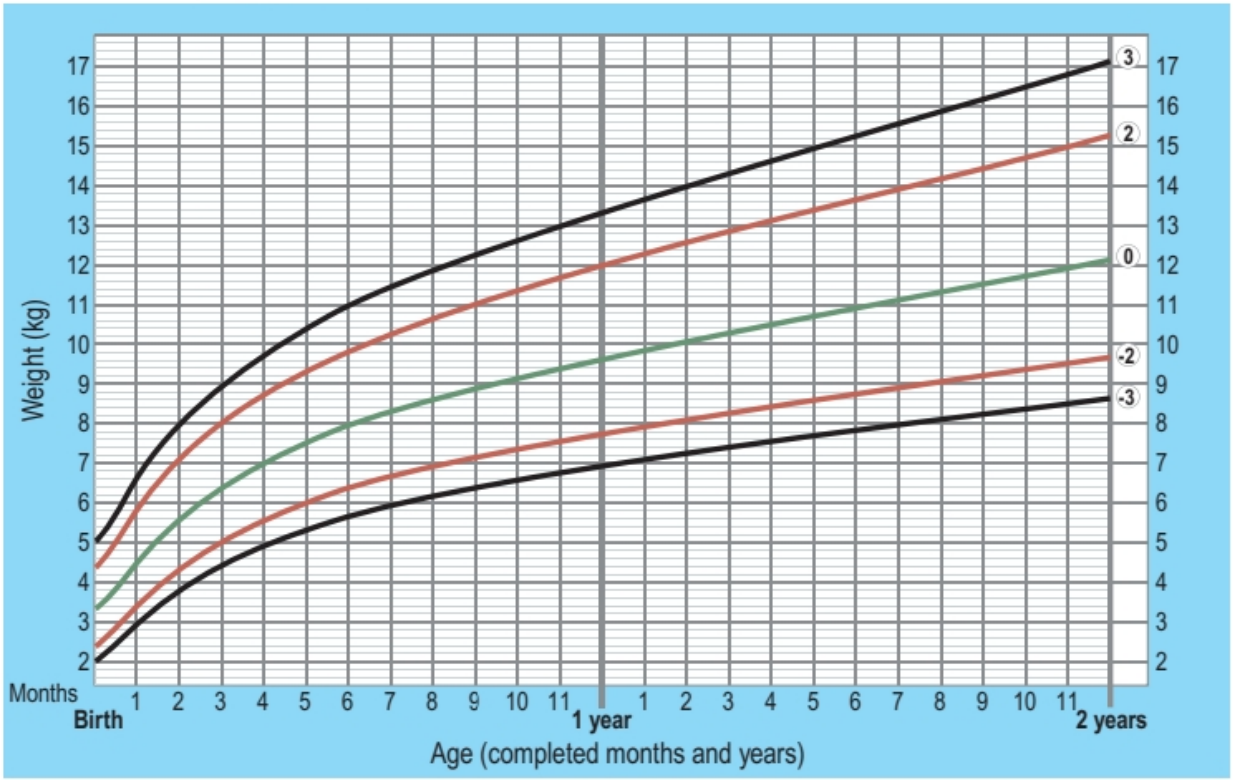
-last 6 months: 0.5 cm for each

Then gain around 10 cm more during life

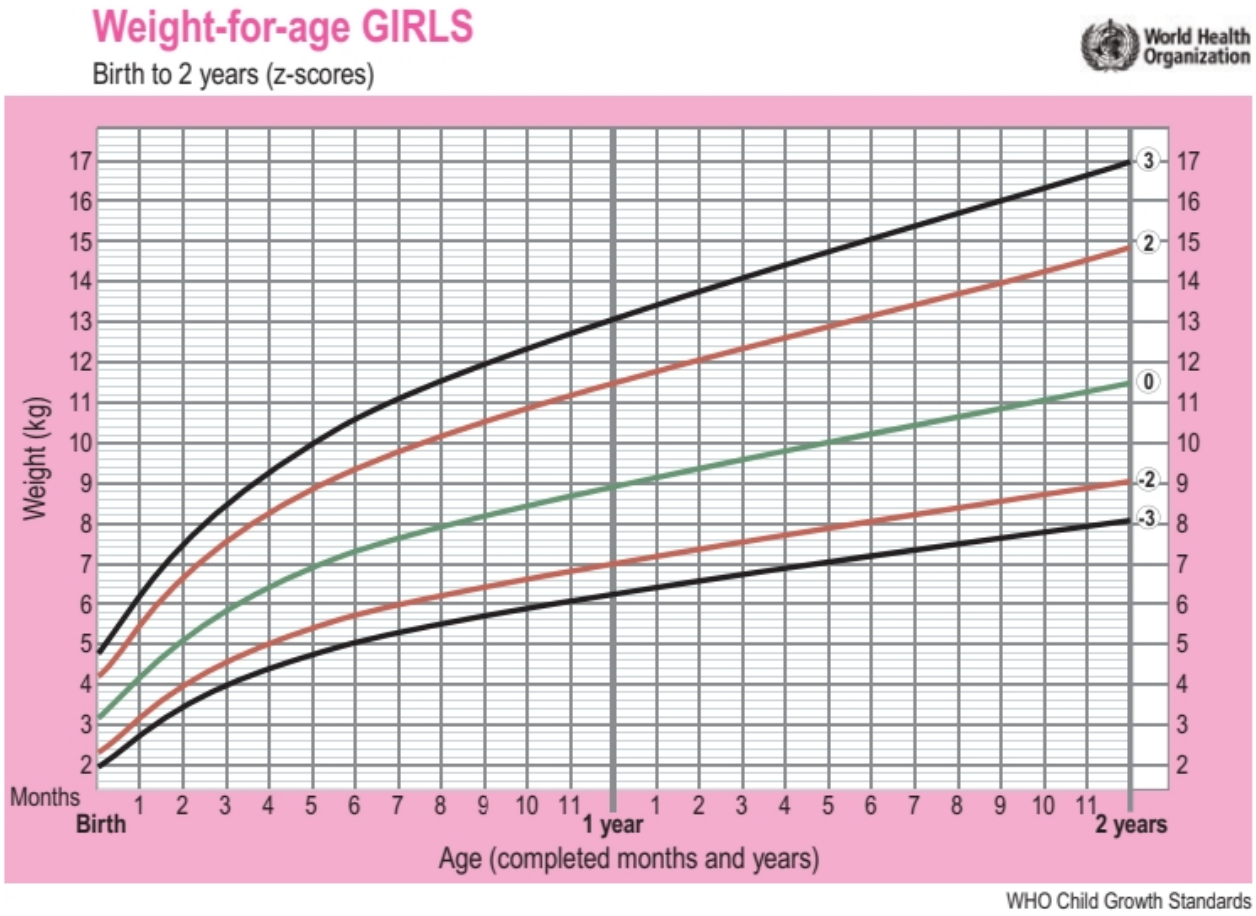
Weight-for-age BOYS

Birth to 2 years (z-scores)

World Health Organization



WHO Child Growth Standards


Weight-for-age GIRLS
Birth to 2 years (z-scores)
World Health Organization
Weight (kg)
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
3
2
0
-2
-3
Months
Birth
1 2 3 4 5 6 7 8 9 10 11
1 year
1 2 3 4 5 6 7 8 9 10 11
2 years
Age (completed months and years)
WHO Child Growth Standards

Neurological development

Normal development is heterogeneous within the population, identifying the abnormalities is difficult

Important determinant: environment, genetic potentials

Developmental assessment need: patience, familiarities of normal range at certain age

Preschool (1-5 years):

Gross motor (more sensitive at the younger age of this group)

Fine motor

Personal social skills

Language; delayed speech (not uncommon, but need hearing assessment)

School age (+5 years)

Developmental problems= education problems

Ask about school performance, and academic and social activities

Puberty:

-When individual is physiologically capable of sexual reproduction

-Time of rapid physical and emotional development

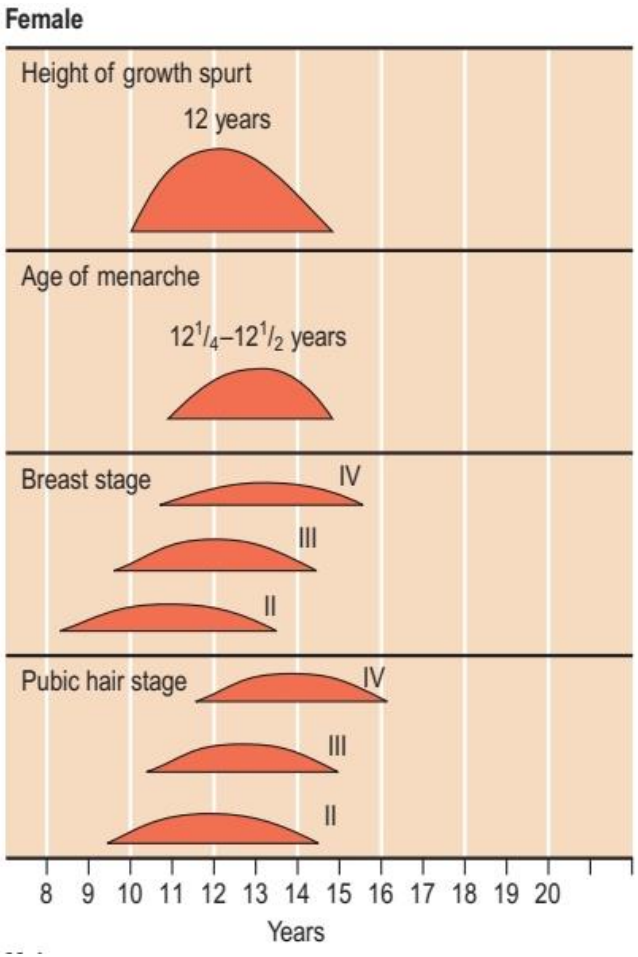
-The age varies: girls(10-14 years) , boys(12-16 years)

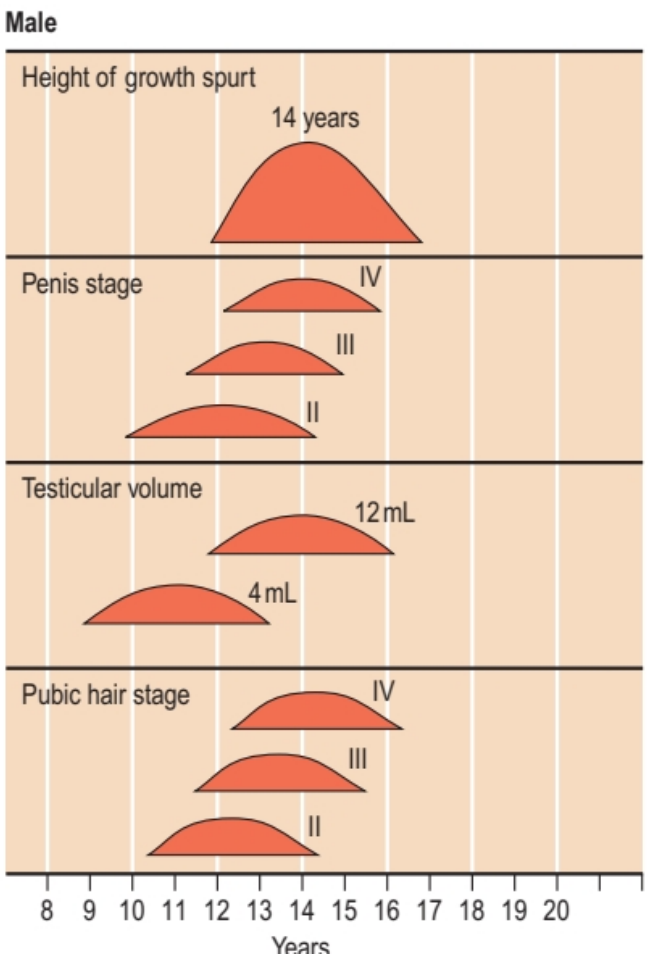
-Average child grows 30 cm, gain 40-50% of weight

-Use chart to stage puberty if required (wide normal range)

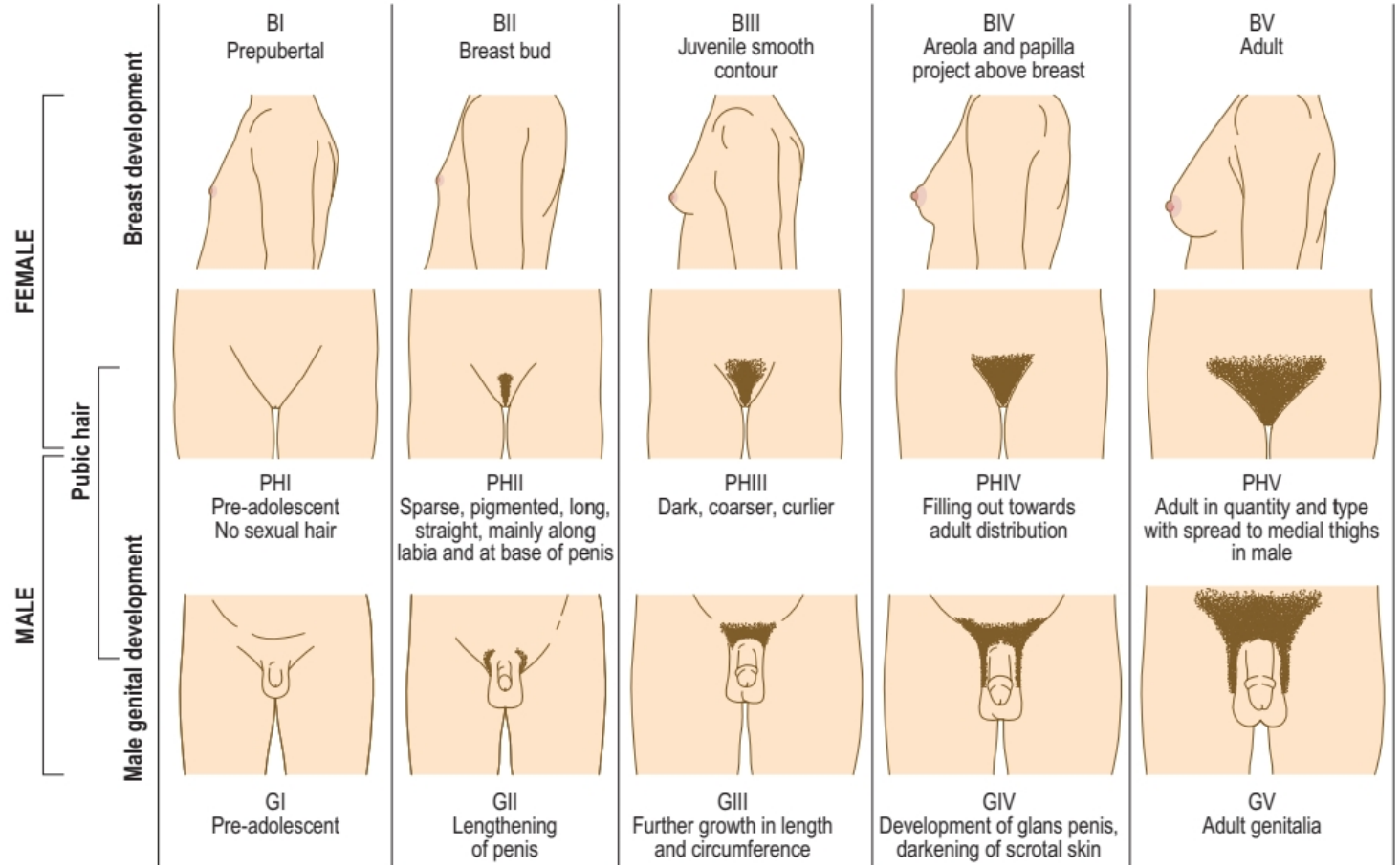
-Delayed or precocious puberty is not uncommon

Timing of puberty in males and females





Stages of puberty in females and males(tanner staging of puberty)



Physical examination techniques in children

Children usually present with symptoms

If acute symptoms usually have signs, chronic symptoms ;examination can be normal

Similarities with adult examination

-Techniques of examination same as adult with some exceptions

-Examining a child is a skill that takes time to learn:

-Observe the child during discussion or play

-Opportunistic

-Adaptive to child's mood and playfulness

---History suggests the diagnosis, examination confirms it

Differences in examination between children and adults

1-3 years:

Hard to be approached by strangers

Dislike being examined

Let child become used to your presence

Observe general condition, color, RR, effort, hydration

Ask parents to sit the child on their knees

ENT exam , at the end

3-5 years

May cooperate: give positive feedback on helpful behavior

Child's social skill regress when unwell

5+ years

Full adult style examination

Over 5 years are able to understand and comply with requests

Under 11 years often not able to express themselves well

Acutely unwell child

Some signs are serious and require immediate investigation and management

Children become ill quickly

If unwell for <24 hours, and initial examination reveals non specific signs, reassess in 1-2 hours; If high level of parental and clinical anxiety that the signs are out of keeping with simple viral illness in a child of that age

15.10 Serious signs requiring urgent attention

- Poor perfusion with reduced capillary refill and cool peripheries (indicating shock)
- Listless, poorly responsive, whimpering child (suggesting sepsis)
- Petechial rash over the trunk (suggesting meningococcal sepsis)
- Headache with photophobia or neck stiffness (suggesting meningitis)
- Respiratory distress at rest (rapid rate and increased respiratory effort, indicating loss of respiratory reserve due to pneumonia or asthma)

General examination

Height

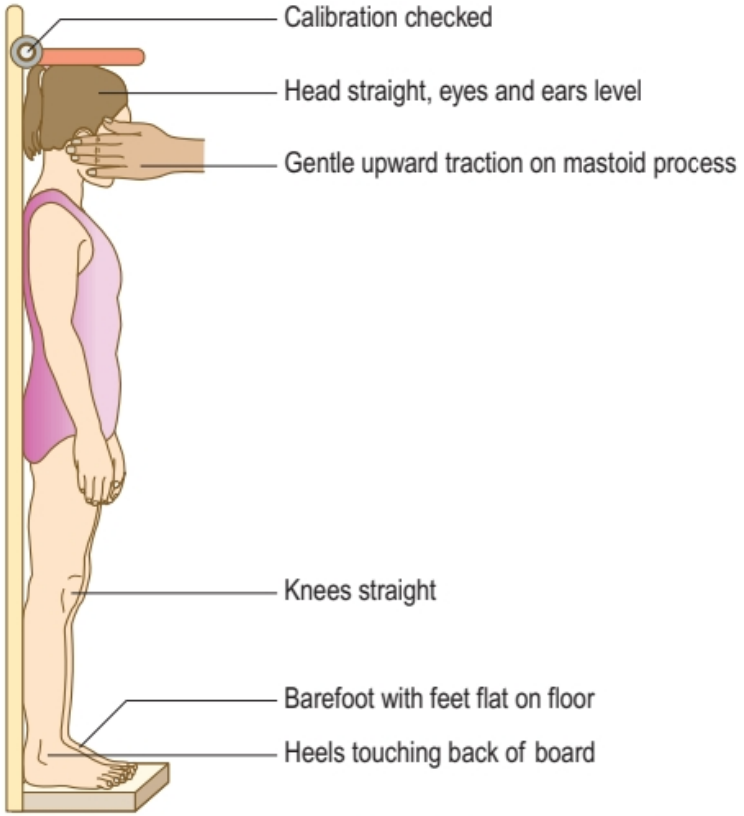


Fig. 15.20 Stadiometer for measuring height accurately in children.

15.11 Physiological measurements in children of different ages

Age (years)	Pulse (bpm)	Respiratory rate (breaths per minute)	Systolic blood pressure (mmHg)
0–1	110–160	30–60	70–90
2–5	60–140	25–40	80–100
6–12	60–120	20–25	90–110
13–18	60–100	15–20	100–120

Ear, nose, throat

Preschool child:

Throat:

-Sit child on parent knees, facing you

-Older child: give him the opportunity to open mouth spontaneously, OR:

-Place one arm on the child's upper arms and chest(to stop child from pushing you)

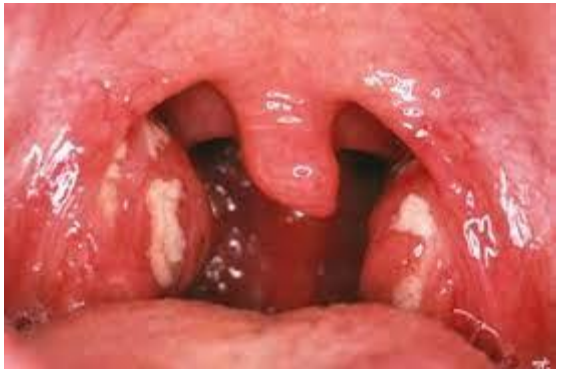
-Hold child's forehead with their other hand (stop pulling chin down to their chest)

-Hold torch in the non dominant hand to illuminate the throat

-Slide the tongue depressor with your dominant hand inside child's cheek

ig. 15.21 How to hold a child to examine the mouth and throat.

Abnormal findings:



Healthy tonsils and pharynx look pink, if inflamed: crimson red

Pus on tonsils and pharynx reflects infection, but can't differentiate viral from bacterial infection

Ears

-Sit child on parent knees, child's ear facing you

-Place one arm around the child's shoulder and upper arm that are facing you

-Place the other hand over the parietal area above the child's ear that is facing you

-Use otoscope with the largest speculum that will comfortably fit the child's auditory meatus

-To straighten the ear canal:

hold pinna gently and pull it out and down in a baby and toddler with no mastoid development

hold pinna gently and pull it up and back in a child whose mastoid process has formed

g. 15.22 How to hold a child to examine the ear.

Lymphadenopathy

Normal findings:

-Palpable neck and groin LNs is extremely common in children under 5 years

-Typically: bilateral, <1cm, hard and mobile, no overlying redness, can persist for many weeks

-In absence of systemic symptoms : weight loss, fever, night sweats: normal healthy response to infections

-Rarely due malignancy

15.12 Causes of lymph node enlargement

Cervical lymphadenopathy

- Tonsillitis, pharyngitis, sinusitis
- 'Glandular fever' (infectious mononucleosis/cytomegalovirus)
- Tuberculosis (uncommon in developed countries)

Generalised lymphadenopathy

- Febrile illness with a generalised rash
- 'Glandular fever'
- Systemic juvenile chronic arthritis (Still's disease)
- Acute lymphatic leukaemia
- Drug reaction
- Mucocutaneous lymph node syndrome (Kawasaki disease)

Cardiovascular examination

Brachial pulse on anterocubital fossa (<2-3 years)

Do not palpate carotid or radial pulses in young children

BP: cuff sized 2/3 distance from elbow to shoulder tip

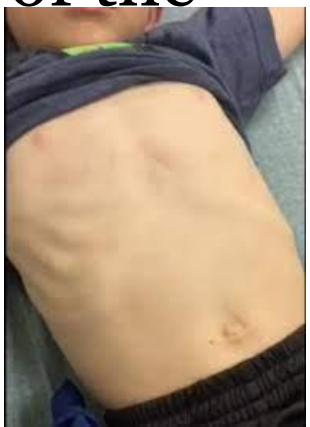
Smaller cuffs yields falsely high values

Respiratory examination

<3 years old: soft chest wall, relatively small stiff lungs

Infection or fluid in lung: stiffer, diaphragm contract vigorously to draw air into lungs

Recession(ribs sucking in, tracheal, intercostal, subcostal) paradoxical outward movement of the abdomen (increase working of breathing)



Children small thin chest transmit sounds readily

Small airways are more prone to turbulence and added sound

Auscultation:

Expiratory polyphonic wheeze (inspiratory too)

Fine end-expiratory crackles

Coarse louder crackles transmitted from larger airways

Pops and squeakers (patient recovering from asthma)

Abdominal examination

6 months to 3 years: examine the child abdomen while sitting upright on parents knees

Splenic enlargement:

Fecal loading of left iliac fossa is common in constipation

Rectal examination is rarely indicated in children

Neurological examination

Power:

Strength against gravity

Ask them to lift their arms above their heads

Raise their legs from the bed while lying down

Stand from squatting

If appropriate, test power against your strength

Neck stiffness (meningitis):

While talking to them or their parents
The neck will remain align with the trunk
In young child move a toy to catch their attention and see if they move their head

Spotting the sick child

It can be difficult to identify a child with sever illness

By experience you should identify if the child is really ill or just miserable

Early warning score can help (PEWS, COAST)…

PRESCHOOL (1–4 years)

COAST: CHILDREN'S UNIT

CHILDREN'S OBSERVATION AND SEVERITY TOOL

Patient details
Name
DOB
Hosp No

CHILDREN'S UNIT

SOUTH COAST CHILDREN'S EARLY WARNING SCORE: CHILDREN'S UNIT

Date	
Time	
Doctor/Nurse/Family Concern?	
Temperature (°C)	40, 39, 38, 37, 36, 35, 34
Heart Rate (bpm) and Blood Pressure (mmHg)* (*nb BP does not score in COAST Scoring)	220, 210, 200, 190, 180, 170, 160, 150, 140, 130, 120, 110, 100, 90, 80, 70, 60, 50, 40
Heart Rate (number)	
Resp Rate (bpm) (over 1 minute)	70, 60, 50, 40, 30, 20, 10
Resp Rate (number)	
Receiving O_2 (L/min)	
O_2 saturations (%)	
Resp. Distress	**Mod/Severe**
	None/Mild
Distress Level	None/Mild
	Decreased
GCS*	
Pain Score*	
TOTAL COAST SCORE Number of shaded boxes	
Observer's initials	

ACTIONS		
	0–1	Continue normal observations.
	2	Nurse in Charge review. Hourly observations.
NB: Scores ≥3 should be recorded overleaf	3	Nurse in Charge & Doctor to review patient. Half-hourly observations.
	4	Nurse in Charge & SpR to review patient. Consider informing Consultant.
	5–6	Nurse in Charge & Senior Doctor to see immediately. If airway compromise, call ITU Registrar immediately.

*nb: BP, GCS and Pain Score values do not contribute to the overall COAST score.

Fig. 15.23 Rapid cardiopulmonary evaluation. *BP*, blood pressure; *bpm*, beats/breaths per minute; *GCS*, Glasgow coma scale score; *ITU*, intensive treatment unit; *SpR*, specialist registrar. *Courtesy Dr Sandell.*

15.13 Clinical signs associated with severe illness in children

- Fever > 38°C
- Drowsiness
- Cold hands and feet
- Petechial rash
- Neck stiffness
- Shortness of breath at rest
- Tachycardia
- Hypotension (a late sign in shocked children where blood pressure is initially maintained by tachycardia and increased peripheral vascular resistance)

Child protection

-Neglect and physical and/or emotional abuse increase risk of health problems

-Injuries from physical abuse : detected visually

-Consider non-accidental injuries, if history nor consistent with injury, injury in unusual place

-Consider if child appears dirty or wear dirty or torn clothes that are to big or small

-Parent-child relationship: child scared of the parent(frozen watchfulness), or the parent apparently oblivious to the child's attention

15.14 Signs that may suggest child neglect or abuse

Behavioural signs

- 'Frozen watchfulness'
- Passivity
- Over-friendliness
- Sexualised behaviour
- Inappropriate dress
- Hunger, stealing food

Physical signs

- Identifiable bruises, e.g. fingertips, handprints, belt buckle, bites
- Circular (cigarette) burns or submersion burns with no splash marks
- Injuries of differing ages
- Eye or mouth injuries
- Long-bone fractures or bruises in non-mobile infants
- Posterior rib fracture
- Subconjunctival or retinal haemorrhage
- Dirty, smelly, unkempt child
- Bad nappy rash

Integrated examination sequence for the newborn child

- Perform a general examination:
  - Looks well and is well grown? Dysmorphic features? Posture and behaviour? Does the cry sound normal?
  - Skin: note cuts, bruising, naevi (haemangiomas or melanocytic), blisters or bullae.
  - Head: check shape, swellings, anterior fontanelle, cranial sutures.
  - Eyes: check for jaundice, ocular movements and vestibular function; perform ophthalmoscopy.
  - Nose: check patency.
  - Mouth: check mucosa, tongue, palate, jaw and any teeth.
  - Ears: note size, shape and position; check the external auditory meatus.
  - Neck: inspect and palpate for asymmetry, sinuses and swellings.
- Examine the cardiovascular system:
  - Inspect: pallor, cyanosis and sweating.
  - Palpate: apex, check for heave or thrill, count heart rate, femoral pulses, feel for hepatomegaly.
  - Auscultate: heart sounds I and II, any additional heart sounds or murmurs.
- Examine the respiratory system:
  - Inspect: chest shape, symmetry of movement, respiratory rate, respiratory distress: tachypnoea, suprasternal, intercostal and subcostal recession, flaring of nostrils.
  - Auscultate anteriorly, laterally and posteriorly, comparing sides.
- Examine the abdomen:
  - Inspect: abdomen, umbilicus, anus and groins, noting any swellings.
  - Palpate: superficial, then deeper structures. Spleen, then liver.
- Examine the perineum:
  - Both sexes: check normal anatomy.
  - Male: assess the penis, noting shape; check the urethral meatus is at the tip. Do not retract the foreskin. Palpate the testes, and the inguinal canal if the testes are not in the scrotum. Transilluminate scrotal swellings.
- Examine the spine and sacrum:
  - With the infant in the prone position, inspect and palpate the entire spine for neural tube defects.
- Examine the neurological system:
  - Inspect: asymmetry in posture and movement, any muscle wasting.
  - Pick the baby up to note any stiff or floppy tone.
  - Sensation: does the baby withdraw from gentle stimuli?
  - In dim light, the eyes should open; in bright light, babies screw up their eyes.
- Check the primitive reflexes:
  - Check grasp responses, ventral suspension/pelvic response to back stimulation, place-and-step reflexes, Moro reflex, root-and-suck responses.
- Inspect the limbs:
  - Inspect: limbs, counting digits and checking feet are, or can be, normally positioned.
  - Check hips for developmental dysplasia/dislocation.
- Weigh and measure:
  - Weigh the infant to the nearest 5 g.
  - Measure: occipitofrontal circumference, crown–heel length (neonatal stadiometer).
  - Record on a centile chart.