The aim of the lecture is to identify the normal to recognize the abnormal

Pediatrics TeamWork 437

Common Neonatal Problems

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Notes Previous Notes Book Important!

History and examination

History

A) Maternal History:

- Age
- Medical / surgical history
- Medications
- Pregnancy history
- Labour and delivery history
- Family history

(B) Neonatal History

We don't care about past medical and surgical of the baby since he has just borned as much as we care about maternal history

Neonatal hx is same as pediatric hx
mid point in neonate is umbilicus while in adult it's symphysis pubis

Past medical:
Why the baby becomes hypoglycemic when the mother has a high blood sugar ?
When the baby inside the uterus there was a high sugar transported to the baby inducing hypertrophic pancreas to lower the blood sugar (more sugar to the baby, more insulin secretion of beta cells)

When you cut the cord there will be no sugar transportation with a high insulin level then the baby will develop hypoglycemia

We ask the nurse to do frequent glucose check to the baby

medications:
Taking anticonvulsant by the mother cause cleft palate to the baby.
Deficiency of folate by the mother cause neural tube defect to the baby.

Family hx:
When the mother tells you i have a baby 3 years ago and at the age of 6 days he collapsed suddenly, we took him to the hospital and they told us he has metabolic disease and died

What's the example of such a metabolic disease?
Organic academia

What will you do at this situation? We will put the baby in NCIU and keep him NPO until we ensure he doesn't have a deficiency of the enzyme that lead to organic academia

Check if there's a hx of sickle cell, G6PD deficiency, mitochondrial brain disease

Physical examination

- Head large
- face rounder
- small mandible
- prominent abdomen
- mid point umbilicus
- liver and spleen easily felt
- kidneys palpable
- flexion posture.

Other specific neonatal examinations:

- Neonatal reflexes.
- Gestational assessment.
- Congenital malformations.

Fetal maturation

Second Trimester:

- CVS attains Final Form 12 wk.
- Respiratory movement as early as 18 wk.
- Sufficient alveolar structures 24 wk. Surfactant production by 20 wk, 34 wk.
- Tidal flow of amniotic fluid, out of lungs.
- Hemoglobin is fetal (HB A 30% at birth).
- Coordinated suck 34 wk. (suck 26 – 28 wk).

Neonatal physiology

Respiratory

- Established at delivery.
- PR 50 - 60/min.
- Wet lung syndrome.

MCQ:
A 34 weeks infant established there breathing with enough surfactant production and can suck and swallow (i didn't get the question, it's in 45 min in recording)

CVS

- HR 120-160/min.
- R ventricle predominant.
- Transient murmur.
- Fetal – neonatal circulation.

Gastrointestinal

- Activity usually addressed toward meeting nutritional needs (crying hungry, active reflexes).
- End of first wk. feeds regular 2-5 hours.
- First stool passed within the first 24 hours.

It's abnormal if he didn't pass stool within the first 48 hours

Thermal regulation & metabolism

- At delivery same temp. as mother.
- End of first wk. 110 kcal/kg/day.
- Extracellular fluid compartment 35%.
- Body wt lost in the first 10 days.
- End of first wk 120-150 m/kg/d.

Renal

- GFR and UOP law first day.
- GFR adult standard end of first year.
- Proteinuria common and urate crystals .
- Urea clearance law and concentrating ability limited.

It's abnormal to not pass urine in the first 24 hours

Hematology

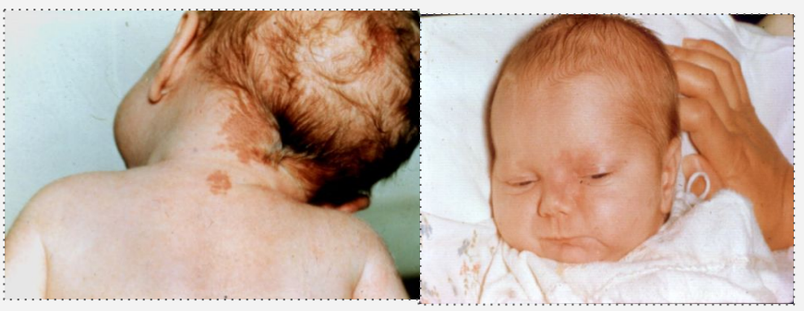
- Hb 17 – 19 g/dl.
- WBC 10 – 30 x 10 3 .
- Plat. 150 – 750 x 10 3.
- Coagulation (acquisition of gut flora).

Immunity

- High IgG levels (materno-fetal transfer).
- IgM, IgE & IgA do not cross placenta.
- Maternal IgG disappear by 3 months.

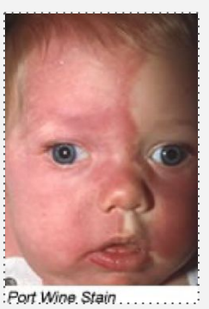
Salmon patches

- Birthmarks that are caused by dilations of capillaries.
- On the face, called an angel kiss, on the back of the neck , it is known as a stork bite.
- It is common.
- It usually disappears within the first 3 years of life.



In both of then there is only dilated blood veseeles not a new formation

Port-wine stain (Nevus flammeus)



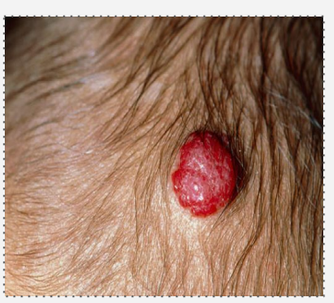
- Early port-wine stains are usually flat and pink in appearance. May deepen to a dark red or purplish color with age.
- They occur most often on the face. Consisting of superficial and deep dilated capillaries in the skin

It can be removed by laser

Strawberry hemangiomas

Also called, nevus vascularis, capillary hemangioma, hemangioma simplex).

- Common type of vascular birthmark.
- It is usually painless and harmless.
- Unknown cause.
- Consist of small, closely packed blood vessels.
- May be absent at birth, and develop at several weeks.
- They disappear by the time a child is 9 years old.



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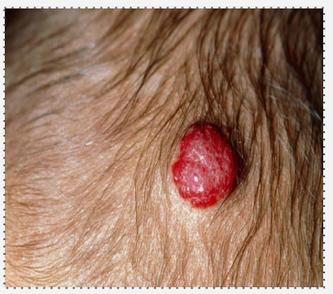
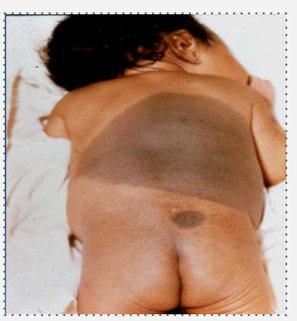


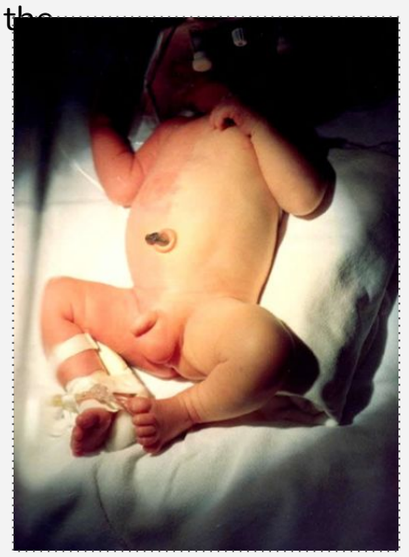
Mongollian spots

Congenital dermal melanocytosis.
- Flat, blue, or blue-gray skin markings with wavy borders and irregular shape.
- Near or around the buttocks.
- Commonly appear at birth or shortly thereafter.
- It disappears within 1-5 years from birth.



Harlequin phenomenon

Transient in approximately 10% of healthy newborns.
- This presents as a well-demarcated colour change, with one half of the body displaying erythema and the other half pallor.
- Usually occurring between two and five days of age, but can be seen as late as three weeks of age.
- The condition is benign, and the change of colour fades away in 30 seconds to 20 minutes.

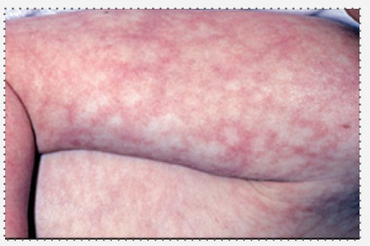


Dilated blood vessels in one area and constricted in the other side. When you turn the baby it becomes the opposite

Cutis Marmorata

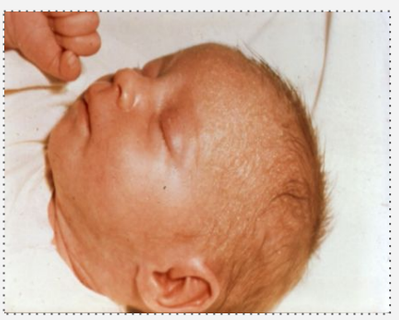
Vasomotor instability

A reticulated mottling of the skin that symmetrically involves the trunk and extremities.
- It is caused by a vascular response to cold and generally resolves when the skin is warmed.
- A tendency to cutis marmorata may persist for several weeks or months, or sometimes into early childhood.
- No treatment is indicated. It is also commonly found in babies with Down's syndrome.



Miliaria crystallina

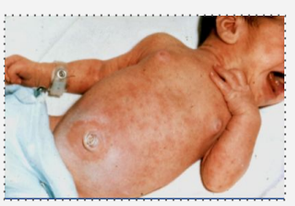
Superficial sweat ducts obstruction.
- It consists of 1- to 2- mm vesicles without surrounding erythema.
- Common on the head, neck, and trunk .
- Rupture followed by desquamation.
- Persist for hours to days.

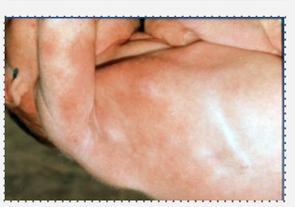


Erythema toxicum neonatorum

Common benign self-limited rash.
- Usually appear between day 2-5 after birth.
- Characterized by blotchy red spots on the skin with overlying white or yellow papules or pustules.
- May be few or numerous that typically resolves within a few days.

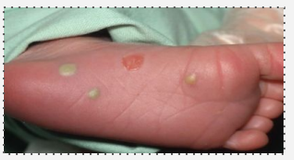
MCQ: when you look under the microscope you ill see a lot of eosinophil

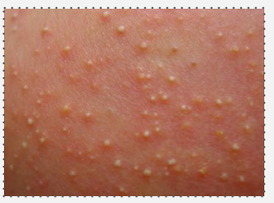




Neonatal pustular melanosis

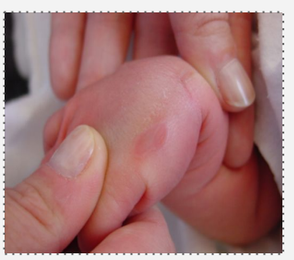
MCQ: Neonatal pustular melanosis presents at birth while erythema toxicum neonatorum presents later in the first days of life





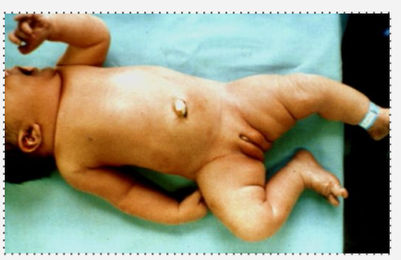
Transient, a benign idiopathic skin condition.
▪ Mainly seen in newborns with skin of color .
▪ Distinctive features characterized by vesicles, superficial pustules, and pigmented macules.
▪ The vesicles and pustules rupture easily and resolve within 48 hours.

Sucking blisters



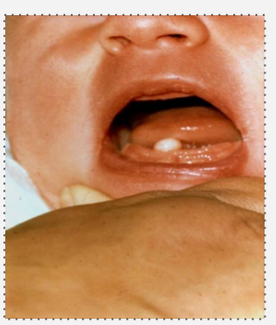
- Erosions, or calluses result from vigorous sucking by the infant during fetal life.
- The lesions are present at birth and resolve without specific treatment within days to weeks.

Tonic neck reflex



- The face is turned to one side, the arm and the leg on that side stretch out and the opposite arm and leg bend up.
- It is called the "fencing" position.
- The tonic neck reflex lasts about six to seven months.

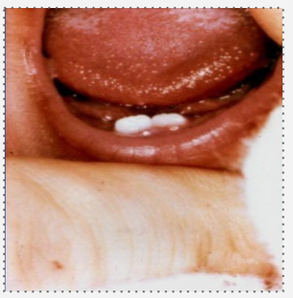
Ranula



Cystic lesions in the floor of the mouth.
▪ Retention cysts of the excretory duct of the sublingual gland.
▪ Benign and causing no discomfort.
▪ It has the tendency to rupture or resolve spontaneously within the first few months of life.

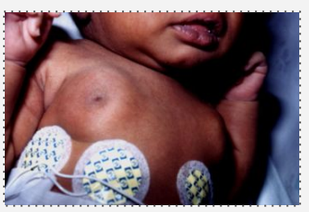
Natal - Neonatal teeth

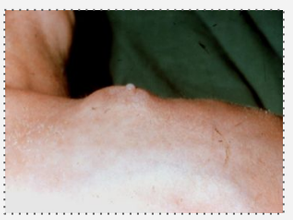
We remove it when it bothers the mother
during breastfeeding although it's not loose



- Teeth that are already present at the time of birth.
- Neonatal teeth, which grow in during the first 30 days after birth.
- In both cases, once erupted, teeth has to be extracted due to the danger of getting aspirated or may cause discomfort.

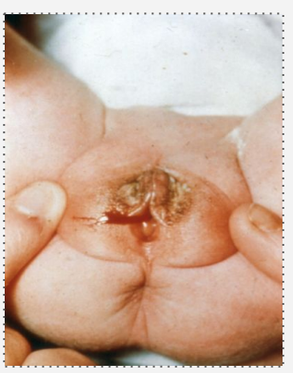
Natal - Neonatal teeth





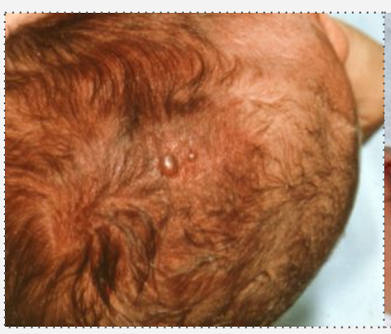
- Is caused by the passage of maternal hormones across the placenta during pregnancy leading to the enlargement of the breasts.
- Usually progressing over the first 2 months of life.
- Breast discharge is also sometimes seen which is
- commonly called "witch's milk".

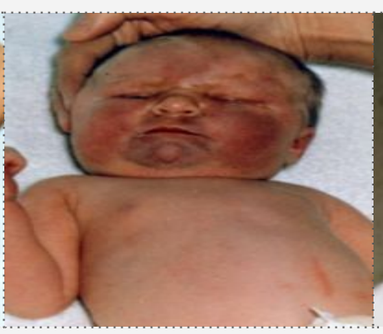
Neonatal Menstruation

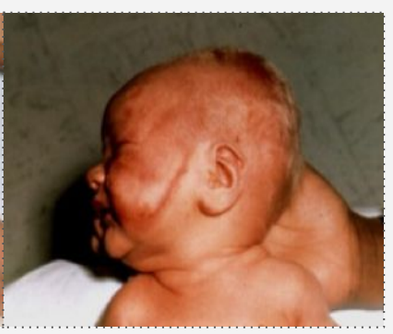


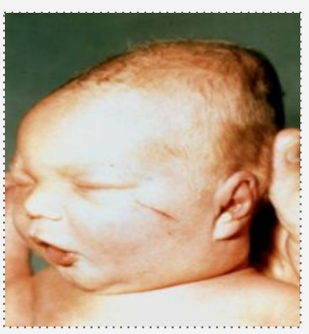
- Is caused by the passage of maternal hormones across the placenta during pregnancy.
- Withdrawal bleeding takes place at the end of first week. It is benign and needs no treatment.

Birth trauma

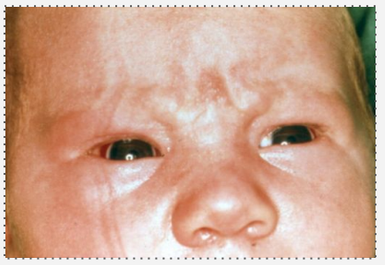






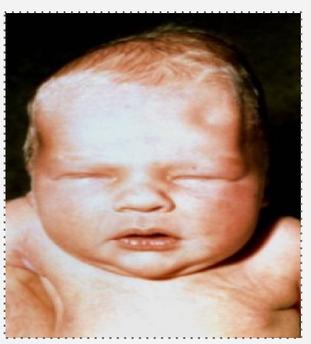


Subconjunctival hemorrhage



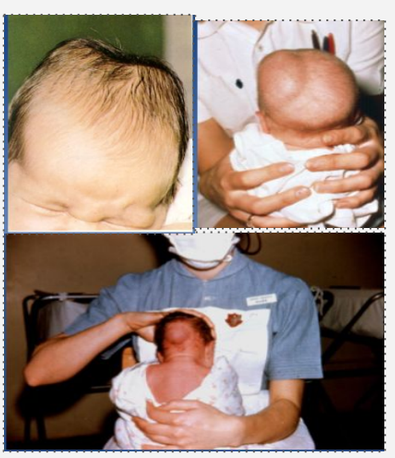
Bleeding underneath the conjunctiva.
- Appears as bright red patch in the sclera.
- It is a painless and harmless.
- As a consequence of elevated venous pressure in the head and neck.
- It usually resolves within 1-2 weeks.

Caput succedaneum



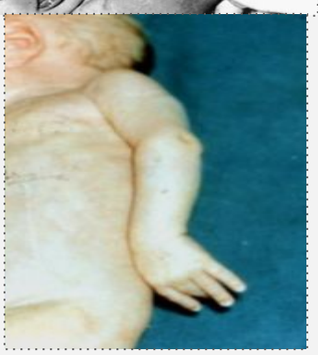
Diffuse scalp swelling that extends across the midline and over suture lines.
- It is commonly associated with head moulding.
- Occurring due to pressure from uterine or vaginal wall during vertex vaginal delivery.
- Does not usually cause complications and resolves over the first few days.

Cephalhematoma



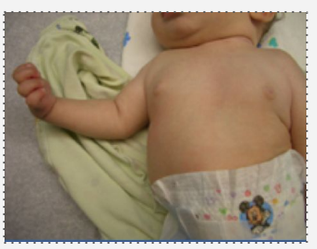
A localized effusion of blood beneath the periosteum of the skull, due to disruption of the vessels during birth.
- It does not cross cranial suture lines.
- It is firmer to the touch than an edematous area.
- It usually appears on the second or third day after birth and disappears within week or months.

Erb's palsy



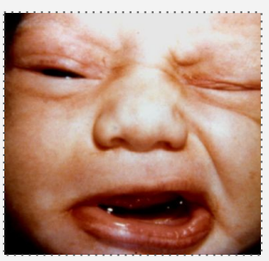
- A paralysis of the arm caused by injury to the upper group of the trunk, C5 -C6 nerves.
- The Moro reflex is absent but grasp reflex of the hand is present.
- The elbow is extended and the forearm is pronated (the "waiter's tip position).

Klumpke palsy



- lower plexus injury to the lower roots of the brachial plexus.
- Involving C8 and T1 roots.
- There is loss of grasp reflex. The hand is supinated, the wrist
- extended, and the fingers clawed .

Facial palsy



- Lower motor neuron lesion.
- Both upper and lower parts are affected.
- Conservative treatment.

Asymmetric crying facies

- A congenital deficiency or absence of the depressor anguli oris muscle which controls the downward motion of the lip.
- The eye and forhead muscles are unaffected.

Book!

Box 11.1 Potential medical problems of preterm infants

- Need for resuscitation and stabilization at birth
- Respiratory:
  - respiratory distress syndrome
  - pneumothorax
  - apnoea and bradycardia
- Hypotension
- Patent ductus arteriosus
- Temperature control
- Metabolic:
  - hypoglycaemia
  - hypocalcaemia
  - electrolyte imbalance
  - osteopenia of prematurity
- Nutrition:
  - Difficulty establishing feeding
- Extra-uterine growth impairment
- Infection
- Jaundice
- Intraventricular haemorrhage/periventricular leukomalacia
- Necrotizing enterocolitis
- Retinopathy of prematurity
- Anaemia of prematurity
- Bronchopulmonary dysplasia (BPD)
- Inguinal hernias

- **Necrotizing enterocolitis:** it is a serious illness. Typically, seen in first few weeks of life. It could be due ischemia and bacterial invasion of the bowel wall and altered gut microbiota which is improved with breast milk, and adversely affected by formula feeds, unduly rapid increase in enteral feeds and antibiotics. **Risk factors** are intrauterine growth restriction, especially if accompanied by antenatal reversed end diastolic flow on Doppler studies and perinatal asphyxia.
- **Early signs of necrotizing enterocolitis** include feed intolerance and vomiting, which may be bile stained. The abdomen becomes distended and the stool sometimes contains fresh blood. The disease may progress to bowel perforation!
- The characteristic X-ray features of necrotizing enterocolitis are distended loops of bowel and thickening of the bowel wall with intramural gas, and there may be gas in the portal venous tract
- Treatment is to stop oral feeding and give broad- spectrum antibiotics to cover both aerobic and anaerobic organisms. Parenteral nutrition is needed and mechanical ventilation and circulatory support are often required. **Surgery is performed for** bowel perforation, difficulty with mechanical ventilation, or a failure to respond to medical management.
- Long-term sequelae include the development of bowel strictures and malabsorption if extensive bowel resection has been necessary, as well as a greater risk of a poor neurodevelopmental outcome.

Necrotizing enterocolitis

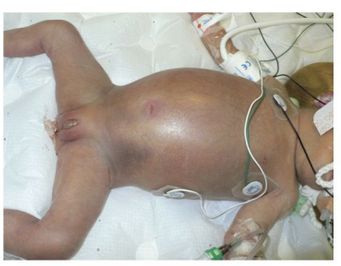


Figure 11.10a Necrotizing enterocolitis showing gross abdominal distension and tense and shiny skin with discoloration over the abdomen. There is also blood on the nappy. (Copyright Nic Alexander.)

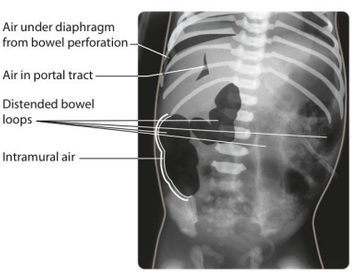


Figure 11.10b Diagram of characteristic features of necrotizing enterocolitis on abdominal X-ray.

Transient tachypnea of the newborn

- This is by far the most common cause of respiratory distress in term infants
- More common after C-section
- The chest X-ray may show fluid in the horizontal fissure
- Diagnosis of exclusion
- Usually resolves within first day; supplemental oxygen may be required and if infant can't feed normal we use NGT or IV fluids

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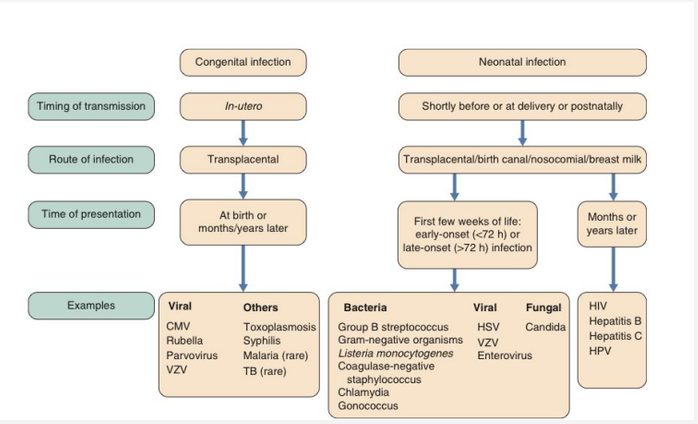
Congenital and neonatal infections



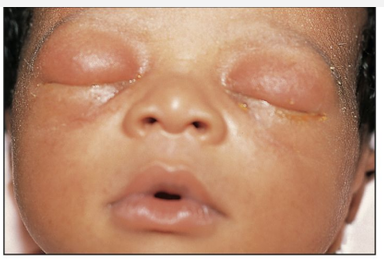


Figure 11.20 Purulent discharge, together with swollen eyelids, in an 8-day-old infant. This is the characteristic presentation of conjunctivitis from *Chlamydia trachomatis*. *Neisseria gonorrhoeae* was absent.

The organism can be identified with NAAT (nucleic acid amplification) testing or immunofluorescent staining. Treatment is with oral erythromycin for 2 weeks. The mother and partner also need to be checked and treated.

- Sticky eyes are common in the neonatal period, starting on the third or fourth day of life. Cleaning with saline or water is all that is required and the condition resolves spontaneously. (If eye redness or other symptoms think of conjunctivitis!)
- Conjunctivitis caused by **strept or staph** is treated with a **topical antibiotic eye ointment e.g. chloramphenicol or neomycin**
- Purulent discharge with conjunctival injection and swelling of the eyelids within the **first 48 hours of life may be due to gonococcal infection**. The discharge should be Gram-stained urgently, as well as cultured, and treatment started immediately, as permanent loss of vision can occur. **Penicillin or third generation cephalosporin (if resistant to penicillin) is given IV**
- If the skin surrounding the umbilicus becomes inflamed systemic antibiotics are indicated
- Umbilical granuloma (sticky umbilicus): treated with silver nitrate (don't forget to protect the skin).

Hypoglycemia

- Common in the first 24 hrs after birth if: IUGR, diabetic mothers, preterm, large for date, hypothermic, polycythemia, ill for any reason.
- Babies of diabetic moms have hyperinsulinemia with sufficient glycogen stores and high insulin is the cause of their hypoglycemia
- **Symptoms:** jitteriness, irritability, apnoea, lethargy, drowsiness and seizures.
- Prolonged, symptomatic hypoglycemia can cause permanent neurological disability. Keeping glucose level **above 2.6 mmol/l** is protective
- Breastfeeding can prevent hypoglycemia
- **Management:** if the blood glucose concentration is 2–2.6 mmol/L, the level is **rechecked until satisfactory** (at least 3 prefeed levels >2 mmol/L), whereas if the level is <2 mmol/L the infant is given **dextrose gel to the mouth and the level checked (after 30 mins)**. If the infant has a very low blood glucose (<1.0 mmol/L) or <2.0 mmol/L and clinical signs or has not responded adequately to two doses of glucose gel, **hypoglycemia should be corrected immediately with an intravenous infusion of dextrose**. If there is difficulty or delay in starting the infusion, or a satisfactory response is not achieved, glucagon can be given.
- High-concentration intravenous infusions of glucose should be given via a **central venous catheter to avoid extravasation into the tissues**, **which may cause skin necrosis and reactive hypoglycemia**.

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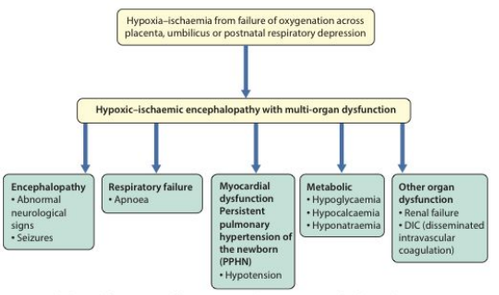
Summary

Hypoxic–ischaemic encephalopathy

- Is an important cause of morbidity and mortality worldwide.
- Causes encephalopathy and multi-organ dysfunction.
- Therapeutic hypothermia has become standard therapy in the UK and many high-income countries if clinical grade is moderate or severe.



Pathogenesis and clinical features of hypoxic–ischaemic encephalopathy.

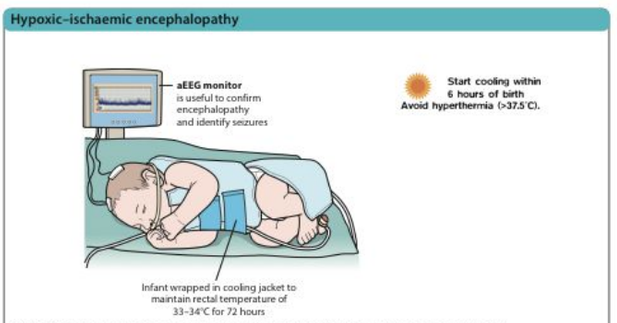


Figure 11.22 Therapeutic hypothermia for moderate or severe hypoxic–ischaemic encephalopathy.

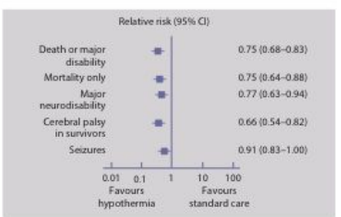


Figure 11.23 Outcomes of therapeutic hypothermia trials compared with standard care for the treatment of term/near-term babies with hypoxic–ischaemic encephalopathy. The figure shows reduction of death or major disability. Reduction in seizures is not demonstrated. (CI, confidence interval.) (Data from: Jacobs SE, Berg M, Hunt R, Tarnow-Mordi WO, Inder TE, et al: Cooling for newborns with hypoxic-ischaemic encephalopathy. *The Cochrane Database of Systemic Reviews* CD003311, 2013.)

Mild hypothermia for moderate and severe HIE reduces death and severe disability and increases the likelihood of survival with normal neurological function.

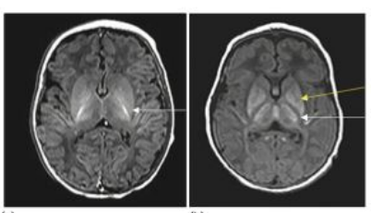


Figure 11.24 Magnetic resonance image (T1 in axial view) of the brain at 14 days in a term infant. (**a**) Normal scan for comparison, showing high signal in the posterior limb of the internal capsule (PLIC) (arrow). (**b**) Following severe HIE, showing loss of the normal high signal from myelin in the internal capsule (PLIC) (white arrow) and abnormal high signal in the adjacent basal ganglia and thalami (yellow arrow). These findings would be associated with a severe motor impairment in the form of cerebral palsy, poor head growth, persistent feeding difficulties, seizures and marked cognitive impairment. (Courtesy of Professor Mary Rutherford.)

Management

-Skilled resuscitation and stabilization will minimize neuronal damage.

-**Infants with HIE may need:**

- respiratory support
- treatment of clinical seizures with anticonvulsants
- fluid restriction because of transient renal impairment and syndrome of inappropriate ADH secretion
- treatment of hypotension by volume and inotropic support
- monitoring and treatment of hypoglycaemia and electrolyte imbalance, especially hypocalcaemia.

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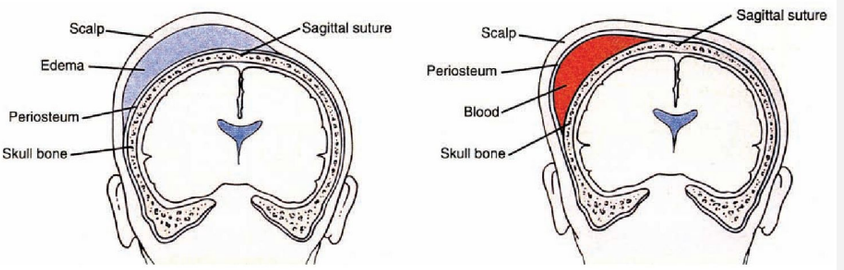
Birth trauma

Soft-tissue injuries

These include:

- caput succedaneum (Fig. 11.25) – bruising and oedema of the presenting part extending beyond the margins of the skull bones; resolves in a few days.
- cephalhaematoma (Figs. 11.25, 11.26) – haematoma from bleeding below the periosteum, confined within the margins of the skull sutures. It usually involves the parietal bone. The centre of the haematoma feels soft. It resolves over several weeks.
- chignon (Fig. 11.27) – oedema and bruising from ventouse delivery.
- bruising to the face after a face presentation and to the genitalia and buttocks after breech delivery. Preterm infants bruise readily from even mild trauma.
- abrasions to the skin from scalp electrodes applied during labour or from accidental scalpel incision at caesarean section.
- forceps marks to face from pressure of blades – transient.
- subaponeurotic haemorrhage (Fig. 11.25; very uncommon) – diffuse, boggy swelling of scalp on examination. Blood loss may be severe and can lead to hypovolaemic shock and coagulopathy.



Understanding the Differences

Caput Succedaneum	Cephalhematoma
• Condition marked by localized soft tissue edema with poorly defined outline	• Condition marked by soft, fluctuant, localized swelling with well-defined outline
• Caused by pressure of the fetal head against the cervix during labor, which decreases blood flow to the area and results in edema	• Caused by subperiosteal hemorrhage
• Present at birth; does not increase in size	• Appears after birth; increases in size for 2–3 days
• Swelling crosses suture lines	• Swelling does not cross suture lines
• Disappears after birth within a few hours to several days	• Disappears from several weeks to even months after birth
• Complications are rare	• Complications include defective blood clotting, underlying skull fracture or intracranial bleeding, and jaundice

From: Nichols, F. H., & Zwelling, E. (1997). *Maternal-newborn nursing theory and practice* (p. 1105). Philladelphia: WB Saunders. Reprinted by permission.

Nerve palsies

Brachial nerve palsy results from traction to the brachial plexus nerve roots. They may occur at breech deliveries or with shoulder dystocia. Upper nerve root (C5 and C6) injury results in an Erb palsy (Fig. 11.28). It may be accompanied by phrenic nerve palsy causing an elevated diaphragm. Erb palsy usually resolves completely, but should be referred to an orthopaedic or plastic surgeon if not resolved by 2–3 months. Most recover by 2 years. A facial nerve palsy may result from compression of the facial nerve against the mother's ischial spine or pressure from forceps. It is unilateral, and there is facial weakness on crying but the eye remains open. It is usually transient, but methylcellulose drops may be needed for the eye. Rarely, nerve palsies may be from damage to the cervical spine, when there is lack of movement below the level of the lesion.

Fractures

Clavicle

Usually from shoulder dystocia. A snap may be heard at delivery or the infant may have reduced arm movement on the affected side, or a lump from callus formation may be noticed over the clavicle at several weeks of age. The prognosis is excellent and no specific treatment is required.

Humerus/femur

Usually midshaft, occurring at breech deliveries, or fracture of the humerus at shoulder dystocia. There is deformity, reduced movement of the limb and pain on movement. They heal rapidly with immobilization.