New Born examination

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The primary examination of the newborn aims:

- Check prenatal problems, group B streptococcal status and intrapartum prophylaxis, hours of ruptured membranes.
- Check maternal labs, blood type, Rh status and antibody status (hepatitis B,C, TORCH and HIV). Review maternal medical and social status.

- Estimated gestational age of the newborn and compliance of this age

- Note the vital signs: breathing, gasping, respiratory rate <20 breaths/min; heart rate >120 beats/min or <100/min; bleeding or shock.
- Observe the general appearance: activity, skin color, and obvious congenital abnormalities.

Family history:

- ethnicity, socio-economic, age of the parents;
- hereditary disorders in the family and relatives;
- maternal exposure to various toxic factors;
- maternal blood group, and if possible - the father;
- mother somatic disorders;
- Mother obstetric and gynecological history.

Conditions of examination

- The child is examined in the first hours after birth
- Temperature of the room where the newborn will be 24 - 26□ C
- Examination is performed in the hatchery or on the table with heater, the newborn must be dry
- The baby is examined in daylight or the light of day lamps
- Examiner hands must be dry and warm
- The examination must due between feedings (usually after 30 min after feeding).

Variants of gestational age:

a) Term newborn (born between 37 and 41 weeks)
b) Preterm infants (born until 36 weeks of gestation)
c) Newborn postterm (born after 42 weeks of pregnancy)

- Small for gestational age – is defined as 2 standard deviation below the 10^{th} percentile
- Large for gestational age- is defined as 2 standard deviation above the 90^{th} percentile, can be seen in baby of diabetic mothers or with fetal hydrops.

Status newborn within the first clinical examination in the delivery room:

- Apgar score;
- Check weight, height, head and chest circumference;
- Sex;
- Assessment of gestation age using a standardized neonatal growth chart and the Ballard Score for premature infants.

Apgar score

TABLE 58–11. Apgar Score

Signs	Points		
	0	*1*	*2*
Heart rate	0	<100/min	>100/min
Respiration	None	Weak cry	Vigorous cry
Muscle tone	None	Some extremity flexion	Arms, legs well flexed
Reflex irritability	None	Some motion	Cry, withdrawal
Color of body	Blue	Pink body, blue extremities	Pink all over

Skin examination

- Skin color: plethora (deep, rosy red color common in polycythemia or over-oxygenated infants.
- Jaundice secondary to hyperbilirubinemia> 5mg/dl; pallor may be secondary to anemia, birth asphyxia, shock or patent ductus arteriosus.
- Cyanosis: central (bluish skin, including the tongue an lips); peripheral (bluish skin with pink lips and tongue)
- Acrocyanosis (bluish hands and feet only)- normal for just been born infants or after cold stress.
- Harlequin sign- clear demarcation an area of redness and normal coloration, can be benign transient or indicative of blood shunting.
- Mottling (lacy red pattern) may be seen in cold stress, hypovolemia, or sepsis. Cutis marmorata, or persistent mottling is found in Down syndrome.
- Vernix caseosa - greasy white substance covers the skin until the 38^{th} week of gestation, its provide moisture barrier.

Skin rashes

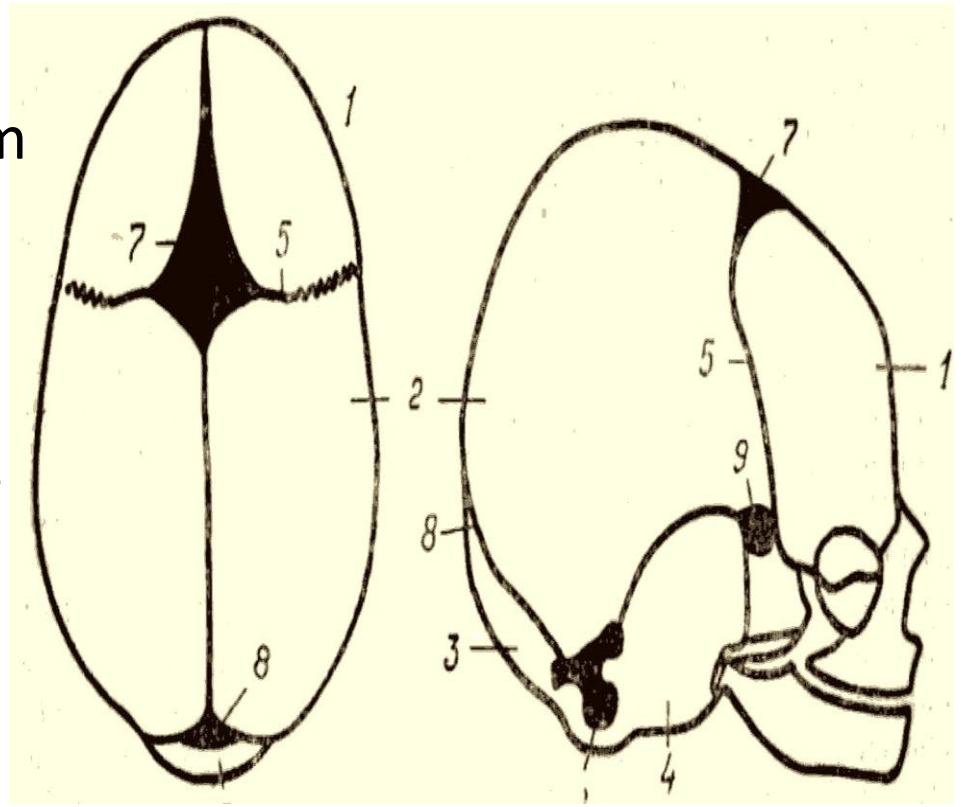
- Milia is a tiny sebaceous retention cysts seen on the chin, nose, forehead, cheeks.
- Erythema toxicum - red skin with yellow- white papule in the center, wright staining of it reveals eosinophils
- Mongolian spots- dark blue macula located over the sacrum, present in blacks.
- Nevi - hemangiomas- macular flat with regression; cavernous, port-wine stain does not disappear with time.

Examination of umbilicus

- Look at the umbilicus, is it red, swollen or draining pus
- Does redness and swelling extend to the skin
- Skin around umbilicus is red and hardened
- Foul-smelling umbilicus
- Abdominal distension
- Treat local infection of umbilicus: wash using 2.5% polyvidone iodine, swab area around with 0.5% gentian violet 4 times/day

Head examination

- Check maximum occipital-frontal circumference (N=33-37cm at term)
- Assesses skull shape asymmetry resulting from the birth process.
- Check for macrocephaly: head circumference is >90th percentile; in microcephaly <10th percentile.
- Fontanelle position, tension and size (anterior up to 4x4cm, posterior 1cm). Bulging anterior fontanelle are common for meningitis.
- Caput succedaneum- diffuse edematous swelling extend across the suture lines.
- Cephalhematoma is a subperiosteal hemorrhage never across the suture lines, secondary to traumatic delivery or forceps



Eyes examination

- Assess for presence and size of subconjunctival hemorrhages (crescent-shaped hemorrhages adjacent to iris);
- Presence of red reflexes (to rule out cataracts and/or retinoblastoma)
- For healthy newborns are characteristic:
  - fissure vents symmetry
  - transparent cornea
  - living reaction to light
  - convergent strabismus and nystagmus may be unstable horizontal

Ears examination

- Look for an unusual shape or an abnormal position. Low- set ears seen with many congenital anomalies (trisomy 9 and 18 syndromes).
- Preauricular skin tags (papillomas) are benign.
- Microtia is a misshaped dysplastic ear that can be associated with middle ear abnormalities.
- Gross hearing can be assessed when an infants blinks in response to loud noises.

Examination of the mouth

- Examine the hard and soft palates for evidence of a cleft palate.
- Cleft lip/palate is secondary to midline fusion failure.
- Localized macroglossia is usually secondary to congenital hemangiomas; in Beckwith syndrome (associated with gigantism, omphalocele and severe hypoglycemia), Pompe disease (type II glycogen storage disease), and hypoglycemia.
- Micrognathia is an underdeveloped jaw that is seen in Pierre Robin syndrome.
- Frothy or copious saliva is seen in infants with an esophageal atresia.

Neck examination

- Eliciting the rooting reflex causes that infant to turn the head and allows easier examination of the neck.
- Palpate the sternocleidomastoid for a hematoma. Torticollis is a shortening of the sternocleidomastoid muscle that causes the head to go toward the affected side.
- Check the thyroid for thyroglossal duct cysts. A cystic hygroma is the most common neck mass, found laterally or over the clavicles.
- A short neck is seen in Turner, Noonan and Klippel-Feil syndromes.
- Note the integrity of clavicles.

Chest examination

- Note whether the chest is symmetric. An asymmetric chest may signify tension pneumothorax. Check respiratory rate (N=30-60/min). Tachypnea, sternal and intercostal retractions, and grunting on expiration indicate respiratory distress.
- Assess breath sounds bilaterally. Absent or unequal sounds may indicate pneumothorax or atelectasis; presence of bowel sounds indicates a diaphragmatic hernia- an immediate chest X-ray and emergency surgical consultation are recommended.
- Pectus excavatum(funnel chest) is depressed sternum; pectus carinatum (pigeon chest) is a protuberant sternum. Both anomalies may be associated with Marfan and Noonan syndromes
- Barrel chest- increased anteroposterior diameter of the chest, secondary to mechanical ventilation, pneumothorax, pneumonia, or pleural effusion.

Examination of the cardiovascular system

- Check heart rate (N=110-160 beats/min), note presence of murmurs, gallops or irregular heart rates. Palpate the femoral pulses (absence or delayed indicate aortic arch abnormalities).
- Murmurs best heard over upper left sternal border suggest PDA, ASD, congenital aortic stenosis, its may radiate to the left clavicle and neck.
- Systolic murmurs detected on down left sternal border are common for VSD, tetralogy of Fallot, coarctation of aorta, transposition of the great vessels with VSD.
- A systolic murmur along the left sterna border are typically for tricuspid atresia, Ebstein disease, truncus arteriosus, pulmonary venous return anomalous.
- A diastolic murmur in newborns may be present in combination with systolic in Ebstein disease.

Digestive system examination

- Inspect abdomen obvious defects: omphalocele, in which the intestine are covered by peritoneum , the umbilicus is central located; gastroschisis in which the intestine are not covered by peritoneum; or exstrophy of the bladder, in which the bladder protrudes out.
- Auscultation- listen for bowel sounds.
- Palpation- check the abdomen for distention, tenderness, or masses. The liver palpate 1-2cm below the costal margin and the spleen tip at the costal margin. Hepatomegaly can be seen with congestive heart failure, hepatitis, or sepsis. Splenomegaly in cytomegalovirus, rubella infections or sepsis.
- Check for patency of the anus, pass meconium within 48h of birth for term baby, premature usually delayed in passing meconium.

Genitalia and urinary system

- Kidney size may be increased with polycystic disease, renal vein thrombosis, or hydronephrosis. Abdominal masses are more commonly related to the urinary tract.
- Examination the external genitalia: girls- inspect clitoris and labia, presence of mucosal tag or blood discharge from the vagina, secondary to maternal estrogen withdrawal. Boys- assess size (N>2.5cm), shape, and position of urinary meatus, palpate for descended testes (retractile testes are normal).

Examination of the trunk and spine

- Check for any gross defects of the spine: abnormal pigmentation, swelling, or hairy patches over the lower back increase the suspicion that spinal abnormality exists.
- A sacral or pilonidal dimple may indicate a small meningocele or other anomaly. Sacral dimples below of the gluteal cleft are benign.
- Evaluate for congenital hip dislocation by using the Ortolani maneuver. Place the baby in the frog-leg position. Adduct the hips by using the middle finger to apply gentle inward and upward pressure over the greater trochanter . A click of reduction and a click of dislocation are elicited in infants with hip dislocation. If this disorder is suspected, imaging studies and orthopedic consultation are indicated.

Examination of the limbs

- Evaluate baby`s arms or legs move asymmetrically.
- Baby cries when a leg, arm, or shoulder is touched or moved
- Bone is displaced from its normal position.
- Club foot (foot is twisted out of shape or position; e.g. heel is turned inward or outward from the midline of the leg).
- Assesses digit number and shape, palmar creases. A single transverse palmar crease is seen in Down syndrome.
- Syndactyly and polydactyly associated with strong family history.

HOW appreciate reflexes

- It is recommended that each reflex Triple research.
- Reflex normal - reflex amplitude in all three cases is the same or slightly lower in the 3-ed assessment.
- Low reflex - initial amplitude is low and remains on three test cases or whether decreases in subsequent tests.
- Exhausted reflex - normal reflex amplitude first test with the following test decrease or disappearance of reflex. In contrast, high-reflex amplitude or increase the extent of testing proves they reflex growth.

Primary reflexes

- Rooting reflex. Stroke the lip and the corner of the cheek with a finger and the infant will turn in that direction and open the mouth.
- Glabellar reflex (blink reflex). Tap gently over the forehead and the eyes will blink.
- Grasp reflex (palmar grasp). Place a finger in the palm of the infant`s hand and he grasp the finger.
- Neck-righting reflex. Turn the infant`s head to the right or left, and movement of the contralateral shoulder obtained in the same direction.
- Check Moro reflex by slightly dropping the head while supporting the infant`s buttocks. This cause symmetrical abduction of both arms.

Primary reflexes (continue)

- Plantar grasp- when one strokes the ball of the foot, the toes will curl.
- Placing reflex- infant places foot on examining surface when dorsum of foot is brought into contact with the surface.
- Tonic neck- supine the infant, turning of the head results in ipsilateral extension of the arm and leg in “fencing” position.
- Parachute reflex- when the infant sitting, tilting to either side results in extension of the ipsilateral arm in a protective fashion.

Peripheral nerves injury

- Brachial plexus injuries involve damage to the spinal nerves that supply the arm, forearm and hand.
- Erb-Duchenne paralysis (upper arm paralysis) involves injury to the fifth andsixth cervical nerves.
- Klumpke paralysis (lower arm paralysis) involves the seventh and eighth cervical nerves and the first thoracic nerve.
- Facial nerve palcy- intrauterine position or forceps can cause compression of seventh cranial nerve.
- Phrenic nerve injury occur secondary to a brachial plexus injury. It cause paralysis of the diaphragm leading to respiratory distress.

Principles of newborn feeding

- Criteria for initiating infant feeding: term healthy infants should be breast-fed as soon as possible within the first hour
- No history of excessive oral secretion, vomiting, or bilious-stained gastric aspirate.
- Non distended soft abdomen with normal bowel sounds. If the abdominal examination is abnormal, an abdominal X-ray indicate. Human milk is preferred for feeding ter, preterm, and sick infants.

Selected References

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