



# Physical Assessment of the Newborn

*Part 2 of 2: Inspection  
through Palpation*

Debbie Fraser Askin, MN, RNC



## Objectives

Upon completion of this activity, the learner will be able to:

1. Outline the elements of a head-to-toe inspection of a newborn.
2. Describe the technique of palpation as it applies to newborn physical assessment.
3. Discuss the importance of accurately recording the findings of a newborn assessment.

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*Debbie Fraser Askin, MN, RNC, is an associate professor in the faculty of nursing, University of Manitoba, Winnipeg, Manitoba, Canada. She reports no conflict of interest or financial relationship relevant to this article.*

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## INTRODUCTION

As described in the previous article in this series, “Physical Assessment of the Newborn, Part 1: Preparation through Auscultation,” physical assessment is a critical means of gathering data about the well-being of the newly born infant. After gathering a comprehensive history, the examiner will have the data necessary to carry out a well-organized, thorough, focused examination. The examination must be well-organized both to prevent omission but also to ensure minimal stress and heat loss for the still fragile newborn.

This article will pick up the examination following collection of the history, general observations and auscultation (covered in Part 1), which should be carried out before the infant is disturbed. The next area of consideration is a review of each body system while utilizing a combination of observation and palpation. The final steps include an assessment of reflexes, deep palpation of the abdomen, and maneuvers to assess the hips. After completion of the assessment, the health care provider must record the findings in a concise and organized fashion, using language that allows other care providers to interpret the findings.

## ASSESSING GESTATIONAL AGE

Throughout the physical assessment, various characteristics will be observed that will help to establish or confirm the newborn’s gestational age. A complete discussion of gestational age assessment is beyond the scope of this article; however, some examples of characteristics found in infants of varying gestational ages are provided in Box 1. (For a more complete discussion of gestational age assessment, visit [http://www.ballardscore.com/intro\\_overview.htm](http://www.ballardscore.com/intro_overview.htm).)

## INSPECTION

### *Skin*

Begin by looking at the skin color and texture, noting any bruising, petechiae or lacerations that may have resulted from the birth process. A healthy newborn is centrally pink (lips and mucous membranes), although acrocyanosis (blue hands and feet) is common and a normal finding in the first few days of life. In less mature infants, the skin may be thinner or more translucent in appearance with more veins visible (see Box 1). A post-mature infant often has cracked or peeling skin, especially on the hands or feet.

**BOX 1 ASSESSMENT OF GESTATIONAL AGE**

EXTERNAL CHARACTERISTIC	28 WEEKS	32 WEEKS	36 WEEKS	40 WEEKS
<b>Skin</b>	smooth, red-pink, veins visible	smooth, pink, few veins visible	smooth, pink	cracking, pale pink
<b>Breast tissue</b>	flat areola, no bud	stripped areola, scant bud	3–4 mm bud palpable	5–10 mm bud palpable, areola raised
<b>Ear cartilage</b>	pinna flat, remains folded	pinna soft, remains folded	pinna firm, springs back into place when folded	pinna firm, instant recoil
<b>Lanugo</b>	abundant	thinning	on shoulders, upper back	little on shoulders
<b>Male genitalia</b>	testes high in canal, scrotal surface smooth	testes descending, a few scrotal rugae	testes high in scrotum, more scrotal rugae	testes descended, scrotum pendulous, covered in rugae
<b>Female genitalia</b>	prominent clitoris with small labia minora	prominent clitoris, enlarging labia minora	labia majora more prominent, labia minora small	clitoris and labia minora covered by labia majora
<b>Plantar surface of foot</b>	scant anterior creases	1/3 anterior creases	sole has creases	creases over the entire sole

Sources: Ballard, et al., 1991; Gardner & Johnson, 2006

A fetus that spent time in meconium-stained amniotic fluid may have yellow- or green- stained skin, particularly the cord or finger nails. Excessive pallor and jaundice are both abnormal findings in the first day of life.

Observe the infant for birthmarks or transient benign skin findings, as well as any rashes or lesions that may indicate the presence of infections. There are a number of common skin findings that will be noted in the newborn. These are listed in Box 2.

### *Head and Neck*

The shape of a newborn's head is largely dictated by molding that occurs during passage through the birth canal (Furdon & Clark, 2001). Some asymmetry is expected with a vertex presentation, but this usually resolves in the first few days of life. Significantly overlapping or widened sutures require further investigation, as do depressions or areas of softening of the skull. Soft tissue swelling and bruising over the presenting part (caput succedaneum) is a common finding in a vertex delivery. Another type of swelling noted over the skull is a cephalohematoma, which results from bleeding between the periosteum and the

cranial bones. Unlike caput, which spreads over the presenting portion of the skull, a cephalohematoma is bounded by the suture lines. A cephalohematoma may not be evident immediately, but will increase in size after birth (Creehan, 2001). It is also relatively common but should be monitored for the presence of an underlying skull fracture and its contribution to the development of hyperbilirubinemia.

Normally, a term infant has a head circumference of 32 to 38 cm with the head circumference approximately 2 cm larger than the chest circumference (Gardner & Johnson, 2006). Plot measurements on a validated growth charts and compare with norms for the infant's gestational age (validated growth charts are available from <http://www.cdc.gov/growthcharts/>).

Palpate the anterior and posterior fontanel for size and bulging or depression. The anterior fontanel is diamond shaped and usually 4 to 5 cm, while the posterior fontanel is triangular and measures 0.5 to 1 cm (Creehan, 2001). A third fontanel (located between the anterior and posterior fontanel) is sometimes palpated and may be a normal finding or associated with Down syndrome (Gardner & Johnson, 2006). Note the texture and distribution of the hair

## BOX 2 NEWBORN SKIN FINDINGS

FINDING	DESCRIPTION	SIGNIFICANCE
<b>Milia</b>	White pinpoint papules of keratogenous material usually over forehead, nose or chin	Last several weeks, no clinical significance
<b>Miliaria</b>	Pinpoint vesicles on forehead, scalp and skin folds	Plugged sweat glands; usually disappear within one week
<b>Café au Lait spots</b>	Pale-brown, nonraised, irregular borders	More than six or larger than 3 cm associated with neurofibromatosis
<b>Mongolian spots</b>	Purple-black spots usually over buttocks or lower back; more common in dark-skinned races	Can be mistaken for bruising; important to document presence at birth
<b>Erythema toxicum</b>	Raised yellow pustules over erythematous base; fades in and out	Pustules contain eosinophils; no clinical significance
<b>Strawberry hemangioma</b>	Raised, bright red irregular lesion	Increases in size, then undergoes spontaneous involution; more common in premature infants
<b>Nevus flammeus</b>	Non-raised deep red lesion; does not blanch with pressure	May fade but doesn't resolve; port wine stains over the trigeminal nerve area associated with underlying hemangiomas (Sturge-Weber Syndrome)
<b>Nevus simplex</b>	Stork bite on back of the neck; angel's kiss on the bridge of the nose; blanch with pressure	Usually fade and disappear
<b>Pustular melanosis</b>	Small vesicular pustules, generally present at birth; intact vesicle ruptures to reveal a pigmented macule	Benign finding

Sources: Furdon & Benjamin, 2004; Gardner & Johnson, 2006; Witt, 2003

and examine the scalp for any defects or injuries such as punctures or lacerations.

Look at the symmetry and overall development of the face and note the relationship of the eyes, nose, ears and mouth to one another (Johnson, 2003). Examine the eyes for spacing, shape and the presence of upward sloping or epicanthal folds. This portion of the exam is best done with the baby in a quiet alert state. Spontaneous eye opening can be achieved by gently tipping the baby's head back and raising the head slowly (Gardner & Johnson, 2006).

Subconjunctival hemorrhage is sometimes seen and resolves spontaneously. Eye discharge is not normally present and should be further assessed. Evaluate the eyes for pupil size, shape, equality and reactivity to light (PERRL = pupils equal, round, reactive to light). Check the eyes with an ophthalmoscope to

note the presence or absence of the red reflex. An absent red reflex should be further investigated as a possible indication of cataracts or tumors (Gardner & Johnson 2006). A newborn infant is capable of fixing and following a light source; however, uncoordinated movements are common (Gardner & Johnson, 2006) as is strabismus, a cross-eyed appearance.

Examine the ears for shape, structure and location. The amount of ear cartilage can be used to gauge gestational age (see Box 1). The newborn ear is also an important marker for several issues, including hearing loss, renal development and genetic syndromes. The presence of skin tags or pits anterior to the tragus have been correlated with an increased risk of renal anomalies (Spilman, 2002). Misshapen ears alert the examiner to the need for hearing evaluation and renal imaging.

Low-set ears are a common finding in a number of genetic syndromes. Evaluate the position of the ear by drawing a line from the inner canthus of the eye to the outer canthus and across to the ear. The top of a normally positioned ear should fall at or above this line. Ears that sit below this imaginary line are considered low-set.

Evaluate the nose for shape and patency. Shape may be affected by the infant's position *in utero* as well as by the birth process. Patency is best checked by placing a cold metal object such as a stethoscope or reflex hammer under each nare, and watching for the presence of condensation (Furdon & Benjamin, 2004).

Examine the lips for fullness and also for the presence of cyanosis or clefts. Using a gloved finger, feel the hard and soft palate, looking for the presence of a cleft. At the same time check the rooting and sucking reflexes (see Box 3). Epstein pearls, small white cysts containing keratin, are commonly found on either side of the median line of the palate. The presence of natal teeth should be noted and the size and shape of the tongue and chin should be evaluated.

The newborn's neck is normally short, but excessive shortness is a characteristic finding in some syndromes. Examine the neck for the presence of redundant skin or a posterior fat pad. Palpate the neck for masses and assess for full range of motion. The newborn's thyroid gland is not normally felt unless it is enlarged (Johnson, 2003). Likewise, lymph nodes are not normally palpable in the newborn and, if felt, may indicate congenital infection.

### *Thorax*

Auscultation of the heart and lungs is addressed in Part 1 of this series. Inspection of the chest includes observing the shape, symmetry, and quality of chest movement. Asymmetrical chest movements may indicate pneumothorax or congenital defect (Gardner & Johnson, 2006). Pay special attention to newborns born through meconium-stained amniotic fluid to assess for signs of respiratory distress. Retractions, grunting, and nasal flaring are abnormal findings indicating respiratory distress. A structural depression of the sternum (pectus excavatum) is considered a benign finding (Hernandez & Glass, 2003).

Examine the newborn's breasts for placement and development. Normally the distance between the nipples is less than 25 percent of the chest circumference (Hernandez & Glass, 2003). Supernumerary nipples are occasionally seen in a medial line below the true

nipple; these usually fade over time. In white infants, supernumerary nipples may be linked to congenital anomalies (Seidel, Ball, Dains, & Benedict, 2006). Palpation of the breast in a term infant yields a finding of a 1- to 2-cm bud of breast tissue, whereas the premature infant will have absent breast buds and a flattened areola (see Box 1). The infant's breasts may be enlarged at birth because of the influence of maternal hormones and may secrete a white liquid known as "witch's milk" (galactorrhea). This finding usually resolves after 1 to 2 weeks.

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### *Cardiovascular System*

Inspect the cardiovascular system by observing skin and mucous membrane color. Through palpation, locate and note the point of maximal impulse (PMI) where the heartbeat is most prominent. Palpate the femoral pulses to assess quality and equality. Bounding pulses may indicate patent ductus arteriosus, whereas absent or decreased pulses may occur with coarctation of the aorta (Vargo, 2003). Assess the capillary refill time by pressing the skin over a bony prominence for one second. Release and watch for the return of color. A delay of reperfusion of greater than 2 to 3 seconds is considered a reflection of reduced perfusion (Hernandez & Glass, 2003).

### *Abdomen*

Assess the shape and symmetry of the abdomen. A newborn's abdomen is normally rounded and protrudent compared with the chest. Excessive fullness or distension requires further evaluation. Observe the abdomen for the presence of visible peristalsis, which is a sign of obstruction, and also for visible masses. Occasionally newborns may have separation of the diastasis or separation of the rectus abdominus muscle between the xiphoid and the umbilicus

with mild herniation of the underlying tissue (Goodwin, 2003).

Inspect the umbilical cord for the presence of three vessels (i.e., two arteries and one vein). A broad or enlarged cord should be evaluated for the presence of bowel tissue in the cord (omphalocele). A very thin or dry umbilical cord is often seen in growth-restricted infants, while a thick cord may be found in large-for-gestational age infants (Creehan, 2001).

### *Genitalia*

The presence of normal male or female genitalia is evaluated. In males, examine the glans of the penis, noting any swelling or discharge and the location of the urethral meatus. Hypospadias (urethral opening on the underside of the glans) is more common than epispadias (urethral opening on the upper surface of the penis), and is less likely to be accompanied by other genitourinary abnormalities. The foreskin is not normally retractable in a newborn and should not be pulled back for the examination. Note the

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presence of chordee (a bending or bowing of the penis) and any gaps in the foreskin (natural circumcision). Normal penile length in a term infant is 2.5 to 3.5 cm (Hernandez & Glass, 2003).

Changes in the male genitalia occur in a predictable pattern with advancing gestational age (see Box 1). Observe the scrotum for the presence of swelling or bruising, which may result from birth trauma in a breech delivery. Scrotal swelling may also occur with testicular torsion (a rare finding), inguinal hernia, blood (hematoma), or fluid (hydrocele) in the scrotal sac (Benjamin, 2002). The presence of a hydrocele (the more common finding) can be confirmed by using a pen-light or small flashlight to transilluminate

the scrotum. A hydrocele will transmit light, causing the scrotal sac to appear translucent. Blood or tissue in the sac will not transmit light. Testicular torsion presents as a firm swollen and erythematous scrotal sac, whereas hydrocele is a painless collection of fluid (Cavaliere, 2003).

After the scrotum is inspected, it should be palpated to detect the testes, which have normally descended into the scrotum in a term infant. Palpation is performed by sweeping the finger of one hand down the groin while gently grasping the scrotal sac in the other hand, looking for the almond-shaped testicle, then repeating on the other side.

In females, the genitals are examined for the size and location of the external genital structures and for the position of the urethral meatus. Like male genitalia, the female genitalia also undergo considerable change over the course of gestation (see Box 1) and examination findings should be considered relative to the infant's gestational age. For example, a prominent clitoris at 28 weeks would be an expected finding but abnormal in a term infant. A white discharge may be seen at the vaginal opening and, in some infants, a small amount of bleeding may be present a few days after birth as a result of the withdrawal of maternal hormones. Hymenal tags are common and a normal finding (Furdon & Benjamin, 2004).

As part of the examination of the genital region, note the position and patency of the anus. Rigid objects such as a thermometer should not be inserted into the anal vault to assess patency (Gardner & Johnson, 2006). Visual inspection of the anal opening is sufficient at the initial examination and until such time as symptoms warrant further investigation. The presence of skin tags or fissures around the anus should also be noted.

### *Musculoskeletal System*

Examine the arms and legs, noting the presence of muscle mass and comparing each extremity for symmetry in length and development. Assess the range of motion of each extremity. Evaluate the hands, noting the presence of a simian crease, extra digits (polydactyly), fused digits (syndactyly) or abnormally shaped fingers (clinodactyly). Assess the ankles and feet for positional or structural abnormalities. The presence of plantar creases is useful in determining gestational age (Box 1).

Place the baby prone and inspect the back, noting the curvature of the spine and the presence of masses, dimples or tufts of hair along the spine. Examine

**BOX 3 NEWBORN REFLEXES**

REFLEX	DESCRIPTION	TIME OF DISAPPEARANCE
<b>Moro or startle</b>	In response to sudden movement or loud sounds the baby extends his or her arms and legs	5–6 months
<b>Root</b>	Stroking the corner of the newborn's mouth results in the baby turning toward the stimulus and opening his/her mouth	3–4 months
<b>Suck</b>	Placing a finger or object in the baby's mouth will illicit sucking	12 months
<b>Palmar Grasp</b>	Placing an object in or stroking the palm of the baby's hand will result in the baby closing his/her fingers in a grasp	2–3 months
<b>Babinski</b>	Stroking the bottom of the foot results in extension or flexion of the toes	12 months
<b>Tonic Neck Reflex</b>	Turning the baby's head to one side results in the arm on that side stretching out and the opposite arm bending at the elbow	6–7 months
<b>Stepping</b>	When foot is placed on the edge of the bed the infant will lift foot and step forward	2–3 months
<b>Incurving reflex</b>	Stroking the infant's back parallel to the spinal column results in the baby's back curving toward the stimulus	3–4 months

Source: Carey, 2003

the thigh creases for symmetry; asymmetrical thigh creases are found in the presence of developmental dysplasia of the hip (Furdon & Benjamin, 2004). While the infant is prone, assess the infant's ventral tone and incurving reflex (see Box 3).

### Neurologic System

Throughout the assessment, information has been collected that contributes to the assessment of the infant's neurological status. For example, the infant's cry, tone and state can be observed at the outset and throughout the examination as is the infant's response to handling. A brief neurologic assessment can be performed by evaluating the infant's primitive reflexes. These are outlined in Box 3. A more complete neurologic assessment is usually reserved for newborns with dysmorphic features or those with complications.

## PALPATION

Following observation, auscultation and inspection, the more invasive maneuvers of assessment can be

completed; these include palpation of the abdomen and assessment of the hips.

### Abdomen

In palpating the abdomen, both light and deep palpation can be used. In newborns, the liver edge is usually 1 to 3.5 cm below the right costal margin (Hernandez & Glass, 2003). To locate the liver, begin in the right lower quadrant and, using light pressure, move the pad of the finger upward until the liver edge is felt. It's important to be gentle in palpating the liver, because vigorous pressure can result in injury (Davies, 1997). Repeat the same maneuver on the left side of the abdomen in an attempt to palpate the spleen. The spleen is not usually felt unless it is enlarged (Hernandez & Glass, 2003). Note the presence of any other abdominal masses.

To assess the newborn's kidneys, place one hand behind the infant on the flank. Using firm pressure with the other hand, press down over the flank area and note the presence of a 4.5 to 5.0 cm mass

representing the kidney. The kidneys are most readily felt in the delivery room before the bowels fill with air. The right kidney is normally located lower than the left (Goodwin, 2003). Perinatal nurses often perform only light palpation to assess the abdomen for masses, leaving the more detailed examination to the primary care provider (Creehan, 2001).

### Hips

It is important to detect the presence of developmental dysplasia of the hip as early as possible so that appropriate corrective measures can be taken. There are several techniques that are useful in identifying hips that are either dislocated or “dislocatable.” One observational technique looking at the symmetry of the infant’s thigh creases was described in the muscu-

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loskeletal section. A second observation can be made by placing the infant in a supine position with feet flat on the bed and knees flexed. Look at the infant’s knees and note any leg length discrepancy, the presence of which can indicate a dislocated hip in the longer leg. This technique is not valid in the presence of bilateral hip dislocation. These observations should be followed up with further screening.

Two additional techniques for hip assessment have been described: Barlow’s and Ortolani’s maneuvers. In some institutions these maneuvers are performed by registered nurses and in other settings they may be reserved for the primary health care provider. The Barlow maneuver is done by grasping the infant’s knee and gently applying downward pressure pushing the knee toward the hip while adducting the leg. An unstable hip will be dislocated with this maneuver and will produce a palpable “clunk” (French & Dietz, 1999). Ortolani’s test is done by stabilizing one hip while abducting the other thigh and gently

pulling it anteriorly. A dislocated hip will produce a palpable “clunk” as it moves back into the joint with this maneuver (French & Dietz, 1999).

## DOCUMENTING ASSESSMENT FINDINGS

It’s critical that information collected during an infant’s physical assessment be documented in a clearly organized fashion using language that is common to all care providers. Most institutions or health care organizations have developed standardized forms or formats for this purpose. Ensure that all of the documentation is correct and complete. This will enable other health care providers to base follow-up examinations on the initial assessment or to accurately evaluate the infant should complications arise. As a final step in the physical examination, appropriate monitoring and follow-up should be arranged when warranted by findings from the history or physical assessment.

## SUMMARY

Collection of a timely and accurate history is the first step in completing a newborn’s physical assessment. Risk factors noted in the health history will direct the examiner to pay particular attention to the relevant physical findings and will ensure that findings are interpreted in view of the infant’s history. The physical assessment, when carried out in an organized and timely manner, will ensure that any abnormalities or complications that may be present are identified and the infant is referred for appropriate intervention. A thorough base-line assessment with identification of relevant variations of normal sets the stage for the infant’s ongoing health care. **NWH**

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## Get the Facts

For further information on newborn assessment, newborns in general, and neonatal nursing, visit these sites:

Academy of Neonatal Nursing  
<http://www.academyonline.org>

Association of Women's Health, Obstetric and Neonatal Nurses  
<http://www.awhonn.org>

American Academy of Pediatrics  
<http://www.aap.org>

Canadian Paediatric Society  
<http://www.cps.ca>

Centers for Disease Control and Prevention: Newborn Screening  
[http://www.cdc.gov/nceh/dls/newborn\\_screening.htm](http://www.cdc.gov/nceh/dls/newborn_screening.htm)

March of Dimes  
<http://www.marchofdimes.com>



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# Post-Test Questions

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1. Which of the following skin findings is abnormal in the first 24 hours of life?
  - a. acrocyanosis
  - b. erythema toxicum
  - c. jaundice
2. An absent red reflex is found in which of the following conditions:
  - a. cataracts
  - b. Down syndrome
  - c. subconjunctival hemorrhage
3. The finding of a stippled areola with a scant breast bud is consistent with a gestational age of:
  - a. 28 weeks
  - b. 32 weeks
  - c. 36 weeks
4. Café au lait spots are of concern when they:
  - a. appear at birth
  - b. are bigger than 3 cm
  - c. are located over the eyes
5. The Babinski reflex normally disappears at what age?
  - a. 3 months
  - b. 6 months
  - c. 12 months

6. The presence of skin tags or pits in front of the ear should prompt an evaluation of the:
- heart
  - kidneys
  - spine
7. Bounding femoral pulses are found with:
- coarctation of the aorta
  - hypovolemia
  - patent ductus arteriosus
8. The skin of a newborn of 40 weeks gestational age should be:
- cracking, pale pink
  - smooth, pink
  - smooth, red-pink, with veins visible
9. The ear cartilage of a newborn of 40 weeks gestational age should have which of the following characteristics?
- a firm pinna that remains folded
  - a firm pinna with instant recoil
  - a flat pinna that remains folded
10. When does the suck reflex disappear?
- 2 months
  - 6 months
  - 12 months
11. In newborns, where is the liver edge usually located?
- 0.5 to 1 cm below the right costal margin
  - 1 to 3.5 cm below the right costal margin
  - 3 to 5 cm below the right costal margin
12. When may acrocyanosis be a common and normal finding?
- the first few days of life
  - the first few weeks of life
  - the first few months of life
13. A term infant's head circumference is normally how much larger than its chest circumference?
- 1 cm
  - 2 cm
  - 3 cm
14. Abdominal palpation of the newborn should be:
- avoided for the first 24 hours after birth
  - deep with vigorous pressure
  - gentle with light and deep palpation
15. Correct and complete documentation of findings collected during the assessment ensures that:
- medical malpractice is avoided
  - other health care providers have accurate information on which to base follow-up
  - parents are appropriately educated about potential complications that may arise

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