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ASSESSING THE GESTATIONAL AGE

17-A ASSESSING GESTATIONAL AGE BY SIMPLE INSPECTION.

There are a number of easily observable clinical signs that can help you decide whether an infant is term or preterm:

	TERM	PRETERM
Sucks well.	Yes	No
Flexes arms and legs.	Yes	No
Veins seen under skin.	No	Yes
Nipple clearly seen.	Yes	No
Palpable breast bud.	Yes	No
Descended testes.	Yes	No
Covered labia minora.	Yes	No

Post term infants can usually be recognised by their long finger nails. With experience, most preterm infants can be identified by their general appearance on clinical inspection.

17-B SCORING GESTATIONAL AGE.

To obtain a more accurate idea of the gestational age, the Ballard scoring method can be used. The accuracy of the method depends on the experience of the examiner. With practice and careful attention to detail, the infant's true gestational age can be estimated with an accuracy of about 2 weeks. If the scored age is within 2 weeks of the gestational age suggested by the mother's dates, then accept her dates as correct. However, if the scored age is more than 2 weeks higher or lower than the mother's dates, then her dates are probably incorrect and the scored age should be used. The scored gestational age can also be used to decide whether the gestational age, determined by obstetric assessment, is correct or not.

Other scoring methods such as the Finnstrom method and the Dubowitz method can also be used.

17-C USE OF THE BALLARD METHOD.

The Ballard scoring method uses both neurological features and external features. The descriptions given below describe how to assess the features illustrated in figure 17-A. Each feature is given a score and these scores are added up to give a final score. This final score can be converted to an estimated gestational age by consulting the table in figure 17-A. Where possible, examine both the left and right sides of the body when doing the Ballard score and give the average score observed on either side. Half scores can be used.

NEUROLOGICAL FEATURES

All 6 neurological features are assessed with the infant lying supine (the infant's back on the bed). The infant should be awake but not crying.

POSTURE: Handle the infant and observe the position of the arms and legs. More mature infants (with a higher gestational age) have better flexion (tone) of their limbs.

- Score 0 if both arms and legs are fully extended.
- Score 1 if there is slight flexion of the legs only.
- Score 2 if there is moderate flexion of the legs.
- Score 3 if the legs are flexed to 90° and the arms are partially flexed.
- Score 4 if all limbs are fully flexed against the body.

SQUARE WINDOW: Gently press on the back of the infant's hand to push the palm towards the forearm. Observe the degree of flexion. More mature infants have greater wrist flexion.

- Score 0 if the wrist can only be flexed to 90° only, giving the appearance of a "square window".
- Score 1 if the wrist can be flexed to 60° .
- Score 2 if the wrist can be flexed half way to the forearm.
- Score 3 if the wrist can be flexed to 30° .
- Score 4 if the palm of the hand can be pressed against the arm.

ARM RECOIL: Fully bend the arm at the elbow so that the infant's hand reaches the shoulder, and keep it flexed for 5 seconds. Then fully extend the arm by pulling on the fingers. Release the hand as soon as the arm is fully extended and observe the degree of flexion at the elbow (recoil). Arm recoil is better in more mature infants. Note that a score of 1 is not given.

- Score 0 if there is no arm recoil at all.
- Score 2 if there is some arm recoil.
- Score 3 if the arm recoil is good and the arm is flexed half way back to the shoulder.
- Score 4 if there is a brisk arm recoil and the infant pulls the arm back almost to the shoulder.

POPLITEAL ANGLE: With your one hand hold the infant's knee against the abdomen. With the index finger of the other hand gently push behind the infant's ankle to bring the foot towards the face. Observe the angle formed behind the knee by the upper and lower legs (the popliteal angle). More mature infants have less extension of the knee.

- Score 0 if the leg can be fully extended to form an angle of 180° .
- Score 1 if there is some limitation to full extension of the leg.
- Score 2 if the knee can only be extended to 130° .
- Score 3 if the knee can be extended just beyond 90° .
- Score 4 if the knee can be extended to 90° .
- Score 5 if the knee cannot be extended to 90° .

SCARF SIGN: Take the infant's hand and gently pull the arm across the front of the chest and around the neck like a scarf. With your other hand gently press on the infant's elbow to help the arm around the neck. In more mature infants the arm cannot be easily pulled across the chest.

- Score 0 if the arm can be wrapped tightly around the neck (like a scarf).
- Score 1 if the elbow can only be pulled well across the chest but not fully wrapped around the neck.
- Score 2 if the elbow reaches the other side of the chest but cannot be pulled beyond the chest.
- Score 3 if the elbow can only reach the midline of the chest.
- Score 4 if the elbow cannot be pulled as far as the midline.

HEEL TO EAR: Hold the infant's toes and gently pull the foot towards the ear. Allow the knee to slide down at the side of the abdomen. Unlike the illustration, the infant's pelvis may be allowed to lift off the bed. Observe how close the heel can be pulled towards the ear. More mature infants have less flexion of the hips and, therefore, you cannot bring the heel towards the ear.

- Score 0 if the heel can easily be pulled to the ear.
- Score 1 if the heel does not quite reach the ear.
- Score 2 if the heel can be pulled most of the way to the ear.
- Score 3 if the heel can be pulled half way to the ear.
- Score 4 if the heel cannot not be pulled half way to the ear.

EXTERNAL FEATURES

Six external features are examined. The infant has to be turned over to examine the amount of lanugo. If the infant is too sick to be turned over, then the amount of lanugo is not scored.

SKIN: Examine the skin over the front of the chest and abdomen, and also look at the limbs. More mature infants have thicker skins.

Score 0 if the skin appears very thin, red, transparent and gelatinous (jelly-like).

Score 1 if the skin is thin and smooth with many small blood vessels visible.

Score 2 if the skin is thicker with only a few blood vessels seen. Fine peeling of the skin is often noticed, especially around the ankles.

Score 3 if the skin is pale and slightly dry with only a few bigger blood vessels seen.

Score 4 if the skin is dry and cracked with no blood vessels visible.

Score 5 if the skin is very thick and looks like leather.

LANUGO: This is the fine, fluffy hair that is seen over the back of small infants. Except for very immature infants that have no lanugo, the amount of lanugo decreases with maturity.

Score 0 if no lanugo is seen. These are very small infants.

Score 1 if the lanugo is thick and present over most of the back.

Score 2 if the lanugo is thinning, especially over the lower back.

Score 3 if there are bald areas with no lanugo.

Score 4 if very little lanugo is seen. These are always bigger infants.

PLANTAR CREASES: Use your thumbs to stretch the skin on the bottom of the infant's foot. Only note creases as very fine wrinkles, that disappear with stretching, are not important. More mature infants have more creases.

Score 0 if there are no creases at all (there may be fine wrinkles).

Score 1 if shallow, red creases are present, especially over the anterior sole.

Score 2 if deeper creases are present on the anterior third of the sole only.

Score 3 if deep creases are present over two thirds of the sole.

Score 4 if the whole sole is covered with deep creases.

BREAST: Both the appearance of the breast and the size of the breast bud are considered. Palpate for the breast bud by gently feeling under the nipple with your index finger and thumb. More mature infants have a bigger areola and breast bud.

Score 0 if the areola (pink skin around the nipple) is very small and difficult to see.

Score 1 if the areola is small and flat, and no breast bud can be felt.

Score 2 if the breast bud can just be felt and the areola is stippled (has fine bumps).

Score 3 if the areola is raised above the surrounding skin and the breast bud is easily felt (3-4 mm).

Score 4 if the areola appears distended and the breast bud is the size of a pea (5-10 mm).

EAR: Both the shape and thickness of the external ear are considered. With increasing maturity the edge of the ear curls in. In addition, the cartilage in the ear thickens with maturity so that the ear springs back into the normal position after it is folded against the infant's head.

Score 0 if the ear is soft and flat and stays folded.

Score 1 if the ear slowly unfolds, and the upper margin of the ear (pinna) has started to curl in.

Score 2 if the upper margin of the ear is well curled and the ear unfolds quickly. Areas of cartilage still feel soft, especially towards the edge of the ear.

Score 3 if the cartilage feels firm throughout the ear, and the ear springs back rapidly if folded.

Score 4 if the ear feels stiff and the whole ear margin is well curled in.

GENITALIA: Male and female genitalia are scored differently. With maturity the testes descend in the male and the scrotum becomes wrinkled. In females the labia majora increase in size with maturity. Note that a score of 1 is not given.

MALES:

Score 0 if the scrotum is very small and smooth with no testes palpable.

Score 2 if there are a few wrinkles (rugae) in the scrotum and one or both testes are felt in the groin.

Score 3 if the testes are in the scrotum and the skin of the scrotum has a lot of wrinkles.

Score 4 if the scrotum hangs low with fully descended testes.

FEMALES:

Score 0 if the labia majora (outer labia) are not formed, leaving the labia minora (inner labia) and clitoris completely exposed.

Score 2 if the labia majora and labia minora are of equal size.

Score 3 if the labia majora are bigger than the labia minora.

Score 4 if the labia majora cover the clitoris and labia.

MEASURING WEIGHT AND HEAD CIRCUMFERENCE

17-D WEIGHING AN INFANT.

The naked infant is weighed, to the nearest 10 g, on a scale. Usually a digital scale is used. If a spring scale is used, it should be standardized with a known weight every month. If possible, the infant should always be weighed on the same scale. The birth weight must be recorded on the infant record card.

**** Measurements made on a spring scale are called weight while measurements recorded with a balance scale are called mass. The result is the same and both are read in grams (g). In this programme all measurement are called weight.*

17-E MEASURING HEAD CIRCUMFERENCE.

The occipito-frontal head circumference is measured with a tape measure or a special plastic head circumference tape to the nearest 1 mm. The largest head circumference must be measured around the forehead and back of the occiput. Usually the head circumference is measured after delivery when the weight is recorded. However, the measurement of head circumference should be postponed for 24 hours if marked moulding or severe caput are present as they may result in an incorrect reading. If possible, the head circumference should be recorded on the infant record card.

The crown-heel length is usually not measured routinely as this is very inaccurate unless a special measuring box is used. Infant length is measured only in special circumstances, e.g. when dwarfism is suspected or for research on growth.

Figure 17-A. The Ballard scoring method.

	-1	0	1	2	3	4	5
Posture							
Square window (wrist)	>90°	90°	60°	45°	30°	0°	
Arm recoil		180°	140-180°	110-140°	90-110°	<90°	
Popliteal angle	180°	160°	140°	120°	100°	90°	<90°
Scarf sign							
Heel to ear							

Physical maturity

Skin	Sticky, friable, transparent	Gelatinous, red, translucent	Smooth, pink; visible veins	Superficial peeling and/or rash, few veins	Cracking pale areas, rare veins	Parchment, deep cracking, no vessels	Leathery, cracked, wrinkled
Lanugo	None	Sparse	Abundant	Thinning	Bald areas	Mostly bald	
Plantar surface	Heel-toe 40-50 mm: -1 <40 mm: -2	>50 mm No crease	Faint red marks	Anterior transverse crease only	Creases anterior 2/3	Creases over entire sole	
Breast	Imperceptible	Barely perceptible	Flat areola, no bud	Stippled areola 1-2 mm bud	Raised areola 3-4 mm bud	Full areola 5-10 mm bud	
Eye/ear	Lids fused loosely: -1 tightly: -2	Lids open; pinna flat, stays folded	Slightly curved pinna; soft; slow recoil	Well-curved pinna; soft but ready recoil	Formed and firm, instant recoil	Thick cartilage, ear stiff	
Genitals: male	Scrotum flat, smooth	Scrotum empty, faint rugae	Testes in upper canal, rare rugae	Testes descending, few rugae	Testes down, good rugae	Testes pendulous, deep rugae	
Genitals: female	Clitoris prominent, labia flat	Prominent clitoris, small labia minora	Prominent clitoris, enlarging minora	Majora and minora equally prominent	Majora large, minora small	Majora cover clitoris and minora	

Maturity rating

Score	Weeks
-10	20
-5	22
0	24
5	26
10	28
15	30
20	32
25	34
30	36
35	38
40	40
45	42
50	44

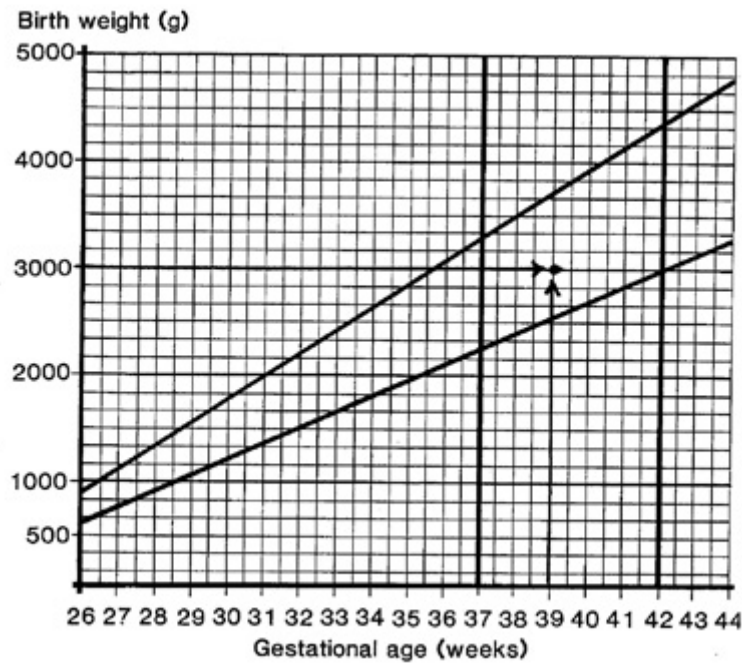
Each separate criteria is given a score after examining that sign on the infant. These separate scores are then added together to give a total score. From the total score the estimated gestational age can be read off the table.

PLOTTING WEIGHT AND HEAD CIRCUMFERENCE FOR GESTATIONAL AGE

17-F PLOTTING WEIGHT FOR GESTATIONAL AGE.

On the chart below an infant's birth weight of 3000 g and gestational age of 39 weeks have been recorded. Note that lines have been drawn from the given weight and gestational age. The weight for gestational age is recorded at the point where these 2 lines meet.

Figure 17-B. Weight for gestational age chart.



Practice plotting weight for gestational age on the above chart by recording the following infants' weight and gestational age. Decide whether each infant is overweight, appropriate weight, or underweight for gestational age. Remember that the centile lines mark the outer limit of the normal (or appropriate) weight for gestational age.

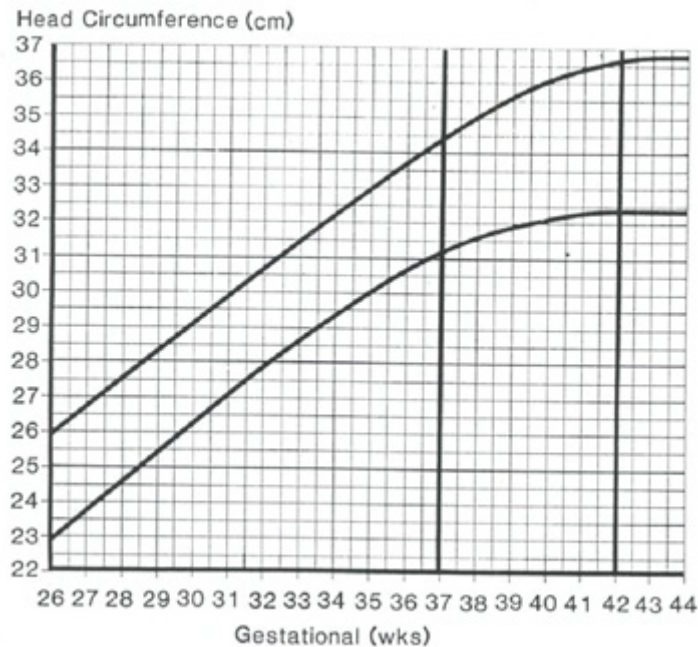
1. Weight 1500 g and gestational age 30 weeks.
2. Weight 1500 g and gestational age 34,5 weeks.
3. Weight 3950 g and gestational age 39 weeks.
4. Weight 4000 g and gestational age 42,2 weeks.
5. Weight 3000 g and gestational age 43 weeks.

17-G PLOTTING HEAD CIRCUMFERENCE FOR GESTATIONAL AGE.

Practice plotting head circumference for gestational age by recording the following infants' head circumference and gestational age on the chart below. Decide whether each infant's head is large, appropriate or small for gestational age.

1. Head circumference 27 cm and gestational age 29,5 weeks.
2. Head circumference 25,5 cm and gestational age 29 weeks.
3. Head circumference 30 cm and gestational age 32 weeks.
4. Head circumference 30 cm and gestational age 35,7 weeks.
5. Head circumference 36 cm and gestational age 38 weeks.

Figure 17-C. Head circumference for gestational age chart.

***** REFERENCES**

1. *The Ballard scoring method - J Pediatr 1991; 119: 41.*
2. *Weight for gestational age chart - Acta Paediatr Scand Suppl 1985; 31: 180.*
3. *Head circumference for gestational age chart - Pediatr Res 1978; 12: 987.*