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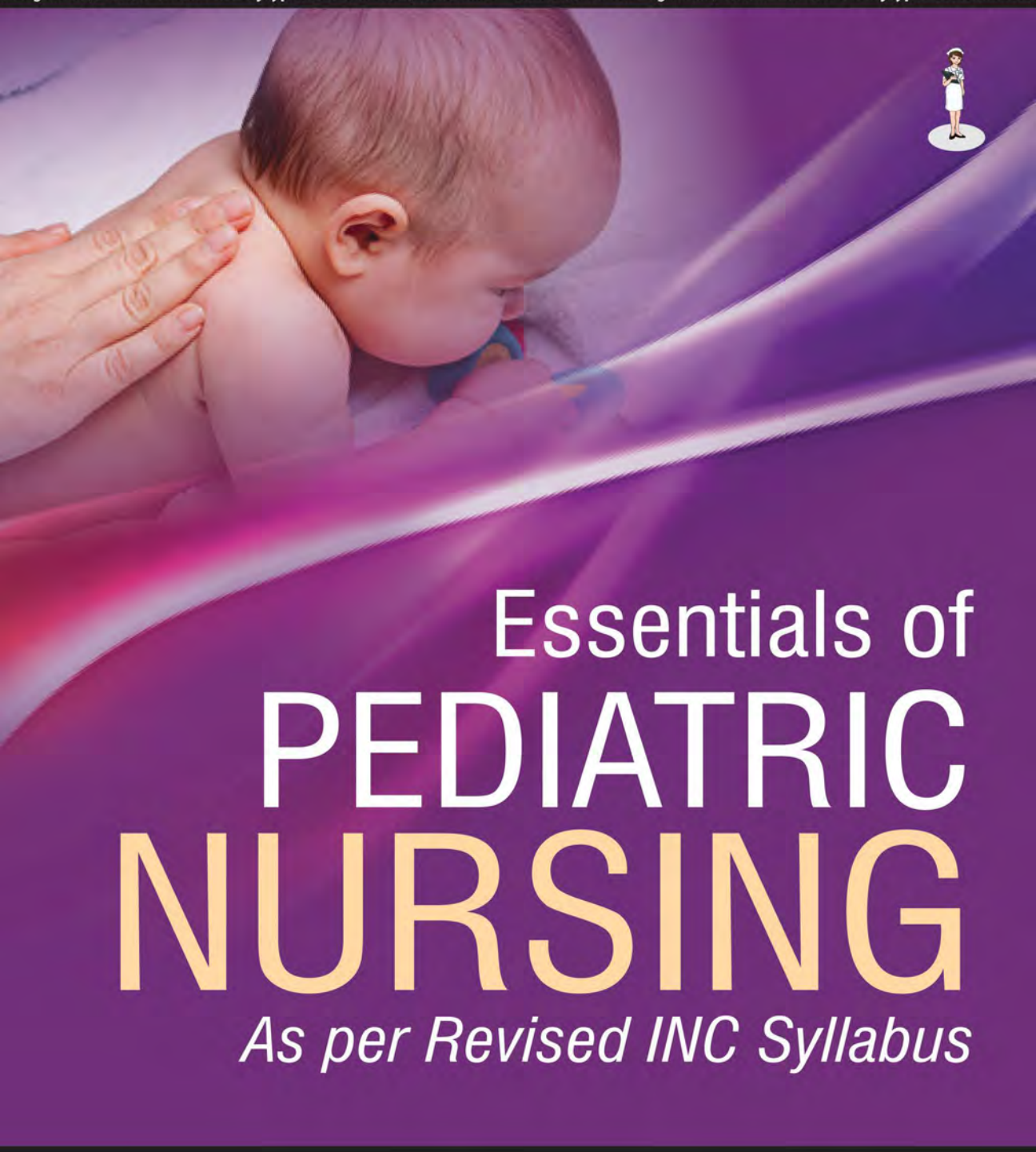

Essentials of PEDIATRIC NURSING

As per Revised INC Syllabus

A Sudhakar

Foreword
M Kandasamy

JAYPEE

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Chapter 2



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- **Organization of Neonatal Care Unit (NICU and PICU)**
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CHARACTERISTICS OF THE NORMAL NEWBORN BABY

Introduction

The nurse is a unique position to care the newborn baby in the stressful transition from a warm, dark, fluid-filled environment to an outside world filled with light, sound, and novel tactile stimuli. During this period of the newborn adjusting from intrauterine to extrauterine life, the nurse must be knowledgeable about a newborn's normal biopsychosocial adaptations to recognize any deviations.

To begin life as an independent being, the baby must immediately establish pulmonary ventilation in conjunction with marked circulatory changes. These radical and rapid changes are crucial to the maintenance of life. All other neonatal body systems change their functions or establish themselves over a longer period of time. The nurse performs an initial assessment to evaluate the neonate, its immediate post birth adaptations, and the need for further support.

Physical Characteristics of Newborn

Temperature Regulation

The newborn baby body temperature drops immediately after birth in response to the extrauterine environment. His internal organs are poorly insulated and his skin is very thin and does not contain much subcutaneous fat. The newborn baby heat regulating mechanism has not fully developed. His temperature rapidly reflects that of his environment. The flexed position that the newborn baby assumes is a safeguard against heat loss because it substantially diminishes the amount of body surface exposed.

Pediatric Nursing implications are centered on regulating an environment to provide constant body temperature of a neutral thermal environment. The newborn baby is placed

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in blankets, hat, and a controlled temperature environment after birth to counteract the drop in body temperature that occurs immediately after birth. After admission to the nursery, the infant is placed in isolation (isolate) and a temperature probe may be used for continuous monitoring. The newborn baby axillary temperature is maintained at 36.4 to 37.2 °C.

- **Pulse:** The normal pulse range for a newborn baby is 120 to 140 beats per minute (bpm). The rate may rise to 160 bpm when the newborn baby is crying or drop to 100 bpm when the infant is sleeping. The apical pulse is considered the most accurate.
- **Blood Pressure:** The average blood pressure (BP) of an infant at birth is 72/42. A drop in systolic BP of about 15 mm Hg the first hour after birth is common. The newborn's BP may be taken with a Doppler blood pressure device. This greatly improves accuracy.
- **Respirations:** The respirations of a newborn baby are irregular in depth, rate, and rhythm and vary from 30 to 60 beats per minute. Respirations are affected by the infant's activity (that is, crying). Normally, respirations are gentle, quiet, rapid, and shallow. They are most easily observed by watching abdominal movement because the infant's respirations are accomplished mainly by the diaphragm and abdominal muscles No sound should be audible on inspiration or expiration.

Characteristics of the Newborn Baby Head

The newborn baby head represents one-fourth of his total body length. Its circumference is equal to that of his abdomen or chest. The average size is 13" to 14" (33–35 cm).

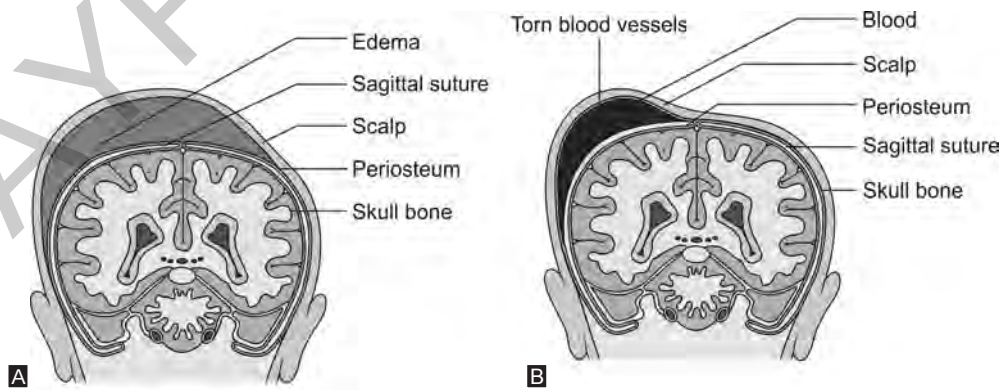
The head is shaped or molded as it is forced through the birth canal in vertex presentations.

Molding

During delivery, for the large head to pass through the small birth canal, the skull bones may actually overlap in a process referred to as molding. Such molding reduces the diameter of the skull temporarily. This elongated look usually disappears a few hours after birth as the bones assume their normal relationships.

Fontanels

The newborn baby skull is separated into six bones one from another along the suture lines. Where more than two bones come together, the space is called a fontanel. This is the



Figs. 2.1 (A and B): A. Cephalophematoma, B. Caput succedaneum

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unossified space or soft spot between the cranial bones of the skull in a newborn baby. The newborn baby pulse is sometimes visible there.

The anterior fontanel is located at the intersection of the sutures of the two parietal bones and the frontal bones. It is diamond-shaped and strongly pulsatile. It normally closes at 9 to 18 months of age.

The posterior fontanel is located at the junction of the sutures of the two parietal bones and one occipital bone. It is small, triangular shaped, and less pulsatile. It normally closes at 1 1/2 to 3 months of age. The anterior fontanel is the large size of the two bones.

Cephalohematoma

This is a collection of blood between a cranial bone and its overlying periosteum. Bleeding is limited to the surface of the particular bone. It is caused by pressure of the fetal head against the maternal pelvis during a prolonged or difficult labor.

This pressure loosens the periosteum from the underlying bone, therefore rupturing capillaries and causing bleeding. It may be apparent at birth but sometimes are not seen until 24 to 48 hours of life because subperiosteal bleeding is slow. It varies in size, rather firm to the touch and tends to increase in size from 1 to 3 days and then become softer and more fluctuant. Most Cephalohematoma are absorbed within several weeks. No treatment is required in the absence of unexplained neurologic abnormalities.

Caput Succedaneum

This is an abnormal collection of fluid under the scalp on top of the skull that may or may not cross the suture lines, depending on the size. Pressure on the presenting part of the fetal head against the cervix during labor may cause edema of the scalp. This diffuse swelling is temporary and will be absorbed within 2 or 3 days.

Characteristics of the Newborn Baby Eyes and Ears

Eyes

The newborn baby eyes may be folded and creased and may seem out of shape because they contain little hardened cartilage. The newborn baby eyes may not track properly and may cross (strabismus) or twitch (nystagmus). This will cause concern if it extends beyond six months.

Color

At birth, the iris color is usually grayish-blue in Caucasians and grayish brown or brown in dark-complexioned races. A gradual deposition of pigment produces the final eye color of the baby at the age of three to six months and sometimes it may take a year.

Pupils

The pupils do react to light and the infant can focus on objects about eight inches away. The newborn baby blinking is a natural protection reflex.

Lacrimal apparatus

The lacrimal apparatus is small and nonfunctioning at birth and tears are not usually produced with crying until one to three months of age.

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Ears

The newborn baby ears tend to be folded and creased. A line drawn through the inner and outer canthus of the eye should come to the top notch of the ear where it joins the scalp. The newborn baby usually responds to sound at birth.

Characteristics of the Newborn Baby Skin

The newborn baby has delicate skin at birth that appears dark red because it is thin and layers of subcutaneous fat have not yet covered the capillary beds. This redness can be seen through heavily pigmented skin and becomes even more flushed when the baby cries.

Vernix Caseosa

This is a soft, white, cheesy, yellowish cream on the newborn baby skin at birth. It is caused by the secretions of the sebaceous glands of the skin. It offers protection from the watery environment of the uterus, is absorbed in the skin after birth, and serves as a natural moisturizer. If there is a large amount of vernix caseosa present, it should be meticulously removed as it is thought to be a good culture medium for bacteria.

Lanugo

This is a long, soft growth of fine hair on the newborn baby shoulders, back, and forehead. It disappears early in postnatal life.

Mongolian Spots

These are blue-black colorations on the infant's lower back, buttocks, and anterior trunk. They are often seen in infants of Black, Indian, Mongolian, or Mediterranean ancestry. These spots occur less frequently in Caucasian babies. The spots are not bruises nor are they associated with mental retardation. They disappear in early childhood.

Jaundice

This is a yellow discoloration that may be seen in the newborn baby skin or in the sclera of the eye. Jaundice is caused by excessive amounts of free bilirubin in the blood and tissue.

Petechiae

These are small, blue-red dots on the newborn baby body caused by breakage of tiny capillaries. They may be seen on the face as a result of pressure exerted on the head during birth. True petechiae do not blanch on pressure.

Milia

These are tiny sebaceous retention cysts. They appear as small white or yellow dots and are common on the nose, forehead, and cheeks of the newborn baby. They are of pin head size and opalescent. Milia are due to blocked sweat and oil glands that have not begun to function properly. They disappear spontaneously within a few weeks.

Birthmarks

- These are small, reddened areas sometimes present on the newborn baby eyelids, mid-forehead, and nape of the neck. They may be the result of local dilatation of skin capillaries and abnormal thinness of the skin. They are sometimes called stork bites

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or telangiectasia. These marks usually fade and disappear altogether. They may be noticeable when the infant blushes, is extremely warm, or becomes excited.

- A hemangioma or strawberry mark is a type of birthmark that is characterized by a dark or bright red raised, rough surface. They do not develop for several days. They may regress spontaneously or may even increase in size. Surgical removal is not recommended. There is a 'wait-and-see' attitude advocated before surgical removal.

Characteristics of the Newborn Gastrointestinal System

Mouth

The newborn baby lips should be pink and the tongue smooth and symmetrical. The tongue should not extend or protrude between the lips. The connective tissue attached to the underside of the tongue should not restrict the mobility of the tip of the tongue.

The gums may have tooth ridges along them, and rarely a tooth or two may have erupted before birth. The roof of the mouth should be closed, and the uvula should be present. Sometimes there are glistening spots (firm white or grayish-white nodules, usually multiple) on the palate that are referred to as Epstein's pearls. A common site for them is at the junction of the hard and soft palates.

Stomach

The capacity of the newborn baby stomach is about one to two ounces (30 to 60 ml) at birth, but increases rapidly. Milk passes through the infant's stomach almost immediately. The infant is capable of digesting simple carbohydrates and proteins, but has a limited ability to digests fats.

Intestines

Irregularity in peristaltic motility slows stomach emptying. Peristaltic increases in the lower ileum, which results in one to six stools a day. The first stools after birth and for three to four days afterwards are called meconium. Meconium is stringy, tenacious, and black and has a tarry texture. With the ingestion of colostrum or formula, a gradual transition occurs. There may be few greenish stools and the stools will gradually become more yellow. Formula stools are lemon yellow and curdy. Breast milk stools are yellow-orange, soft, and more frequent.

Characteristics of the Newborn Circulatory System

Blood Flow

The umbilical blood stops flowing at birth, sudden pressure differences occur within the circulatory system. These differences cause the blood flowing to the lungs and liver to increase and the blood flowing through the bypass channels to decrease. Peripheral circulation refers to residual cyanosis in hands and feet. This may be apparent for one to two hours after birth and is due to sluggish circulation. Blood is shunted to vital organs immediately after birth.

Blood Coagulation

During the first few days of life, the prothrombin level decreases and clotting time in all infants is prolonged. This process is most acute between the second and fifth postnatal days. It can be prevented to a large extent by giving vitamin K to the newborn baby after birth.

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With the ingestion of food, establishment of digestion, and maturation of the liver, vitamin K is manufactured by the baby and clotting time stabilizes within a week to ten days.

Characteristics of the Newborn Respiratory System

Until the newborn baby first breath of air is taken, the alveoli (air sacs) in the lungs are in an almost complete state of collapsed. The lungs should be in this state because the lung must not fill with amniotic fluid or other liquids. However, the fluid/liquid that flows in the lungs during normal delivery is squeezed or drained from the infant lungs. The major portion of the fluid is absorbed after delivery by the vacuolar membranes into the blood capillaries.

The most frequent cause of respiratory difficulty in the first few hours of birth has been due to the too liberal use of sedatives, tranquilizers, analgesics, and anesthetics that affect not only the mother, but pass over the placenta to the infant. These drugs make the baby sleepy and disinclined to take the first breath.

Characteristics of the Newborn Endocrine System

The endocrine glands are considered better organized than other systems. Disturbances are most often related to maternally provided hormones (estrogen, luteal, and prolactin) that may cause the following conditions:

- Vaginal discharge and/or bleeding may occur in female infants. This discharge is white fucoids in color. Bleeding may occur as a result of withdrawal from maternal hormones at the time of birth. There are usually only a few blood spots seen on the diapers. The entire process terminates in one to two days.
- Enlargement of the mammary glands may occur in both sexes. This is particularly noticeable about the third day of life. Breast secretion may also occur. Swelling usually subsides in two to three weeks. The breast should not be squeezed; it only increases the chances of infection and injuries to the tender tissue.

Characteristics of the Newborn Neuromuscular System

The newborn baby exhibits remarkable sensory development and an amazing ability for self-organization in social interactions. The newborn baby muscles are firm and resilient. He has the ability to contract when stimulated, but lacks the ability to control them. He wiggles and stretches, but movements are uncoordinated.

Cephalocaudal (Head to Toe) in Development

The gross motor development occurs first, followed by finer motor development. Reflex actions present at birth serve the newborn baby until neuromuscular development is improved. Absence of reflex activity often indicates some form of brain damage.

Common Infant Reflexes

- *Rooting:* The newborn baby turns his head to the side when the side of his face is touched.
- *Moro reflex:* The newborn baby total body responds to a startling event. His arms extend out and up, legs flex toward abdomen. This reflex is usually lost by three months of age.
- *Tonic neck reflex:* The newborn baby assumes a fencer's position. His arm and leg on one side is extended, the opposite side is flexed. His head is turned toward extended side. This is not evident after four months of age.

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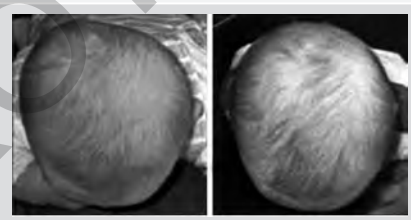
Table 2.1: Normal newborn baby appearance

Features	Description	Image
Color	A baby's skin coloring can vary greatly, depending on the baby's age, race or ethnic group, temperature, and whether or not the baby is crying. Skin color in babies often changes with both the environment and health. When a baby is first born, the skin is a dark red to purple color. As the baby begins to breathe air, the color changes to red. This redness normally begins to fade in the first day. A baby's hands and feet may stay bluish in color for several days. This is a normal response to a baby's immature blood circulation. Jaundice can often be seen by gently pressing on the baby's forehead or chest and watching the color return. Laboratory tests may be needed to assess jaundice.	
Molding	Molding is the elongation of the shape of a baby's head. It occurs when the movable bones of the baby's head overlap to help the baby pass through the mother's birth canal. Normal shape usually returns by the end of the first week.	 Before After
Vernix	This is a white, greasy, cheese-like substance that covers the skin of many babies at birth. It is formed by secretions from the baby's oil glands and protects the baby's skin in the amniotic fluid during pregnancy. Vernix may not be present in babies who are born post-term (after 41 weeks of pregnancy). It does not need to be removed and usually absorbs into the skin.	
Lanugo	This is soft, downy hair on a baby's body, especially on the shoulders, back, forehead, and cheeks. It is more noticeable in premature babies, but is not usually seen in babies born very late in pregnancy.	

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Contd...

Features	Description	Image
Milia	Milia are tiny, white, hard spots that look like pimples on a newborn's nose. They may also appear on the chin and forehead. Milia form from oil glands and disappear on their own. When these occur in a baby's mouth and gums, they are called Epstein pearls.	
Stork bites or salmon patches	These are small pink or red patches often found on a baby's eyelids, between the eyes, upper lip, and back of the neck. The name comes from the marks on the back of the neck where, as the myth goes, a stork may have picked up the baby. They are caused by a concentration of immature blood vessels and may be the most visible when the baby is crying. Most of these fade and disappear completely.	
Mongolian spots	Mongolian spots are blue or purple-colored splotches on the baby's lower back and buttocks. Over 80 percent of African-American, Asian, and Indian babies have Mongolian spots, but they occur in dark-skinned babies of all races. The spots are caused by a concentration of pigmented cells. They usually disappear in the first four years of life.	
Erythema toxicum	Erythema toxicum is a red rash on newborns that is often described as 'flea bites.' The rash is common on the chest and back, but may be found all over. About half of all babies develop this condition in the first few days of life. It is less common in premature babies. The cause is unknown but it is not dangerous. Erythema toxicum does not require any treatment and disappears by itself in a few days.	

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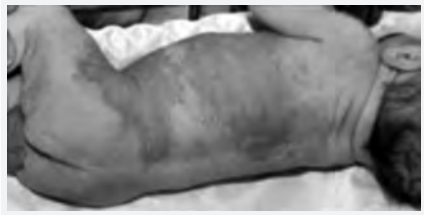
Features	Description	Image
Acne neonatorum (baby acne)	About one-fifth of newborns develop pimples in the first month. These usually appear on the cheeks and forehead. It is thought that maternal hormones cause these, and they usually disappear within a few months. Do not try to break open or squeeze the pimples, as this can lead to infection.	
Strawberry hemangioma	This is a bright or dark red, raised or swollen, bumpy area that looks like a strawberry. Hemangiomas are formed by a concentration of tiny, immature blood vessels. Most of these occur on the head. They may not appear at birth, but often develop in the first two months. Strawberry hemangiomas are more common in premature babies and in girls. These birthmarks often grow in size for several months, and then gradually begin to fade. Nearly all strawberry hemangiomas completely disappear by nine years of age.	
Port-wine stain	A port-wine stain is a flat, pink, red, or purple colored birthmark. These are caused by a concentration of dilated tiny blood vessels called capillaries. They usually occur on the head or neck. Port-wine stains on the face may be associated with more serious problems. Skin-colored cosmetics may be used to cover small port wine stains. The most effective way of treating port wine stains is with a special type of laser. This is done when the baby is older by a plastic surgery specialist.	
Newborn breast swelling	Breast enlargement may occur in newborn boys and girls around the third day of life. In the first week, a milky substance, sometimes called 'witch's milk,' may leak from the nipples. This is related to the mother's hormones and goes away within a few days to weeks. Do not massage or squeeze the breasts or nipples, as this may cause an infection in the breast.	

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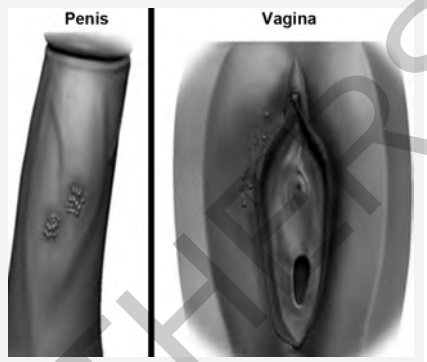
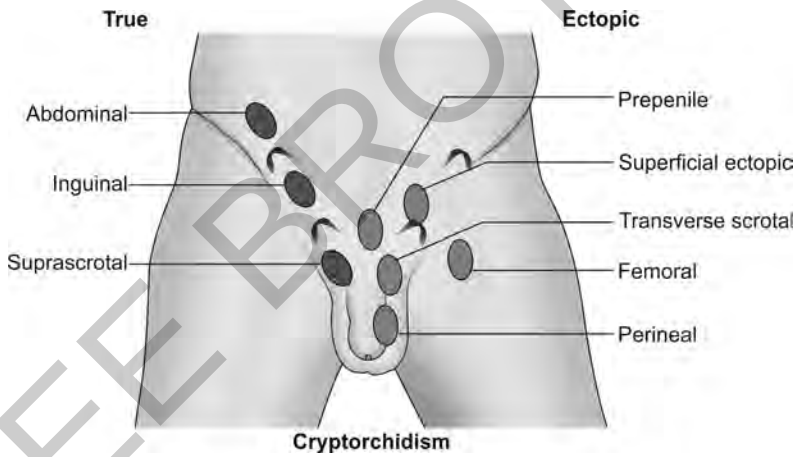
Features	Description	Image
Swollen genitals/ discharge	A newborn's genitals may appear different depending on the gestational age (the number of weeks of pregnancy). Premature baby girls may have a very prominent clitoris and inner labia. A baby born closer to full-term has larger outer labia. Girls may have a small amount of whitish discharge or blood-tinged mucus from the vagina in the first few weeks. This is a normal occurrence related to the mother's hormones. Premature boys may have a smooth, flat scrotum with undescended testicles. Boys born later in pregnancy have ridges in the scrotum with descended testicles.	



ASSESSMENT OF THE NEWBORN BABY

Introduction

Each newborn baby is carefully checked at birth for signs of problems or complications. A complete physical assessment will be done that includes every body system. Throughout the hospital stay, doctors, nurses, and other health care providers continually assess the health of the baby, observing for signs of problems or illness. Assessment may include:

APGAR Scoring

The APGAR score is one of the first checks of your new baby's health. The APGAR score is assigned in the first few minutes after birth to help identify babies that have difficulty breathing or have a problem that needs further care. The baby is checked at 1 minute and 5 minutes after birth for heart and respiratory rates, muscle tone, reflexes, and color.

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Each area can have a score of 0, 1, or 2, with 10 points as the maximum. A total score of 10 means a baby is in the best possible condition. Nearly all babies score between 8 and 10, with 1 or 2 points taken off for blue hands and feet because of immature circulation. If a baby has a difficult time during delivery, this can lower the oxygen levels in the blood, which can lower the APGAR score. APGAR scores of 3 or less often mean a baby needs immediate attention and care.

	0 Points	1 Points	2 Points	Points totaled
Activity (muscle tone)	Absent	Arms and legs flexed	Active movement	
Pulse	Absent	Below 100 bpm	Over 100 bpm	
Grimace (reflex irritability)	Flaccid	Some flexion of Extremities	Active motion (sneeze, cough pull away)	
Appearance (skin color)	Blue, pale	Body pink, Extremities blue	Completely pink	
Respiration	Absent	Slow, irregular	Vigorous cry	

Severely depressed	0–3
Moderately depressed	4–6
Excellent condition	7–10

Fig. 2.2: Assessment of newborn baby with APGAR scoring scale

Birth Weight

A baby's birth weight is an important indicator of health. The average weight for term babies (born between 37 and 41 weeks gestation) is about 7 lbs. (3.2 kg). In general, small babies and very large babies are at greater risk for problems. Babies are weighed daily in the nursery to assess growth, fluid, and nutrition needs. Newborn babies may often lose 5 to 7% of their birth weight. This means that a baby weighing 7 pounds 3 ounces at birth might lose as much as 8 ounces in the first few days. Babies will usually gain this weight back by 2 weeks of age. Premature and sick babies may not begin to gain weight right away.

Anthropometric Measurements

The measurement of the human individual. An early tool of physical anthropology, it has been used for identification, for the purposes of understanding human physical variation, in paleoanthropology and in various attempts to correlate physical with racial and psychological traits. Anthropometry involves the systematic measurement of the physical properties of the human body, primarily dimensional descriptors of body size and shape.

History Collection

History taking in children is likely to be compromised by a variety of factors, not least that the child may be distressed and ill and the parents extremely anxious. This is particularly true where most pediatric histories are taken—that is, in general practice and in accident

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ISBN 978-93-85999-21-5