MEDAVIE

HealthEd

ÉduSanté

OBSTETRICS

Advanced Care Paramedicine

Module: 10

Section: 02c

Normal Events of Pregnancy

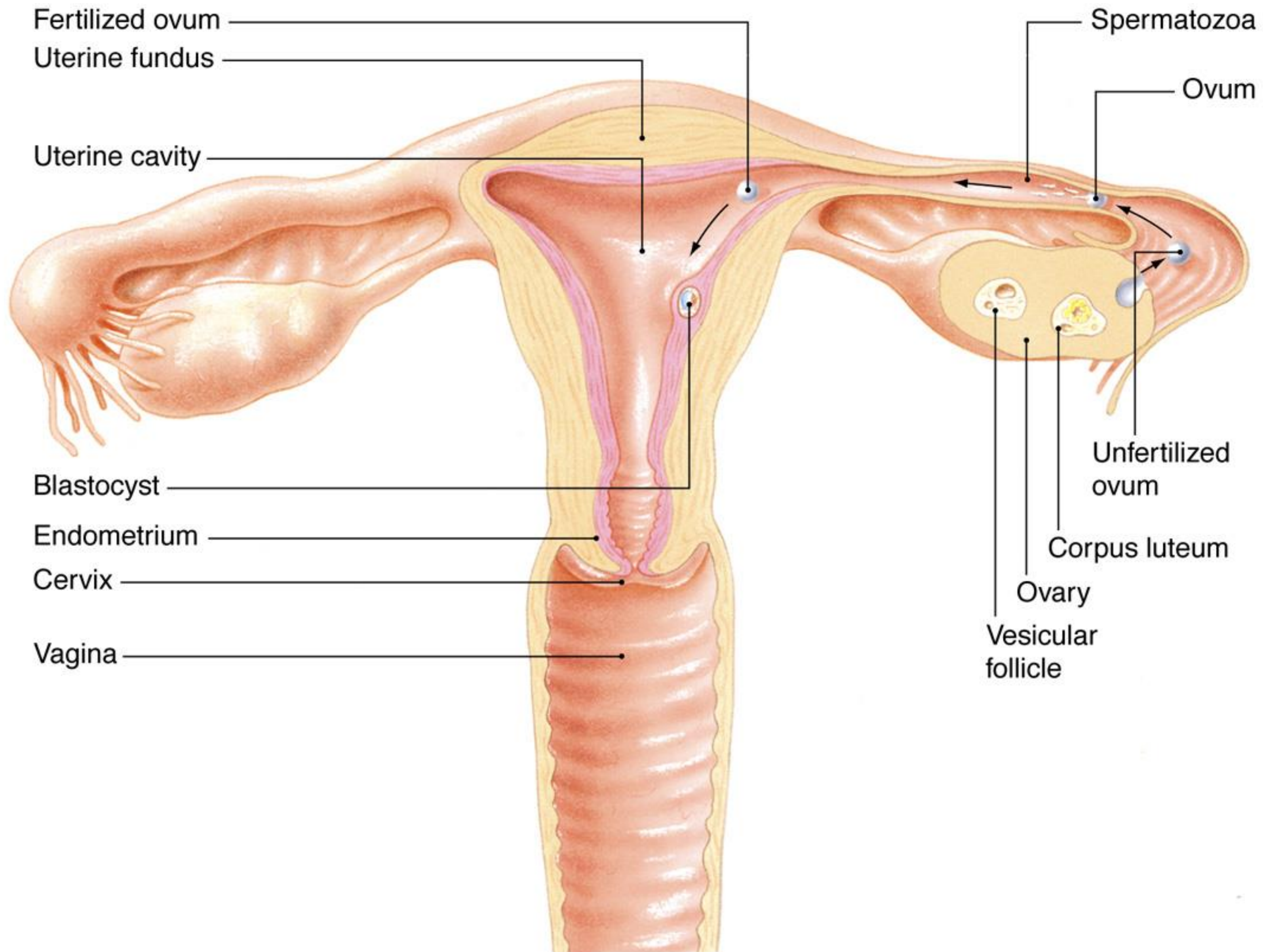
- Ovulation
- Fertilization
  - Occurs in distal third of fallopian tube
- Implantation
  - Occurs in the uterus

Ovulation

- First two weeks of menstrual cycle
  - Dominated by estrogen
  - Endometrium thickens and engorged
- Surge of LH and FSH
  - Ovulation occurs
  - Egg travels down Fallopian tubes to uterus
- Unfertilized egg
  - Menstruation takes place 14 days later

Fertilization

- Distal third of the Fallopian tubes
- Ovum begins cellular division immediately
- Blastocyst implanted in thickened uterine lining
  - Prepared by progesterone
- Fetus and placenta subsequently develop


Fertilized ovum
Uterine fundus
Uterine cavity
Blastocyst
Endometrium
Cervix
Vagina
Spermatozoa
Ovum
Unfertilized
ovum
Corpus luteum
Ovary
Vesicular
follicle

Specialized Structures of Pregnancy

- Placenta
- Umbilical cord
- Amniotic sac and fluid

Placenta

- Develops three weeks after fertilization
- Temporary blood rich organ
  - Transfers heat
  - Gas exchange
  - Delivers nutrients, carries away wastes
  - Endocrine gland
- Connected to fetus by umbilical cord
- Expelled with afterbirth

Umbilical Cord

- Connects placenta to fetus
- Contains two arteries and one vein
  - Vein transports oxygenated blood
  - Arteries return deoxygenated blood
- Develops within amniotic sac
- Fluid surrounds and protects fetus
- Allows for fetal development

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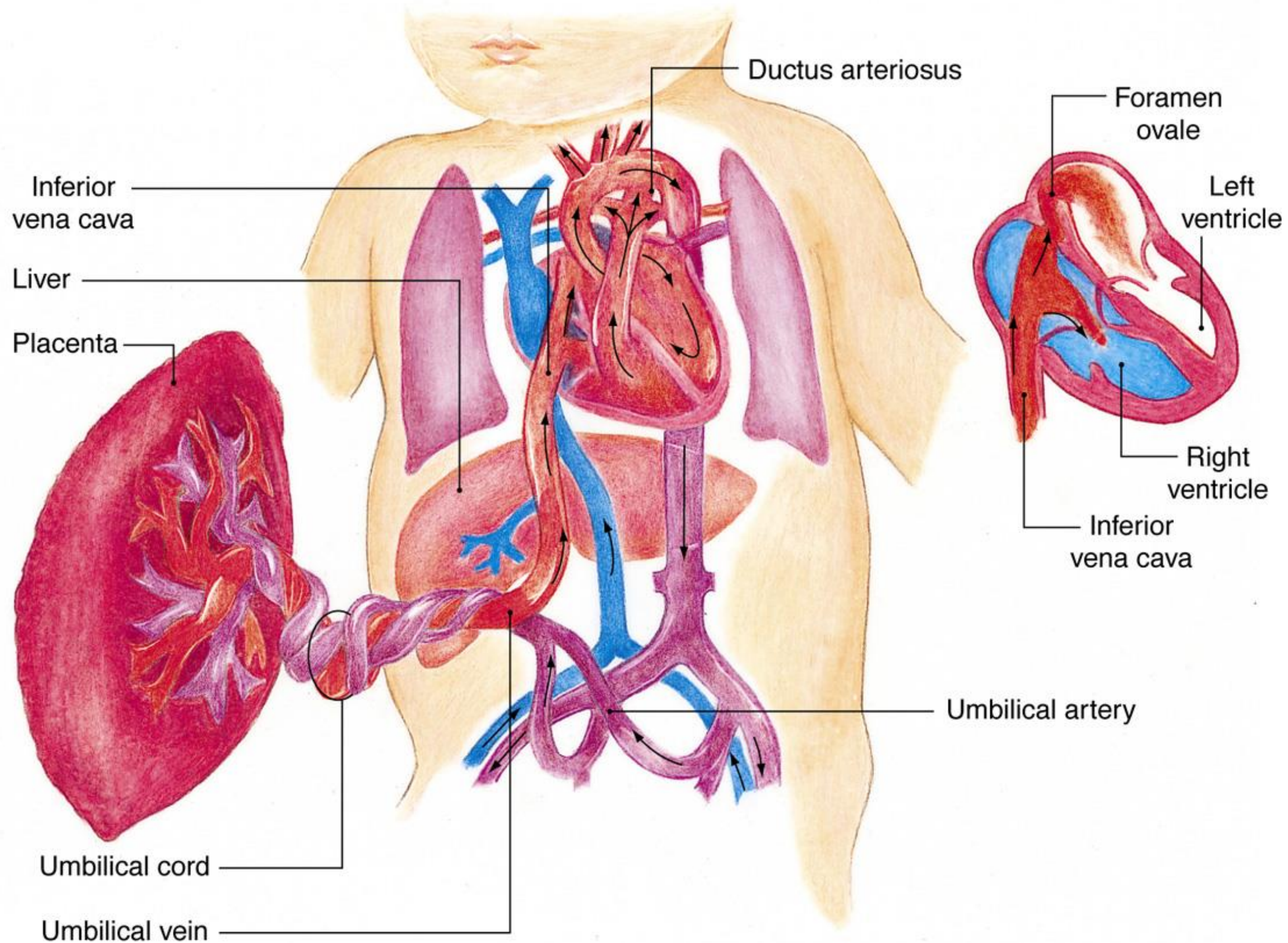
Fetal circulation



Amniotic Sac and Fluid

- Membrane surrounding the fetus
- Fluid originates from fetal sources – urine, secretions
  - Fluid accumulates rapidly
  - Amounts to about 175 to 225 mL by the fifteenth week of pregnancy and about 1 L at birth
- Rupture of the membrane produces watery discharge

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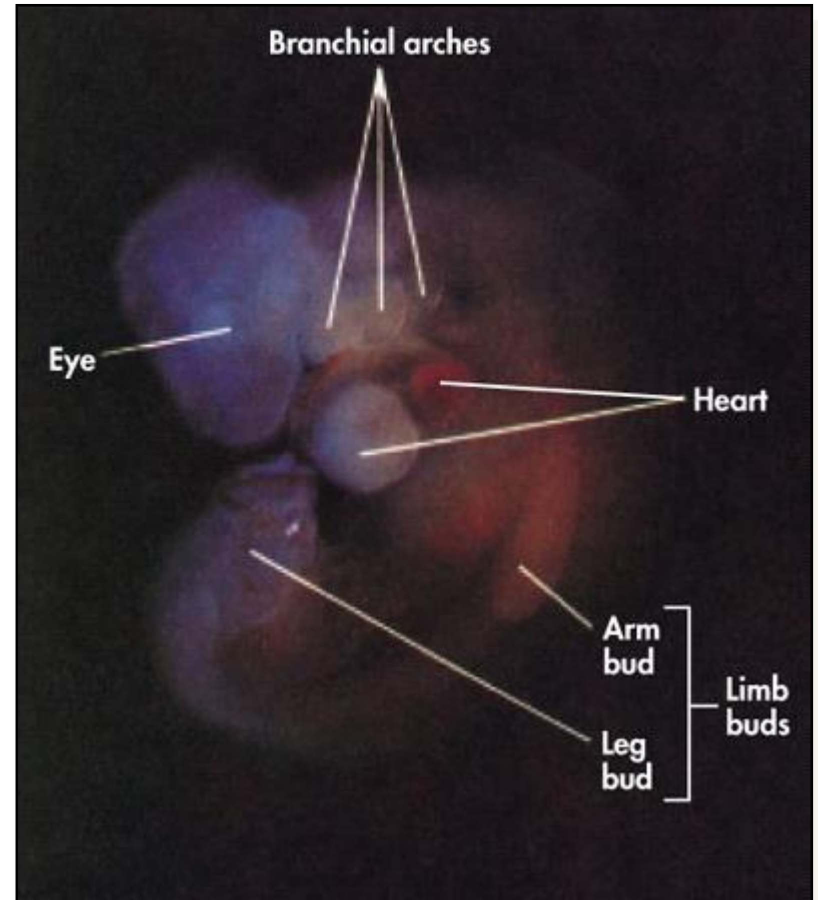
Fetal Growth and Development

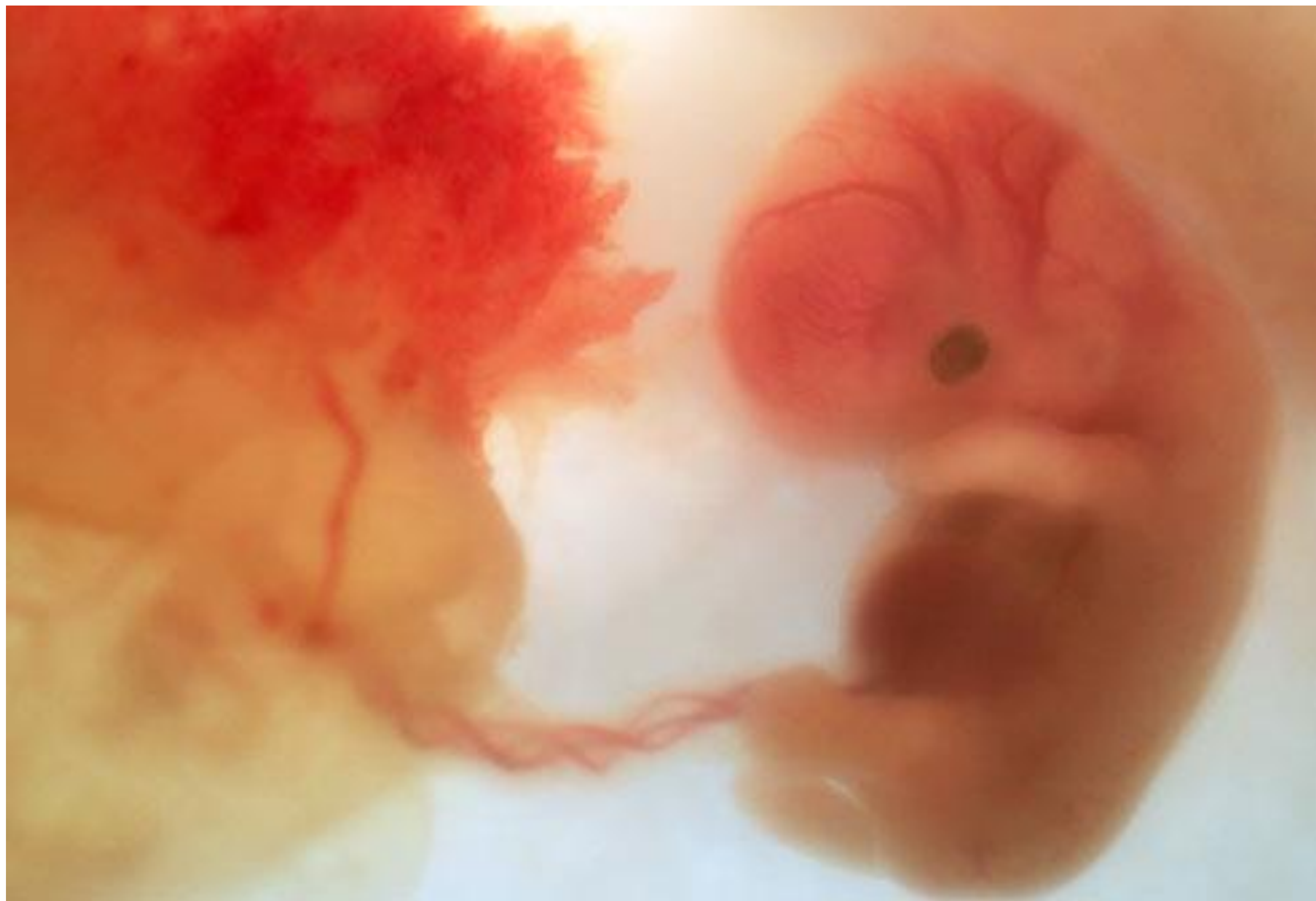
- During the first 8 weeks of pregnancy the developing ovum is known as an embryo
- After that and until birth it is called a fetus
- The period during which intrauterine fetal development takes place (gestation) usually averages 40 weeks from time of fertilization to delivery
  - The progress of gestation is usually considered in terms of 90-day periods or trimesters

Table 40-1	SIGNIFICANT FETAL DEVELOPMENTAL MILESTONES
	Pre-embryonic Stage
2 weeks	Rapid cellular multiplication and differentiation
	Embryonic Stage
4 weeks	Fetal heart begins to beat
8 weeks	All body systems and external structures are formed
	Size: approximately 3 centimeters (1.2 inches)
	Fetal Stage
8–12 weeks	Fetal heart tones audible with Doppler
	Kidneys begin to produce urine
	Size: 8 centimeters (3.2 inches), weight about 1.6 ounces
	Fetus most vulnerable to toxins
16 weeks	Sex can be determined visually
	Swallowing amniotic fluid and producing meconium
	Looks like a baby, although thin
20 weeks	Fetal heart tones audible with stethoscope
	Mother able to feel fetal movement
	Baby develops schedule of sucking, kicking, and sleeping
	Hair, eyebrows, and eyelashes present
	Size: 19 centimeters (8 inches), weight approximately 16 ounces
24 weeks	Increased activity
	Begins respiratory movement
	Size: 28 centimeters (11.2 inches), weight 1 pound 10 ounces.
28 weeks	Surfactant necessary for lung function is formed
	Eyes begin to open and close
	Weighs 2 to 3 pounds
32 weeks	Bones are fully developed but soft and flexible
	Subcutaneous fat being deposited
	Fingernails and toenails present
38–40 weeks	Considered to be full-term
	Baby fills uterine cavity
	Baby receives maternal antibodies

28 - 35 days



56 Days



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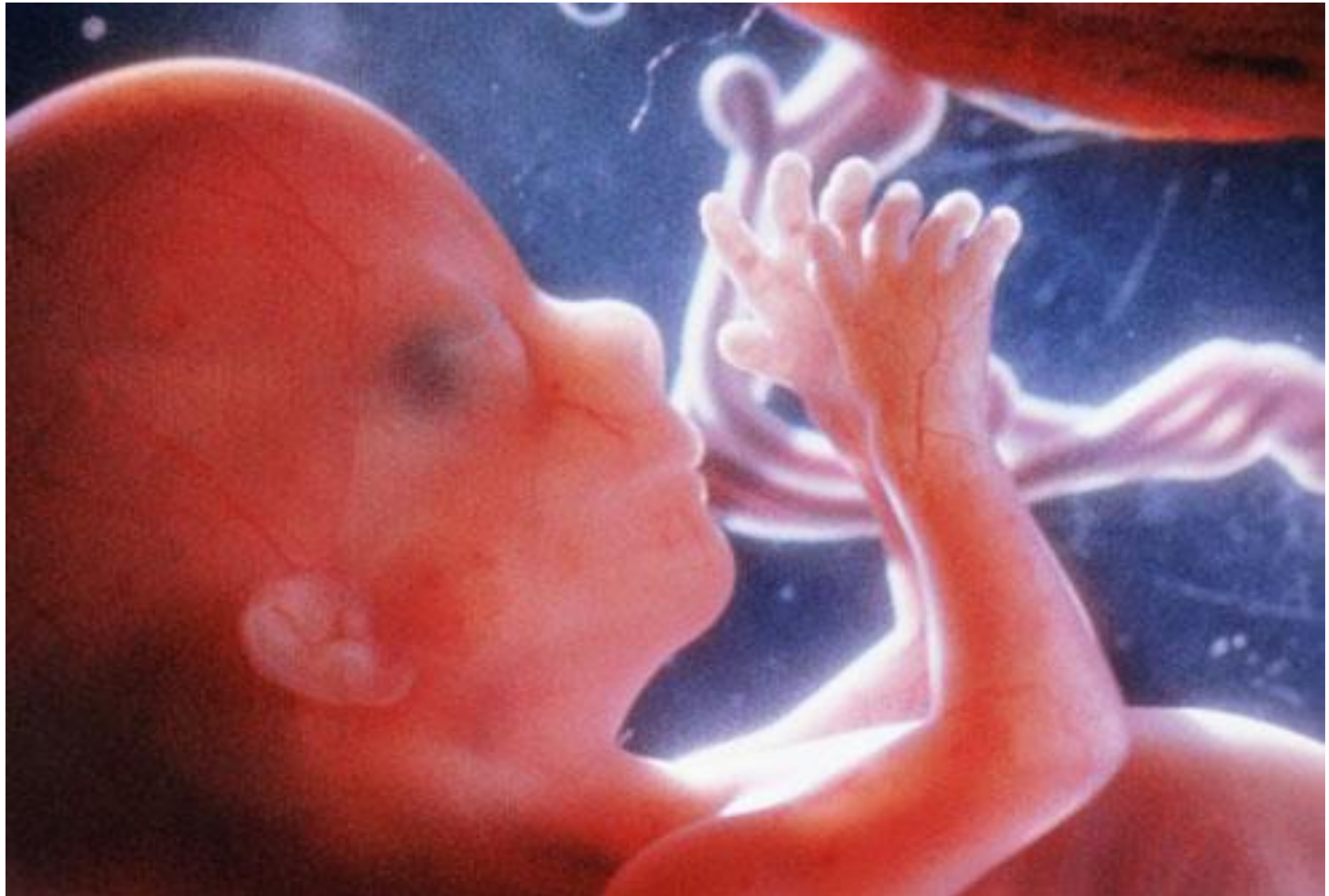
16 Weeks



20 Weeks

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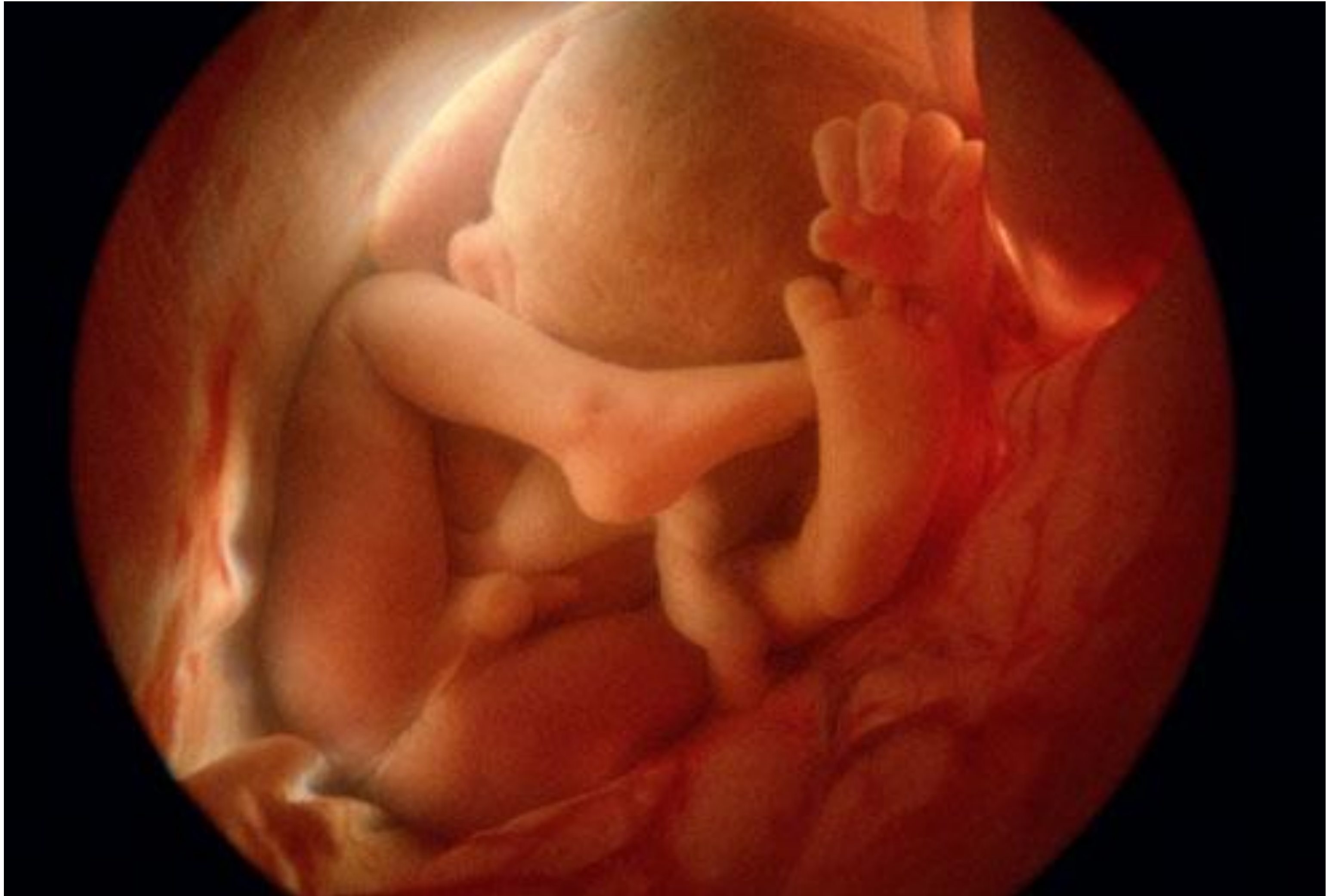
36 Weeks



Obstetrical Terminology

- Gravida
  - refers to the number of all of the woman's current and past pregnancies
- Para
  - refers only to the number of the woman's past pregnancies that have remained viable to delivery
- Antepartum
  - the maternal period before delivery
- Gestation
  - period of intrauterine fetal development
- Grand multipara
  - a woman who has had seven deliveries or more

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Obstetrical Terminology

- Multigravida
  - a woman who has had two or more pregnancies
- Multipara
  - a woman who has had two or more deliveries
- Natal
  - connected with birth
- Nullipara
  - a woman who has never delivered
- Perinatal
  - occurring at or near the time of birth
- Postpartum
  - the maternal period after delivery

Obstetrical Terminology

- Prenatal
  - existing or occurring before birth
- Primigravida
  - a woman who is pregnant for the first time
- Primipara
  - a woman who has given birth only once
- Term
  - a pregnancy that has reached 37 weeks gestation

Maternal Changes During Pregnancy

- Besides cessation of menstruation and the obvious enlargement of the uterus, the pregnant woman undergoes many other physiological changes affecting the:
  - Genital tract
  - Breasts
  - Gastrointestinal system
  - Cardiovascular system
    - (↑30%, BP initially ↓ then will ↑to norm at term)
  - Respiratory system
  - Metabolism

Physiologic Changes

- Reproductive system
  - Uterus increases in size.
  - Vascular system.
  - Formation of mucous plug in cervix.
  - Estrogen causes vaginal mucosa to thicken.
  - Breast enlargement.

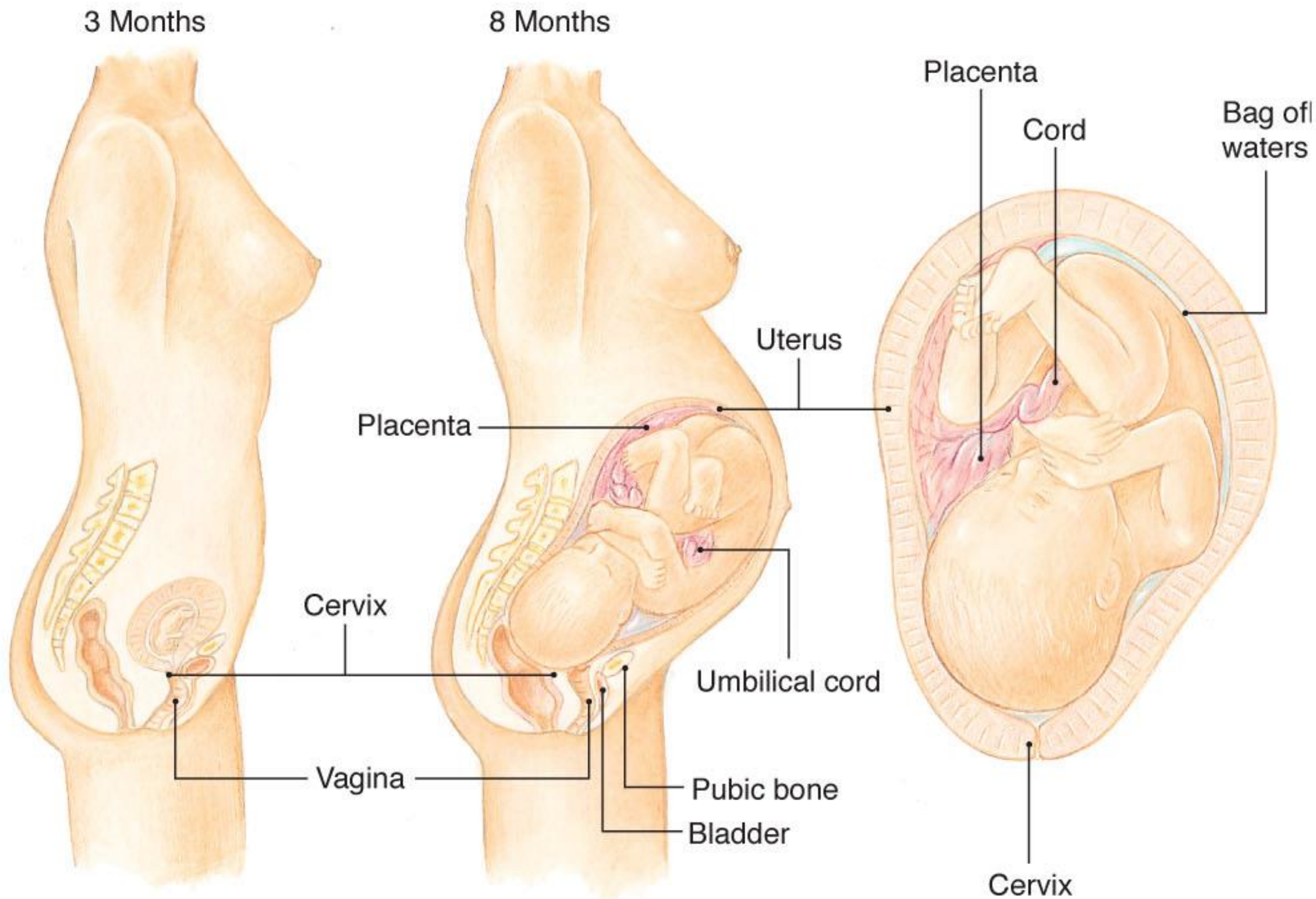

FIGURE 40-3 Uterine changes associated with pregnancy.

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Physiologic Changes

- Respiratory system
  - Progesterone causes a decrease in airway resistance.
  - Increase in oxygen consumption.
  - Increase in tidal volume.
  - Slight increase in respiratory rate
- Cardiovascular system
  - Cardiac output increases.
  - Blood volume increases.
  - Supine hypotension.

Physiologic Changes

- Gastrointestinal system
  - Hormone levels.
  - Peristalsis is slowed.
- Urinary system
  - Urinary frequency is common.
- Musculoskeletal system
  - Loosened pelvic joints.

Obstetric History

- EDC
- Length of gestation
- Gravidity and Parity
- Previous cesarean delivery
- Maternal lifestyle (alcohol or other drug use, smoking history)
- Infectious disease status
- History of previous gynecological or obstetrical complications
- Presence of pain

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Obstetric History

- Presence, quantity, and character of vaginal bleeding
- Presence of abnormal vaginal discharge
- Presence of “show” (expulsion of the mucous plug in early labor) or rupture of membranes
- Current general health and prenatal care (none, physician, nurse midwife)

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Obstetric History

- Allergies, medications taken (especially the use of narcotics in the last 4 hours)
- Maternal urge to bear down or sensation of imminent bowel movement, suggesting imminent delivery

Physical Examination

- The patient's chief complaint determines the extent of the physical examination
  - The prehospital objective in examining an obstetrical patient is to rapidly identify acute surgical or life-threatening conditions or imminent delivery and take appropriate management steps

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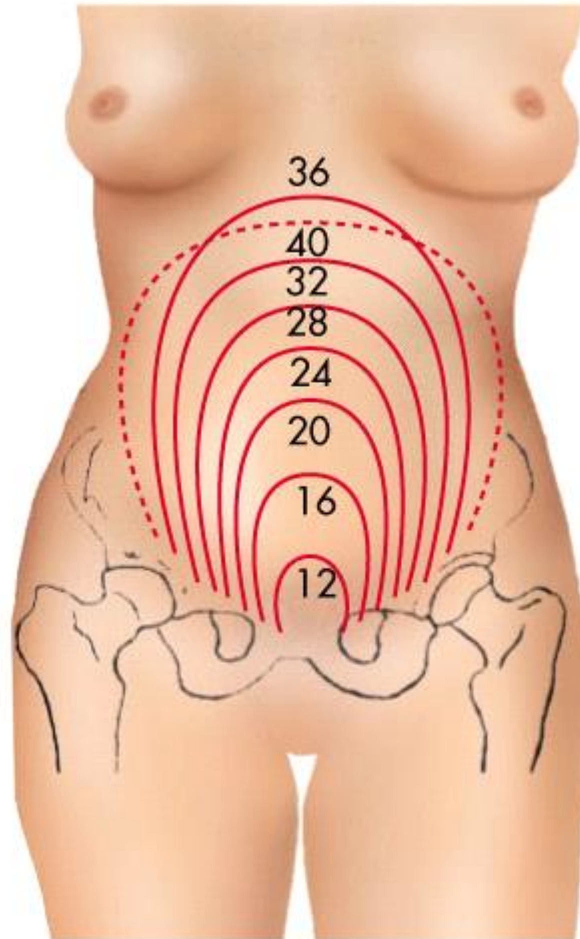
Physical Examination

- Evaluate the patient's general appearance skin color
- Assess vital signs and frequently reassess them throughout the patient encounter
- Examine the abdomen for previous scars and any gross deformity, such as that caused by previous uterine surgery especially caesarean birth, a hernia or marked abdominal distention

Evaluation of Uterine Size

- The uterine contour is usually irregular between weeks 8 and 10
  - Early uterine enlargement may not be symmetrical
  - The uterus may be deviated to one side
- At 12 to 16 weeks, the uterus is above the symphysis pubis
- At 20 weeks, the uterus is at the level of the umbilicus
- At term, the uterus is near the xiphoid process

Fundal Height



Fetal Monitoring

- Fetal heart sounds may be auscultated between 16 and 40 weeks by use of a stethoscope or Doppler
  - Normal fetal heart rate is 110 to 160 beats/min, regular rhythm with occasional accelerations noted

General Management of the Obstetric Patient

- If birth is not imminent, care for the healthy patient will often be limited to basic treatment modalities
- In the absence of distress or injury, transport the patient in a position of comfort (usually left lateral recumbent)
  - ECG monitoring, high-concentration oxygen administration, and fetal monitoring may be indicated for some patients, based on patient assessment and vital sign determinations
  - Medical direction may recommend IV access be established in some patients

Complications of Pregnancy

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Trauma in Pregnancy

- The leading causes of obstetric trauma are motor vehicle accidents, falls, assaults, and gunshots, and ensuing injuries are classified as blunt abdominal trauma, pelvic fractures, or penetrating trauma
- Many of the assessment and management aspects of obstetric trauma are unique to pregnancy, although initial evaluation and resuscitation should always be maternally directed.
- Increased incidence of intimate partner violence in pregnancy; if there is a pre-existing abusive relationship it is more likely to escalate into physical violence during pregnancy
- The greatest risk of fetal death is from fetal distress and intrauterine demise caused by trauma to the mother or her death

Trauma in Pregnancy

- When dealing with a pregnant trauma patient, promptly assess and intervene on behalf of the mother
- Causes of fetal death from maternal trauma
  - Death of mother, placenta separation, shock, uterine rupture and fetal head injury
- Assessment and management
  - Remember increased blood volumes
  - 30 – 40 % loss will only show minimal changes in BP but will decrease uterine flow by 10-20%
- Transportation strategies
  - Tilt mother to left lateral

Trauma Management

- Apply c-collar for cervical stabilization and immobilize on a long backboard.
- Administer high-flow oxygen
- Fluid resuscitation
- Place patient tilted to the left to minimize supine hypotension.
- Reassess patient.
- Monitor the fetus.

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Transport Considerations

- Transport
  - All trauma patients of 20 weeks or more gestation
  - Any pregnant patient complaining of abdominal pain
- Anticipate development of shock

Medical Conditions and Disease Processes

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Preeclampsia and Eclampsia

- Known collectively as Hypertensive Diseases of Pregnancy (HDP)
  - While the exact etiology of HDP is unknown, the most popular current theory is that it arises as a result of abnormal placentation or excessive fetal demands, such that there is a mismatch between uteroplacental supply and fetal demands. This results in maternal endothelial cell dysfunction, manifesting in maternal and fetal complications.
- Preeclampsia
  - A disease of unknown origin that primarily affects previously healthy, normotensive primigravida
    - Occurs after the twentieth week of gestation, often near term
  - Pathophysiology
    - Vasospasms, endothelial cell injury, increased capillary permeability, activation of clotting cascade
- Eclampsia
  - Characterized by the same signs and symptoms plus seizures or coma

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Preeclampsia and Eclampsia

- Diagnostic criteria (updated by the Society of Obstetricians and Gynaecologists of Canada in 2008) can be fairly complex. The criteria for diagnosis of HDP, however, there are two diagnostic criteria – hypertension and proteinuria.
- Consider the following:
  - Diastolic BP of >90 mm Hg based on the average of at least 2 measurements taken in the same arm > five minutes apart after an initial rest period of > five minutes. This is the better predictor of adverse outcome
  - Systolic BP >140 mm Hg is not a criterion for defining hypertension in pregnancy, but should be watched as it may predict diastolic hypertension
  - Severe hypertension should be defined as a systolic BP >160 mm Hg or a diastolic BP >110 mm Hg.
  - Proteinuria is > 300 mg/day, or > 2+ on dipstick
- Predisposing factors
  - Young and advanced age, previous history, obesity, HTN, renal disease, diabetes, multiple gestation

Preeclampsia

- Right upper quadrant (RUQ) pain, headache, and visual disturbances are potentially ominous symptoms requiring immediate assessment
- Other symptoms may include:
  - Hyperreflexia
  - Dizziness
  - Confusion
  - Seizures
  - Coma
  - Blurred Vision
  - N/V
  - Hypertension
  - Edema

Management

- Closely monitor mother and fetus
- Left lateral recumbent
- Oxygen therapy
- IV access
- $MgSO_4$ 2 – 4 g IV/IM over 4 mins if:
  - Seizure
  - Severe headache
  - HTN (BP > 160/100)
- May have to manage seizures
  - Valium 5.0 mg IV

Braxton-Hicks Contractions

- As early as 13 weeks
- Uterus begins intermittent contractions
- May enhance placental blood flow
- Painless irregular contractions
- Do not cause cervical changes

Supine Hypotensive Syndrome

- Occurs in third trimester
- Gravid uterus compresses inferior vena cava
- Left lateral recumbent or elevated right hip
- Monitor fetal heart tones and maternal vital signs
- Fluid resuscitation

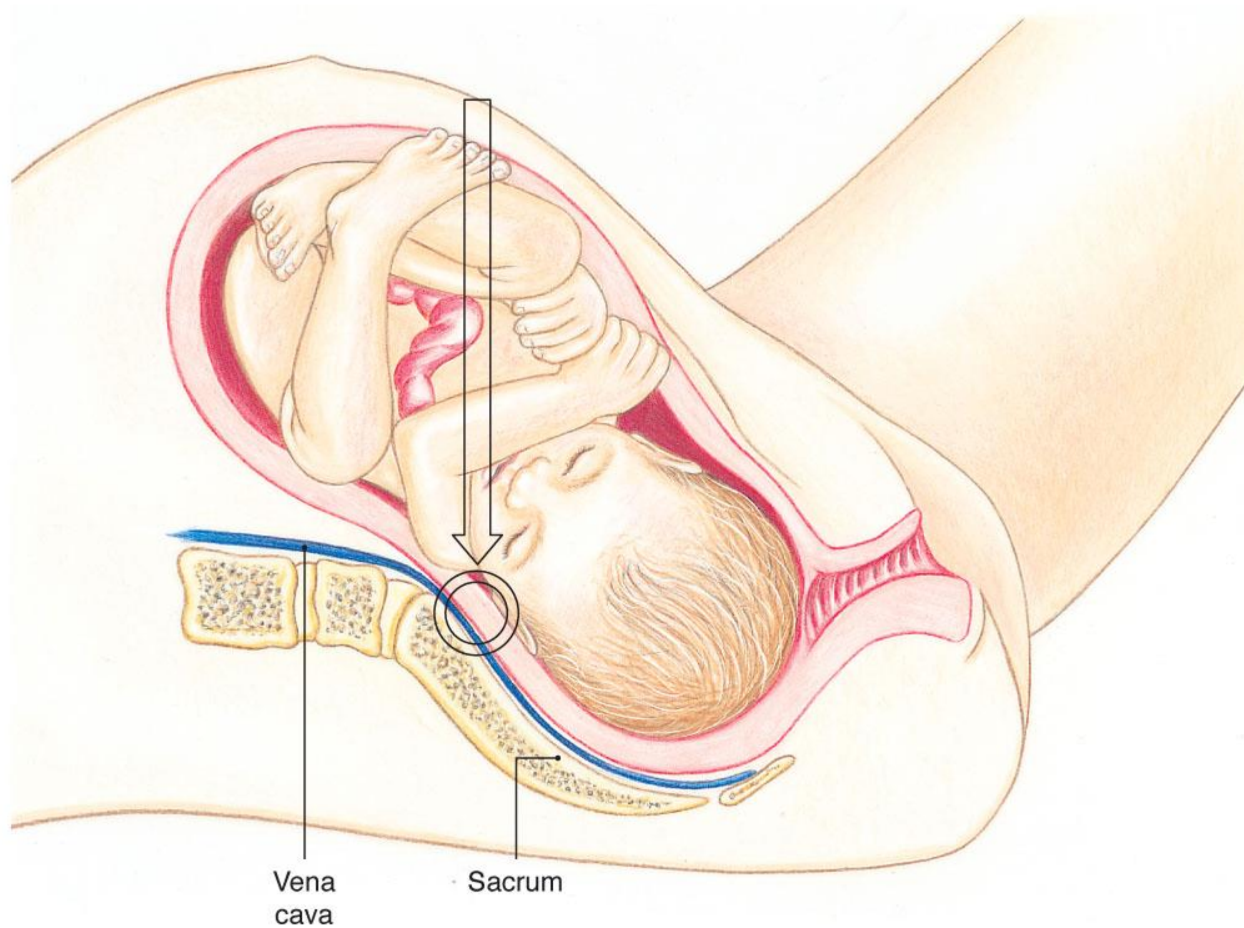

FIGURE 40-7 The supine-hypotensive syndrome results from compression of the inferior vena cava by the gravid uterus.

Preterm Labour

- Maternal Factors
  - Cardiovascular disease
  - Renal disease
  - Diabetes
  - Uterine and cervical abnormalities
  - Maternal infection
  - Trauma
  - Contributory factors

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Preterm Labour

- Placental factors
  - Placenta previa
  - Abruptio placenta
- Fetal factors
  - Multiple gestation
  - Excessive amniotic fluid
  - Fetal infection

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Preterm Labour

- Signs and Symptoms of Preterm birth:
  - Regular contractions
  - Vaginal fluid loss
  - Vaginal bleeding
  - Change in pelvic pressure, low dull backache, or vaginal discharge
- In the presence of worrisome symptoms it is recommended that woman present to hospital immediately
  - No evidence for efficacy with respect to the use of sedation or fluid boluses
- Tocolysis
  - Agents/protocols available vary from hospital to hospital (there is not any perfect agent to stop preterm labour – if a baby is going to come, that's the way it's going to be)
  - Aim is to delay birth for at least 48 hours so that betamethasone can be given to mom to promote fetal lung maturity

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Tocolysis

- Tocolytics are medications used to suppress premature labor
- The suppression of contractions is often only partial and tocolytics can only be relied on to delay birth for several days

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Tocolysis

- Terbutaline - β2-agonist
  - Maternal SE: Cardiac or cardiopulmonary arrhythmias, pulmonary edema, myocardial ischemia, hypotension, tachycardia, death
  - Fetal SE: Fetal tachycardia, hyperinsulinemia, hypoglycemia, myocardial and septal hypertrophy, myocardial ischemia
- Nifedipine (Adalat) – Calcium Channel Blocker
  - Maternal SE: Flushing, headache, dizziness, nausea, transient hypotension (Not the drug of choice for use during maternal transport due to its associated hypotensive effects)
  - Fetal SE: None noted
- Indomethacin (Indocid) – PG synthetase inhibitor
  - Maternal SE: Nausea, Heartburn
  - Fetal SE:
    - Should not be used after 32 weeks gestation because of increased sensitivity of the ductus arteriosus to closure
    - Constriction of ductus arteriosus, pulmonary hypertension, reversible decrease in renal function with oligohydramnios, intraventricular hemorrhage, hyperbilirubinemia, necrotizing enterocolitis
    - Therefore, PG synthetase inhibitors should not be used for more than 48 hours without assessment of amniotic fluid volume

Vaginal Bleeding

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Abortion

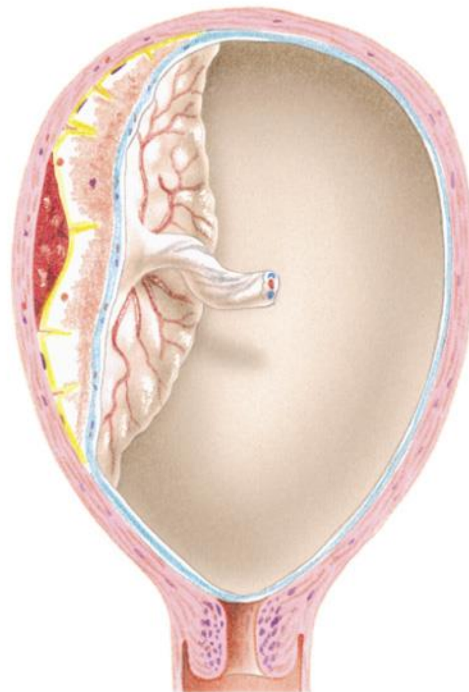
- The termination of pregnancy from any cause before the twentieth week of gestation (after which it is known as a preterm birth)
- Common classifications of abortion
  - Complete, incomplete, induced, missed, spontaneous, therapeutic, threatened
- When obtaining a history, determine
  - The time of onset of pain and bleeding
  - Amount of blood loss
  - If the patient passed any tissue with the blood

Third-trimester Bleeding

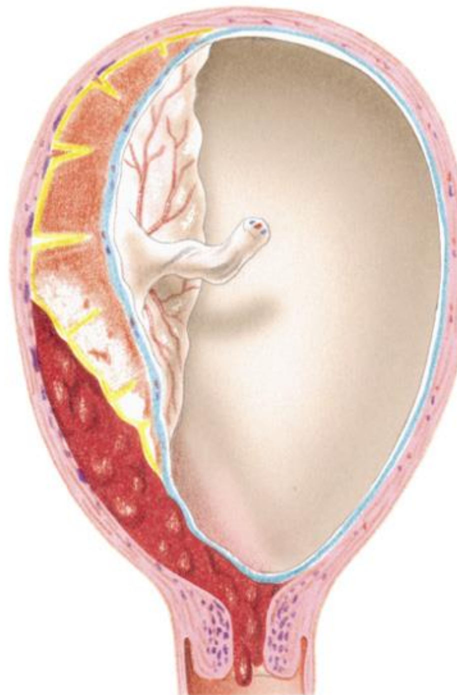
Abruptio Placentae

- A partial or complete detachment of a normally implanted placenta at more than 20 weeks gestation
- Predisposing factors
  - HTN, preeclampsia, trauma, previous occurrence
- Life threat for mother and fetus
- Signs and symptoms vary
- Classified as partial, severe, or complete
- Treat for shock, fluid resuscitation
- Transport left lateral recumbent position

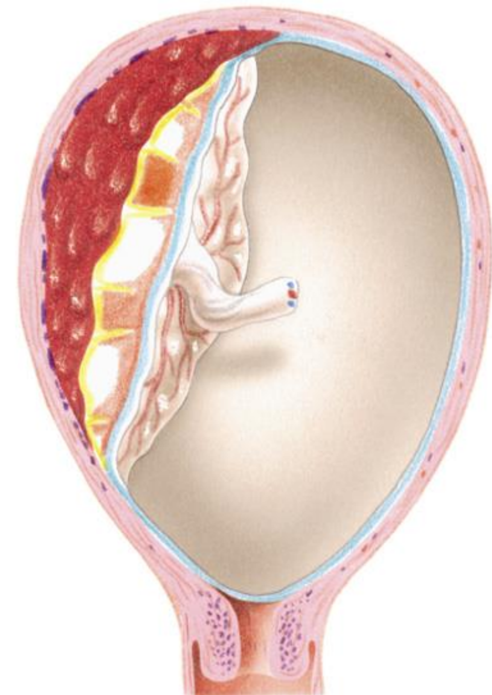
Abruptio Placentae



Partial separation
(concealed hemorrhage)



Partial separation
(apparent hemorrhage)



Complete separation
(concealed hemorrhage)

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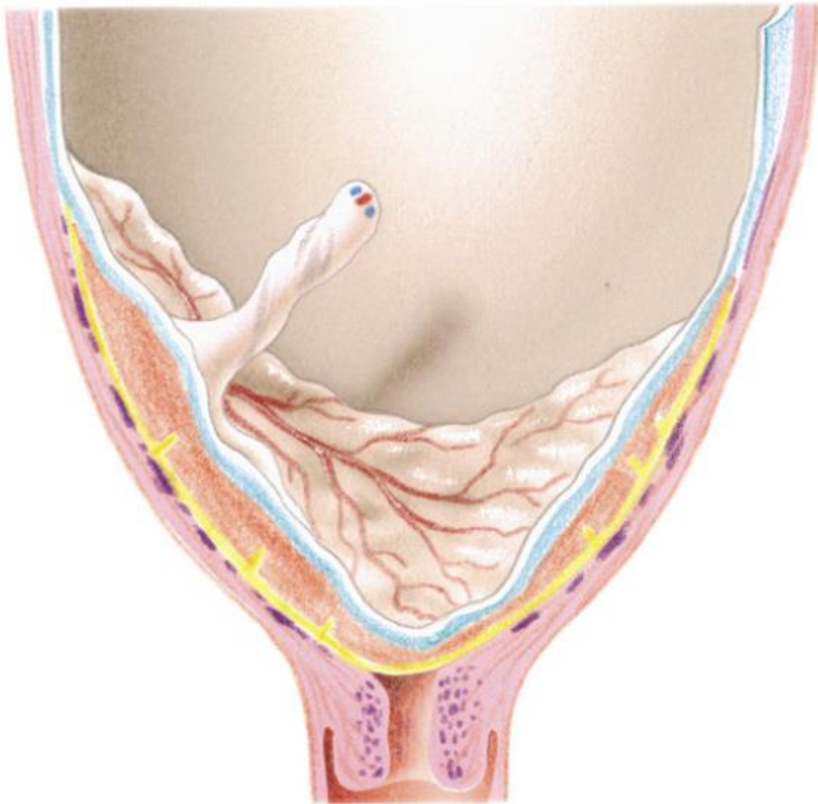
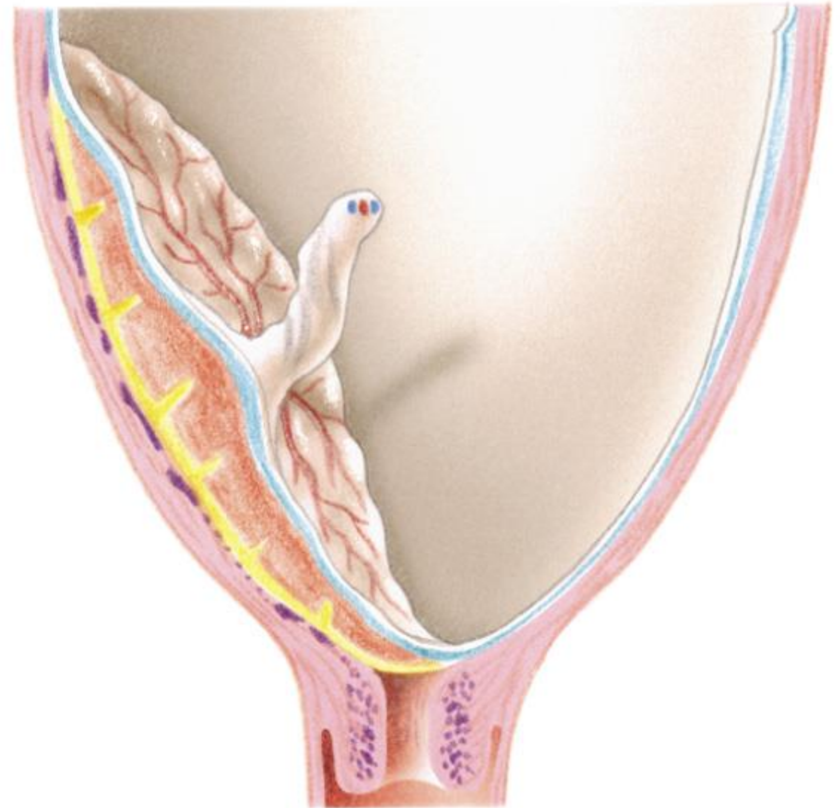
Placenta Previa

- Placental implantation in the lower uterine segment encroaching on or covering the cervical os
- Painless vaginal bleeding (3rd trimester)
- Never attempt vaginal exam
- Treat for shock
- Rapid transport
- Definitive management is delivery by C-section

Placenta Previa



Total placenta previa



Partial placenta previa

Uterine Rupture

- A spontaneous or traumatic rupture of the uterine wall
- Causes
  - Pervious C-Section, trauma

Differentiation of Abruptio Placentae, Placenta Previa, and Uterine Rupture

History	Bleeding	Abnormal Pain	Abdominal Exam
Abruptio Placentae Association with toxemia of pregnancy and hypertension of any cause	Single attack of scant, bright vaginal bleeding (often concealed) that continues until delivery	Present	may range from localized tenderness to (more likely) excruciating with abdominal rigidity that may or may not be associated with labour contractions Labor Absent fetal heart tones (often)
Placenta Previa Lack of association with toxemia of pregnancy	Repeated "warning" hemorrhages over days to weeks	Usually absent	Lack of uterine tenderness (usually) Labor (rare) Fetal heart tones (usually)
Uterine Rupture Previous cesarean section	Possible bleeding	Usually present and associated with sudden onset of nausea and vomiting	Diffuse abdominal tenderness Sudden cessation of labor Possible fetal heart tones

Management of Third-trimester Bleeding

- Prehospital management of a patient with third-trimester bleeding is aimed at preventing shock
- No attempt should be made to examine the patient vaginally
  - Doing so may increase hemorrhage and precipitate labor

Labor and Delivery

Stages of Labor

- Stage 1 (Dilation)
  - Begins with the onset of regular contractions and ends with complete dilation of the cervix
- Stage 2 (Expulsion)
  - Measured from full dilation of the cervix to delivery of the infant
- Stage 3 (Placental)
  - Begins with delivery of the infant and ends when the placenta has been expelled and the uterus has contracted

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Signs and Symptoms of Imminent Delivery

- If any of these signs and symptoms are present, prepare for delivery:
  - Regular contractions lasting 45 to 60 seconds at 1- to 2-minute intervals
  - The urge to bear down that is uncontrollable, and another symptom is bulging in the perineum and rectum or has a sensation of a bowel movement
  - There is a large amount of bloody show
  - Crowning occurs
  - The mother believes delivery is imminent

Signs and Symptoms of Imminent Delivery

- Except for cord presentation, the delay or restraint of delivery should not be attempted in any fashion
- If complications are anticipated or an abnormal delivery occurs, medical direction may recommend expedited transport of the patient to a medical facility
- Preparing for delivery
- Delivery equipment

Equipment

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Assisting With Delivery

- In most cases, the paramedic only assists in the natural events of childbirth
- Primary responsibilities of the EMS crew:
  - Prevent an uncontrolled delivery
  - Protect the infant from cold and stress after the birth

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Assisting with a Normal Delivery

- Delivery procedure
- Evaluating the infant
- Cutting the umbilical cord
- Delivery of the placenta
- Initiate fundal massage to promote uterine contraction

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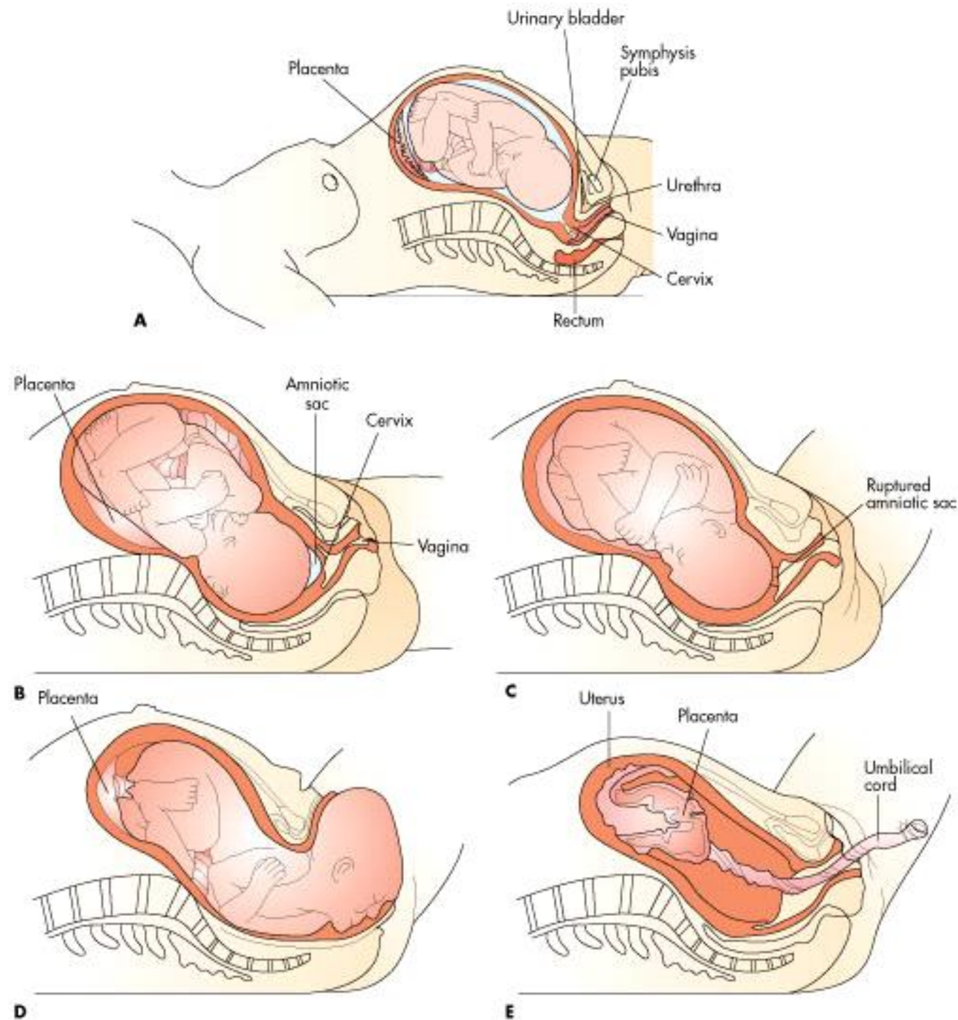
Parturition (Child birth)



Crowning

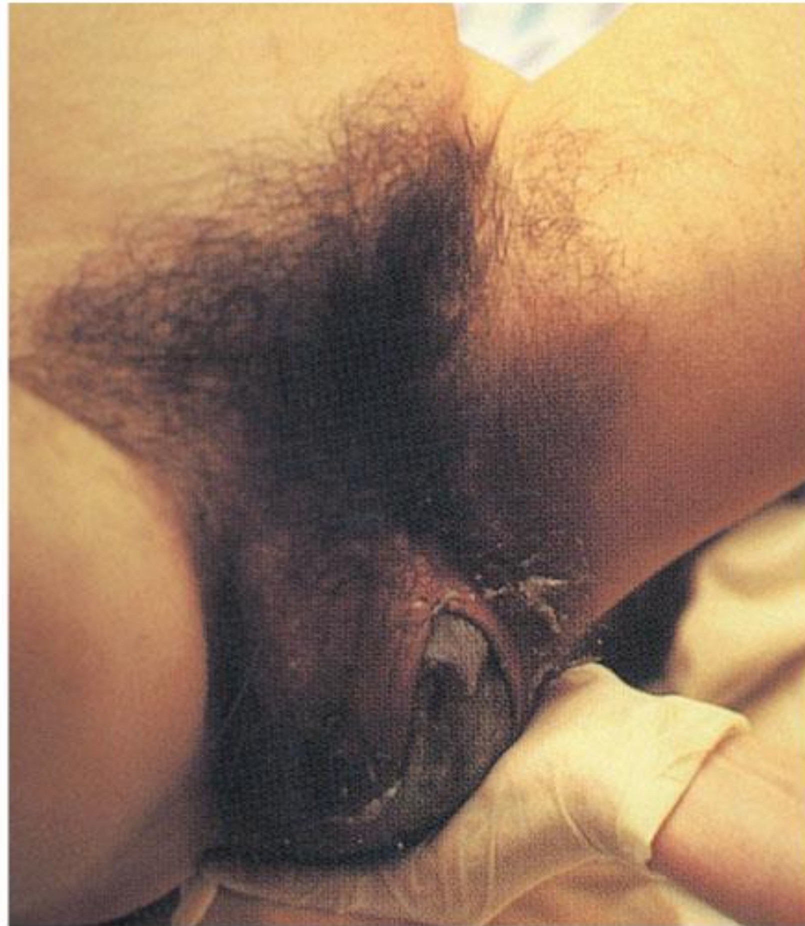


FIGURE 40-8 Crowning.

Delivery of the head

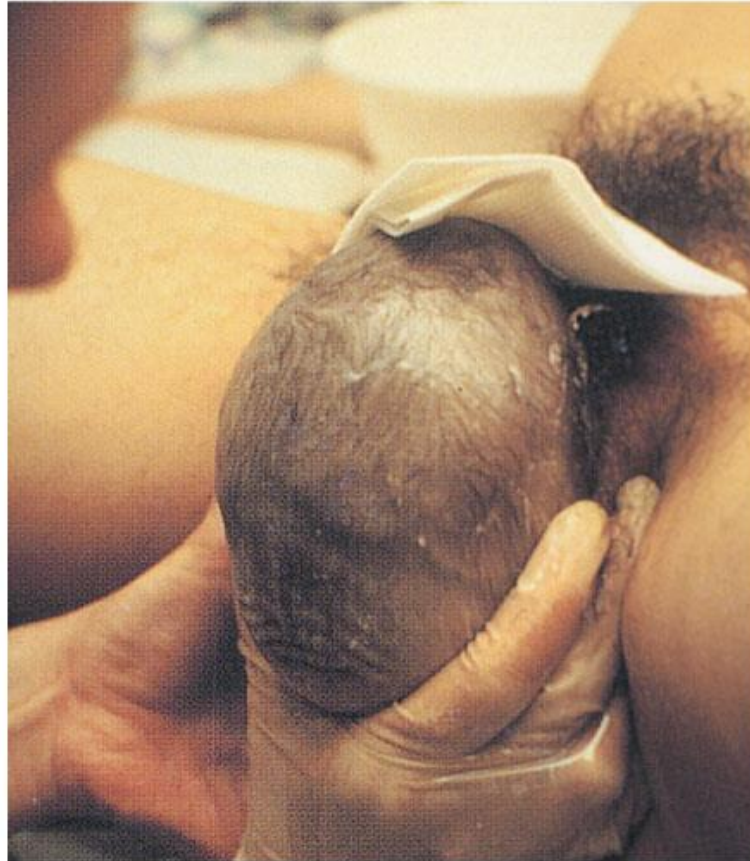


FIGURE 40-9 Delivery of the head.

External rotation of the head

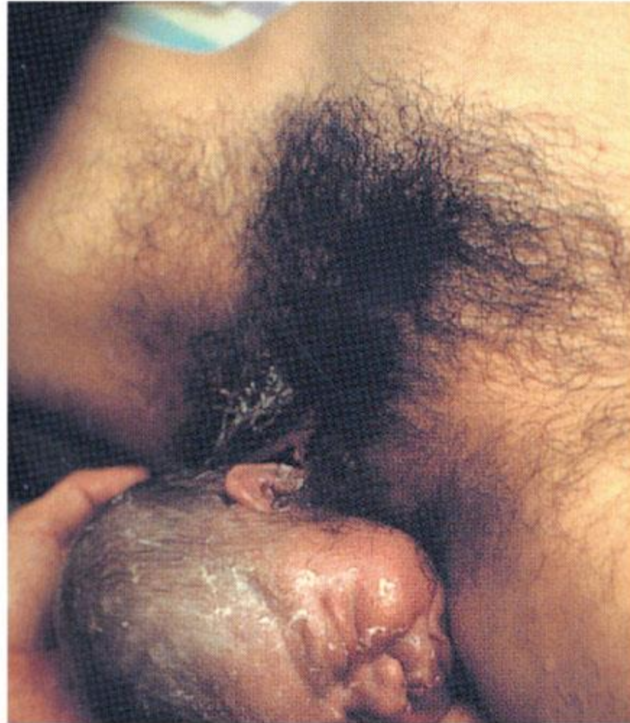


FIGURE 40-10 External rotation of the head.

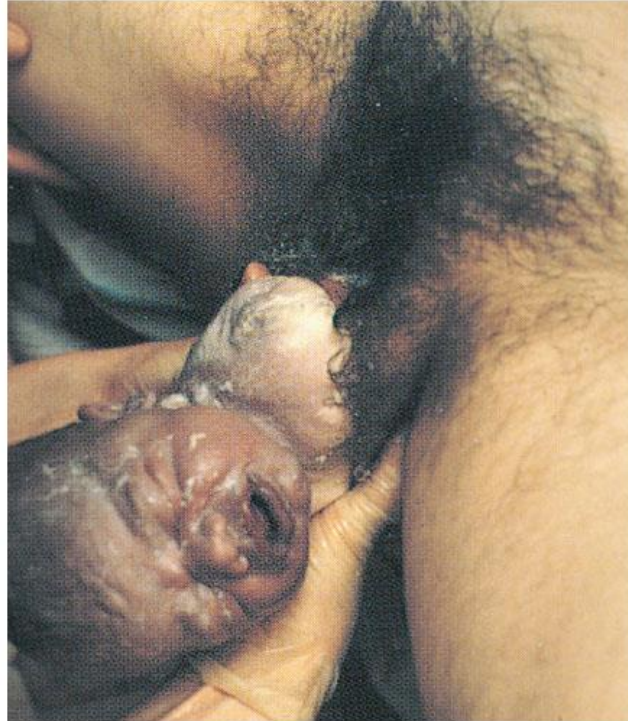


FIGURE 40-12 Delivery of the anterior shoulder.

FIGURE 40-13 Complete delivery of the infant.

FIGURE 40-14 Dry the infant.

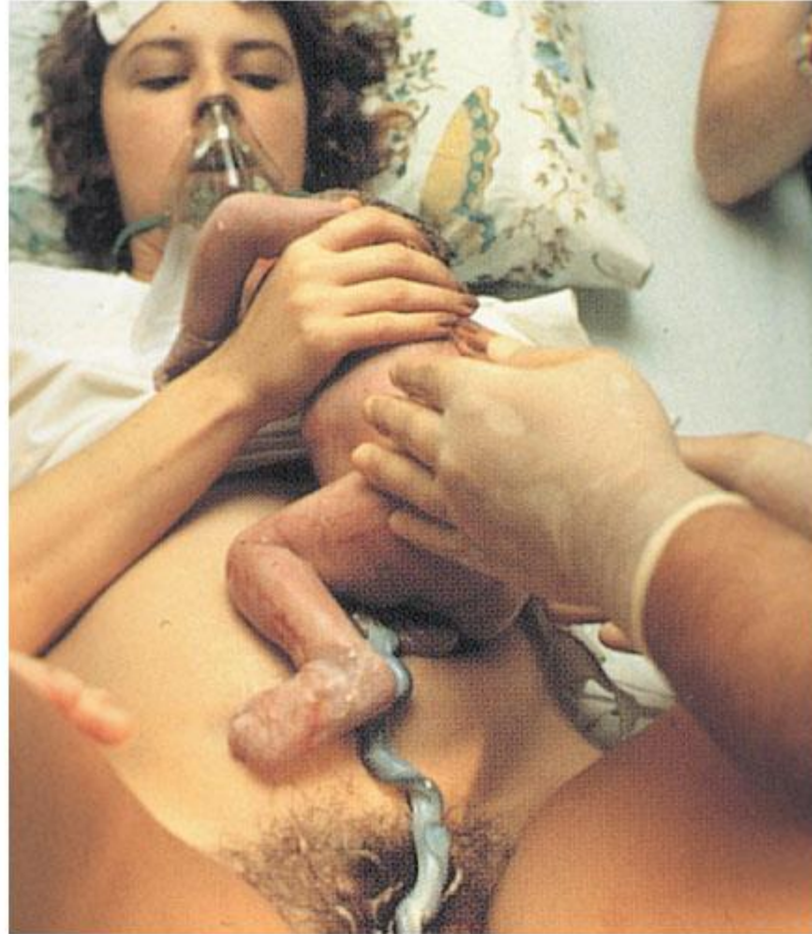


FIGURE 40-15 Place the infant on the mother's abdomen.

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Placental Delivery

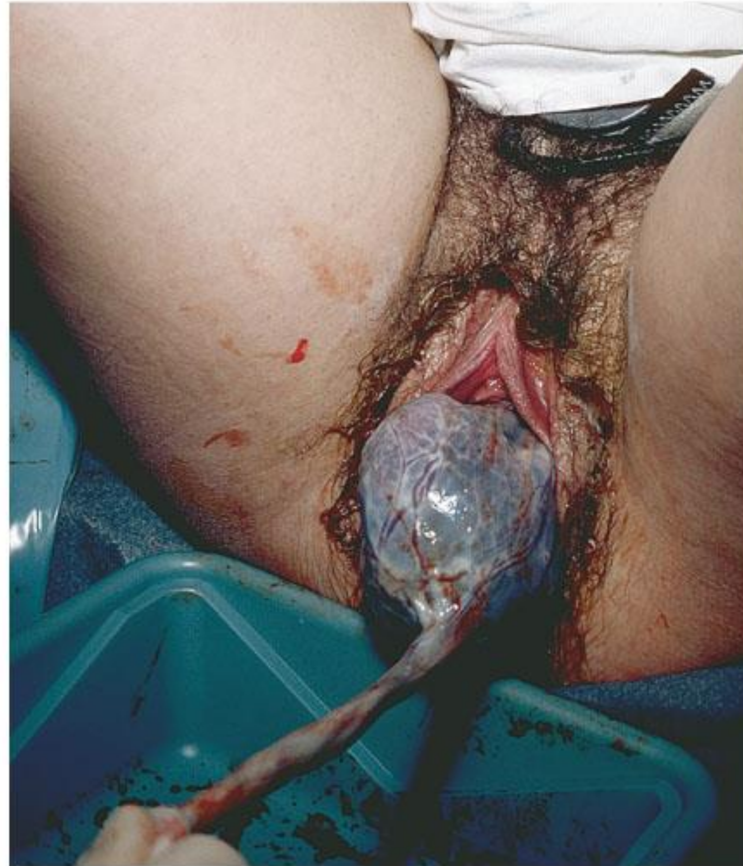
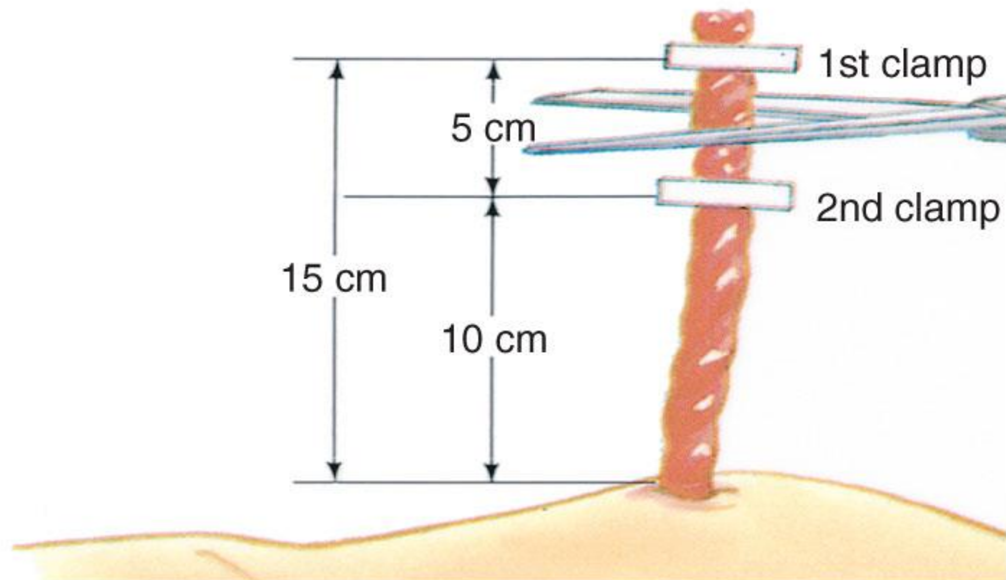


FIGURE 40-16 Deliver the placenta. and save it for transport with the mother and infant.

FIGURE 40-17 Clamp and cut the cord.



Postpartum Hemorrhage

- More than 500 mL of blood loss after delivery of the newborn
- Incidence (5%)
- Causes
  - Inadequate uterine tone
  - Retained placenta pieces or membranes
  - Vaginal or cervical tears
- Risk factors
  - Precipitous delivery
  - Uterine atony from prolonged labor
  - Grand multiparity
  - Twin pregnancy
  - Placenta previa
  - Full bladder

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Clinical Findings in PPH

Degree of Shock				
	Compensation	Mild	Moderate	Severe
Blood loss	500-1000 ml 10-15%	1000-1500 ml 15-25%	1500-2000 ml 25-35%	2000-3000 ml 35-45%
Blood Pressure Change (systolic pressure)	none	slight fall (80-100 mmHg)	marked fall (70-80 mmHg)	profound fall (50-70 mmHg)
Symptoms and Signs	palpitations dizziness tachycardia	weakness sweating tachycardia	restlessness pallor oliguria	collapse air hunger anuria

ALARM (Advances in Labour and Risk Management) course manual 18th edition (2011-2012)

Postpartum Hemorrhage

- Management
  - First steps involve recognition and initial treatment
  - Inadequate uterine tone is the cause of 70% of postpartum hemorrhages
    - Massage the uterus
    - Encourage the infant to breastfeed (releases intrinsic oxytocin)
    - Administer oxytocin IV/IM (30 U in 1 L @ 250 ml/hr)
    - Volume expanders IV
    - O_2 administration
    - Do not examine the vagina or packing

Cephalopelvic Disproportion

- Produces a difficult labor because of the presence of a small pelvis, an oversized fetus, or fetal abnormalities (hydrocephalus, conjoined twins, fetal tumors) or may also result from an unusual presentation of the fetus into the maternal pelvis
  - The mother is often primigravida and experiencing strong, frequent contractions for a prolonged period
- Prehospital care is limited to maternal oxygen administration, IV access for fluid resuscitation if needed, and rapid transport to the receiving hospital

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Abnormal Presentation

- Most infants are born head first - on rare occasions, a presentation is abnormal
  – Breech presentation
  – Shoulder dystocia
  – Shoulder presentation (transverse presentation)
    - Rapid transport, spontaneous delivery is not possible

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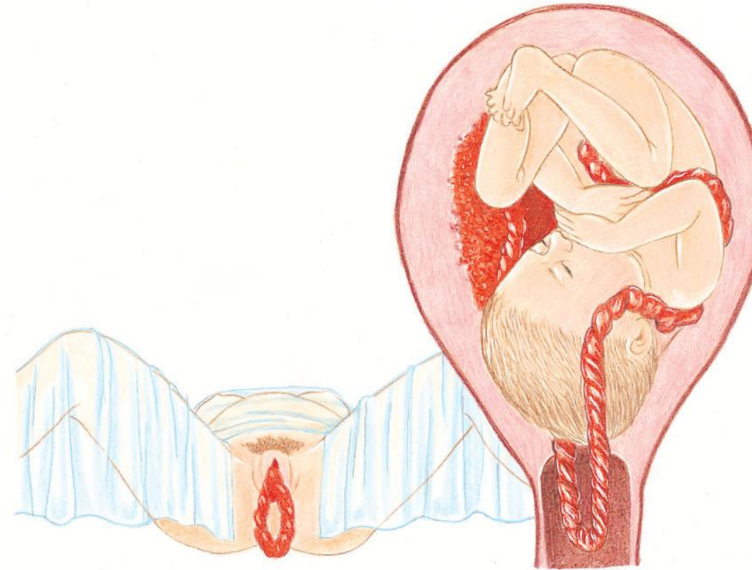
Shoulder Dystocia

- More a complication of birth rather than an abnormal presentation
- Infant's shoulders are larger than its head.
- Turtle sign.
- Place mother in knee-chest position
  - Be aware that this may place a baby in a better position for birth and so constant surveillance is indicated
- Do not pull on the infant's head.
- If baby does not deliver, transport the patient immediately.

Abnormal Presentation

- Cord presentation (prolapsed cord)
  - The umbilical cord precedes the fetal presenting part
  - Knee-chest position, continually elevating the presenting part to relieve compression on the cord
  - Administer oxygen, and keep warm
  - If the umbilical cord is seen in the vagina, insert two gloved fingers to raise the fetus off the cord. Do not push cord back
  - Wrap cord in sterile moist towel.
  - Rapid Transport immediately; do not attempt delivery.

Prolapsed Cord



- Elevate hips, administer oxygen, and keep warm.
- Keep baby's head away from cord.
- Do not attempt to push cord back.
- Wrap cord in sterile moist towel.
- Transport mother to hospital, continuing pressure on baby's head.

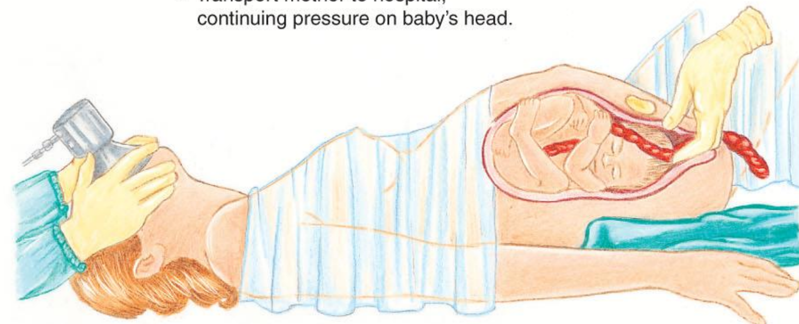
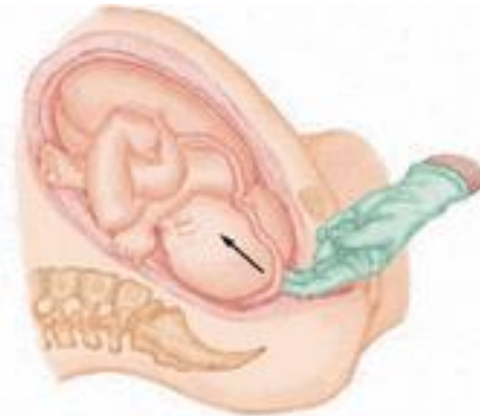


FIGURE 40-21 Prolapsed cord.

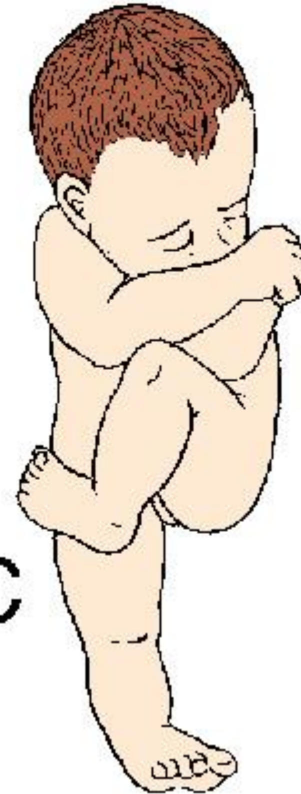
A gloved hand in the vagina pushes the fetus upward and off the cord.



Knee-chest position uses gravity to shift the fetus out of the pelvis. The woman's thighs should be at right angles to the bed and her chest flat on the bed.

The woman's hips are elevated with two pillows; this is often combined with the Trendelenburg (head down) position.

Breech presentations.



Limb Presentation

- Place the mother in knee-chest position
- Administer oxygen
- Transport immediately
- Do not attempt delivery

Abnormal Presentation

- Goals of prehospital management
  - Early recognition of potential complications
  - Maternal support and reassurance
  - Rapid transport for definitive care

Premature Birth

- A premature infant is one born before 37 weeks of gestation
- Care of the premature infant see neonatal care session

Multiple Gestation

- A pregnancy with more than one fetus
- Associated complications
- Delivery procedure

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Precipitous Delivery

- A rapid spontaneous delivery, with less than 3 hours from onset of labor to birth
- Results from overactive uterine contractions and little maternal soft tissue or bony resistance
- Usually in patients in grand multipara, fetal trauma, tearing of cord, or maternal lacerations.
- Be ready for rapid delivery, and attempt to control the head.
- Keep the baby warm.

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Uterine Inversion

- An infrequent but serious complication of childbirth
- Causes
  - Contraction with ↑ ABD pressure (cough or sneeze)
  - Excessive Fundal pressure
  - Excessive cord traction
- S/S
  - Postpartum hemorrhage
  - Sudden onset of ABD pain
  - May immediately experience bradycardia and shock
- Management
  - Place supine
  - Cover with moist sterile dressings

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Pulmonary Embolism

- The development of pulmonary embolism during pregnancy, labor, or the postpartum period is one of the most common causes of maternal death
- Causes
  - Blood clot (usually seen with cesarean)

Pulmonary Embolism

- Signs and symptoms
  - Sudden dyspnea
  - Focal CP
  - Tachycardia
  - Tachypnea
  - Hypotension

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Fetal Membrane Disorders

- Premature rupture of membranes
  - A rupture of the amniotic sac before the onset of labor, regardless of gestational age
  - Signs and symptoms include a history of a “trickle” or sudden gush of fluid from the vagina
  - Transport for physician evaluation
- Amniotic fluid embolism
  - May occur when amniotic fluid gains access to maternal circulation during labor or delivery or immediately after delivery