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Навчальний посібник присвячений вивченню фізіологічного перебігу вагітності, пологів та післяпологового періоду і розроблений для англomовних студентів медичних та стоматологічних факультетів вищих медичних закладів III-IV рівнів акредитації. Посібник створений з урахуванням новітніх підходів до ведення вагітності та пологів, прекоцепційної підготовки та основ перинатології, і стане у нагоді молодим лікарям, що навчаються у інтернатурі та клінічній ординатурі за спеціальністю «Акушерство та гінекологія» та «Загальна практика-сімейна медицина».

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The textbook is designed to study the physiological course of pregnancy, labor and postpartum and is intended for English-speaking students of medical and dental faculties of higher medical institutions of III-IV levels of accreditation. The textbook takes into account modern approaches of pregnancy and labor management, preconception care and perinatology basis. It is of use to young doctors-interns and residents of speciality "Obstetrics and Gynecology" and "General Practice-Family Medicine".

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«Ukrainian Medical Stomatological Academy»

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PHYSIOLOGICAL OBSTETRICS

*Textbook for English-speaking students
of medical and dental faculties of higher medical educational establishments of
III-IV levels of accreditation, doctors-interns and residents of speciality
“Obstetrics and Gynecology” and “General Practice-Family Medicine”*

Poltava

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ABBREVIATIONS

ACT	asparticaminotransferase
BFHB	basale frequency of heart-beats
BTF	biophysical type of fetus
BV	bacterial vaginosis
CCT	controlled cord traction
CMV	cytomegalovirus
CTG	cardiotocography
ECG	electrocardiography
FHB	frequency of heart-beats
FHR	fetal heart rate
FIGO	International Federation of Gynecology and Obstetrics
GBS	group B streptococci
GDM	gestational diabetes mellitus
HBV	hepatitis B virus
HCG	human chorionic gonadotropin
HIV	human immunodeficiency virus
IP	index of resistention
MCV	minute cardiac volume
MAS	meconium aspiration syndrome
RMF	respiratory motions of fetus
SDR	systolic-diastolic relation
STDs	sexually transmitted diseases
UST	unstressing test
WHO	World Health Organization

CHAPTER 1. THE STRUCTURE OF BIRTH CANAL. MATERNAL PELVIS AND FETAL SKULL

ANATOMY OF FEMALE BIRHT CANAL

The birth canal consists of bones and soft part.

Soft part of birth canal is represented by uterus, cervix, vagina and muscular and fascial system of pelvic floor.

The *uterus (or womb)* is the major female reproductive organ. On one end there is the cervix, which opens into the vagina; and on the other it is connected both sides to the fallopian tubes. The uterus is located inside the pelvis and is dorsal to the urinary bladder and ventral to the rectum. The uterus has thick, muscular walls and is very small. When woman is not pregnant, its size is several centimeters in diameter. In a nulliparous woman, the uterus is only about 7 cm long and 4 to 5 cm wide, but it can expand to the size of 4 kg baby. From outside to inside, there are the following uterus parts:

- Cervix uteri - "neck of uterus":
 - Canal of the cervix
 - External and internal orifices of the cervix
- Isthmus of uterus
- Corpus uteri - "Body of uterus":
 - Cavity of the body of the uterus
 - Fundus of uterus.

The end of the uterus is called the cervix. Longitudinal size of cervix is about 2.5 cm. External and internal orifice of the cervix is closed. Before labor cervix becomes shorter and orifice of the cervix begins to open.

The cervix secretes mucus, which consistency varies with the stages of menstrual cycle. This cervical mucus is clear, runny and conducive to sperm at ovulation time.

The wall of uterus consists of 4 layers. The layers of uterus, from inside to outside, are as follow.

Endometrium. The lining of the uterine cavity is called "endometrium". It is a mucous lining, which consists of lamina propria and superficial epithelium. The endometrium builds a lining periodically which, if no pregnancy occurs, is shed or reabsorbed. Shedding of the endometrial lining in humans is responsible for menstrual bleeding (known colloquially as a woman's "period") throughout the fertile years of a female and some time beyond. During pregnancy endometrium changes to the deciduas. Its major function is to accept a fertilized ovum which becomes implanted into the endometrium, and derives nourishment from blood vessels which develop exclusively for this purpose in endometrium. The fertilized ovum becomes an embryo, develops into a fetus and gestates until childbirth.

Myometrium. The uterus mostly consists of smooth muscle known as "myometrium". The muscular fibres of miometrium have 3 distinct directions: outer longitudinales, middle interlacing and inner circular.

Perimetrium. This is a serous coat, which covers the entire organs except on the lateral borders. The uterus is surrounded by peritoneum.

Uterus is held in place by several *peritoneal ligaments*. They are divided into suspending, immobilizing and supporting structures. The suspending structure of interna genitalia comprises the following:

Table 1

Peritoneal ligaments

Name	From	To
Broad ligament of the uterus (mesometrium)	the sides of the uterus	the walls and pelvic floor
Round ligament of uterus	lateral angle of the uterus (uterine horns)	labium majus
Ovarian ligament (or "proper ovarian ligament")	lateral surface of uterus	ovaries
Uterosacral ligaments	posterior surface of uterus (the	Anterior surface

	point where isthmus transforms into cervix)	of the sacrum
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Immobilizing system comprises: Cardinal ligaments and Uterosacral ligaments. Supporting system comprises: muscles and fascies of pelvis floor (see below)

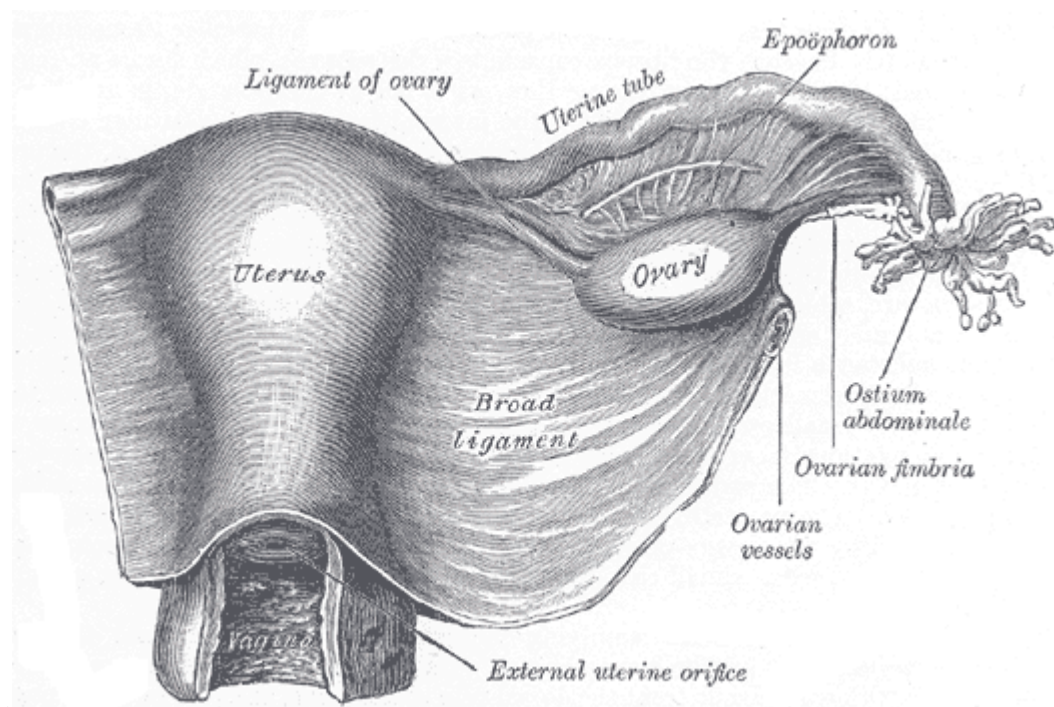


Figure 1. Anatomy of inner reproductive organs.

Vagina is the tubular tract leading from the uterus to the exterior. The human vagina is an elastic muscular canal that extends from the cervix to the vulva. Although there is a wide anatomical variation the average vagina is 15 to 18 cm in length; its elasticity allows it to stretch during sexual intercourse and during labor and delivery. The vagina connects the vulva (which is outside the body) to the cervix of the uterus (which is inside the body). If the woman stands upright, the vaginal tube points in an upward-backward direction and forms an angle of slightly more than 45 degrees with the uterus. The vaginal opening is at the back (caudal) end of the vulva, behind the opening of the urethra. Vaginal lubrication is provided by the Bartholin's glands near the vaginal opening and the cervix. The membrane of the vaginal wall also produces moisture, although it does not contain any glands.

Before and during ovulation, the cervix produces cervical mucus, which provides favorable environment for sperm to survive.

There are anterior, posterior, and 2 lateral walls of the vagina. The part of its cavity around the cervix is called fornix. There are 4 fornices: anterior, posterior, and 2 lateral ones.

During childbirth, the vagina provides the route to deliver the baby from the uterus to outside the body of the mother. During birth, the vagina is often referred to as the birth canal. The vagina is remarkably elastic and stretches to many times its normal diameter during vaginal birth.

Ending part of birth canal is represented external reproductive organs end perineum. *External genitalia* include such organs as: Labia majora and minora, Clitoris, Vestibule, Perineum.

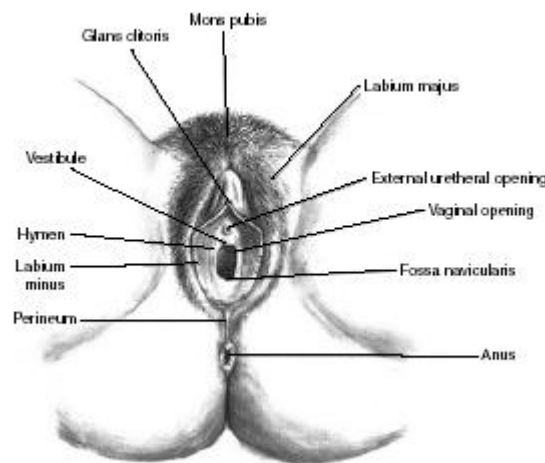


Figure 2. Anatomy of external reproductive organs.

Unlike the male, the female has separate openings for the urinary tract and reproductive system. These openings are covered externally by two sets of skin folds. The thinner, inner folds are the labia minora and the thicker, outer ones are the labia majora. The labia majora are covered with squamous epithelium and contain sebaceous glands, sweat glands and hair follicles.

The labia minora are two thin folds of skin, devoid of fat, on either side just within labia majora. Anteriorly they are united with each other in front and behind clitoris. The lower portion of the *labia minora* fuses across the midline to form a fold of skin known as fourchette. The labia minora contain connective

tissues, numerous sebaceous glands, numerous vessels and nerve endings and also erectile tissue, like that in the penis, thus it change shape when the woman is sexually aroused.

Clitoris. It is a small cylindrical erectile body, situated in the most anterior part of the vulva, at the anterior end of the labia, under the pubic bone. It consists of glands, a body and two crura. The glands are covered with squamous epithelium and are very supplied with nerves and vessels. The vessels of clitoris are connected with the vestibular bulb and are liable to be injured during childbirth.

The opening around the genital area is called the *vestibule*. It is triangular space bounded anteriorly by the clitoris, posteriorly by the fourchette and on either side by the labia minora. There are 4 openings into vestibule:

1. uternal opening
2. paraurethral ducts
3. vaginal orifice and hymen
4. opening of Bartholin's ducts

There are two Bartholin's glands, one on each side. They are situated in the superficial perineal pouch, close to the posterior end of vestibular bulb. They are pea-sized and yellowish white in colour. Each gland has got a duct measures about 2 cm long and opens into the vestibule outside the hymen at the junction of anterior two thirds and posterior one third in the groove between the hymen and the labius minus.

Hymen is membrane that partially covers the opening of the vagina. This is torn by the woman's first sexual intercourse (or sometimes other causes like injury). In women, the openings of the vagina and urethra are susceptible to bacterial infections.

Perineum. It is divided into anatomical and obstetrical perineum. *Anatomical perineum* is bounded above by the inferior surface of pelvic floor, below by skin between the buttocks and thighs. Laterally it is bounded by the ischiopubic rami, ischial tuberosities and sacrotuberous ligaments. Posteriorly it is

bounded by coccyx. The perineum is divided into 2 triangular spaces: anterior (urogenital triangle) and posterior (anal triangle).

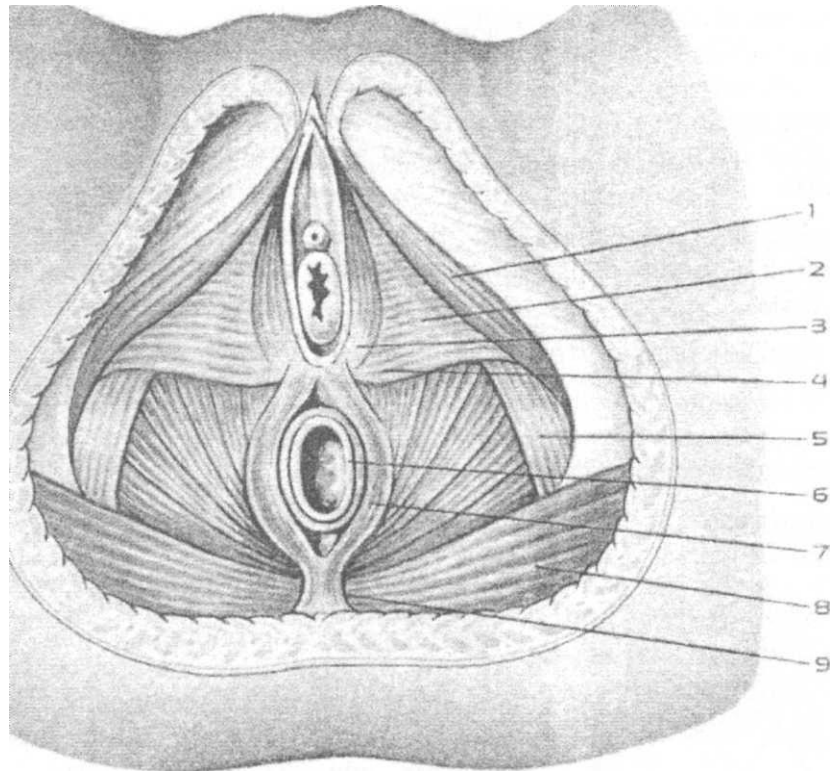


Figure 3. The muscul and fascial structures of perineum. 1 – m. ischiaspongiosus; 2 - urogenital diaphragm; 3 – m. bulbospongiosus; 4 – m. transversus perineum superficialis; 5 –m. obturatoria interna; 6 – rectum; 7 - sphincter ani externus; 8 – piriformis muscles; 9 – m. pubococcygeus muscles (legament)

Obstetrical perineum is pyramidshaped tissue between commissural labial posterior and anal canal. It measures about 4x4 cm. The base is covered with perineal skin and the apex is pointed and continues with retrovaginal septum.

Fasciae: Superficial perineal fasciae (2 layer), Inferior and Superior layers of urogenital diaphragm. Together they are called triangular ligaments.

Muscles: Superficial and Deep transverse perineum; Bulbospongiosus; Levator ani; Sphincter ani externus (see Figure 3).

Blood supply of perineum.

Arteries: - branches of internal pudendal artery:

- labial
- transverse perineal

- artery of vestibular bulb
- deep and dorsal arteries to the clitoris
- branches of femoral artery:
 - superficiae and deep external pudendal

Veins: internal pudendal vein, vaginal venous plexus, long saphenous vein.

MATERNAL PELVIS

Bony part of birth canal consists of bones of pelvis. Pelvis has an important significance in obstetrical practice. It forms and defines the birth canal size during labor. The pelvis of an adult woman consists of 4 bones: two innominate bones, sacrum and coccyx. The innominate bone consists of ilium, pubis and ischium. These are united together by four joints: two sacroiliac joints, sacrococcygeal joint and the symphysis pubis.

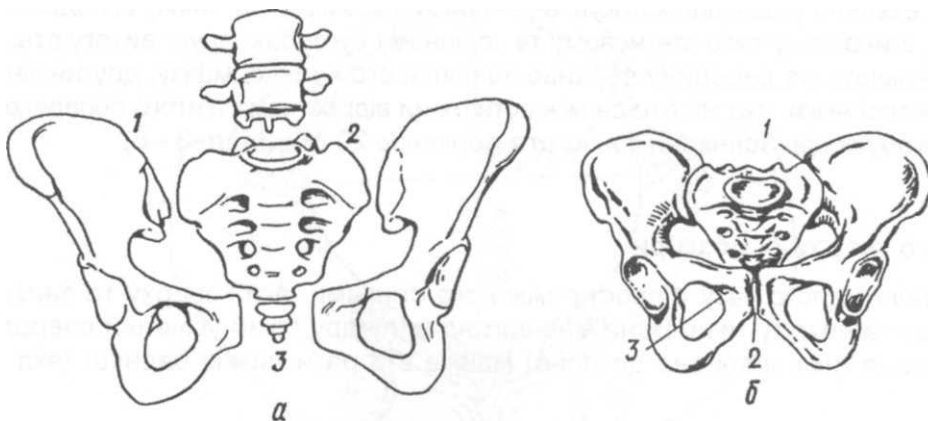


Figure 4. Bones of pelvis (a: 1 - innominate bone; 2 - sacrum, 3 - coccyx) and joints (b: 1- sacroiliac joints; 2 - symphysis pubis; 3 - sacrococcygeal joint)

Female pelvis differs from male: female bones are thinner and smoother; female pelvis is shorter and wider than in male; the cavity of the female pelvis looks like cylinder, and the male one is crater-like.

The pelvis is anatomically divided into a true pelvis and a false pelvis, the boundary line being the brim of the pelvis. The bony landmarks on the brim of the pelvis from anterior to posterior on each side are the upper border of the symphysis pubis, pubic crest, pubic tubercle, pectineal line, iliopectineal

line, sacroiliac articulation, anterior border of the ala of the sacrum and sacral promontory.

The false pelvis. It is much wider than the true pelvis. It is bounded laterally by the large fan-shaped iliac bones, posteriorly by the last, lumbar vertebrae and anteriorly by the lower portion of the abdominal wall. It has got a little obstetric significance except that its measurements can to a certain extent predict the size and configuration of the true pelvis.

The important diameters are:

- *Distancia spinarum*: 25-26 cm - it is the distance between two anterior superior iliac spines.
- *Diastancia cristarum*: 28-29 cm - it is the distance between the most widely separated points on the outer border of the iliac crests.
- *Diastancia trochanterica*: 31-32 cm - it is the distance between the trochanters of both sides.
- *Conjugata externa* (diameter of Baudelocque) : 20-21 cm - it is the distance between the tip of the 5th lumbar vertebra (upper point of Michaelis rhomboid) and the upper border of the anterior surface of the symphysis pubis.

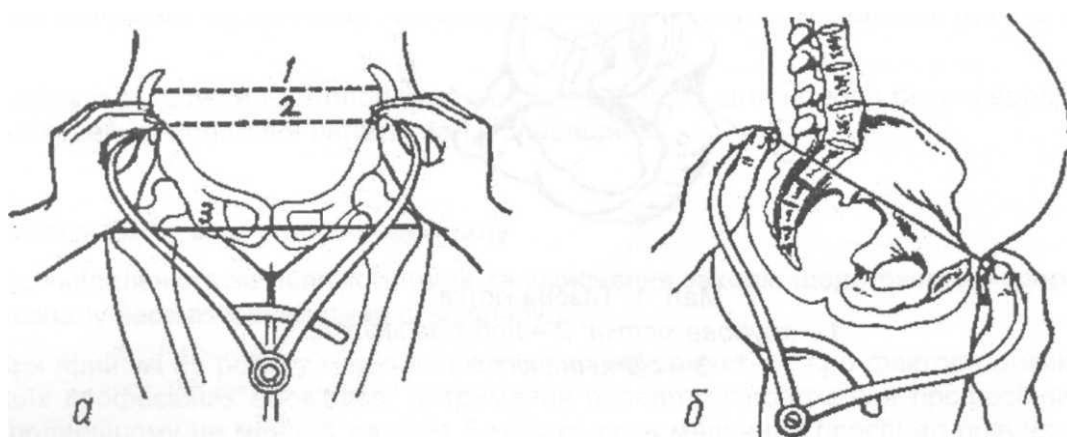
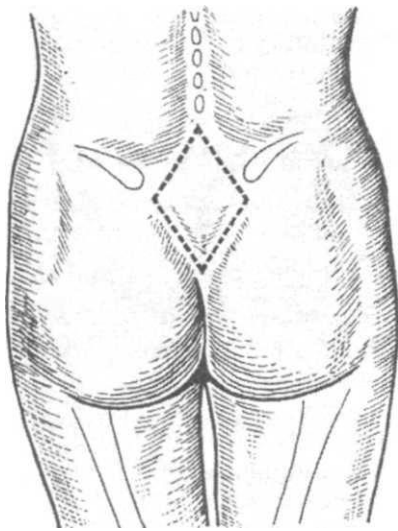


Figure 5. External sizes of pelvis: a - transverse: 1 - distantia cristarum; 2 - spinarum; 3 - trochanterica; b – conjugata externa



Michaelis rhomboid (lumbosacral rhombus).

In women the sacral triangle is expanded to form a diamond-shaped figure with the following boundaries: the left and right posterior superior iliac spines, the spinous process of the L4 vertebra, and the upper part of the anal cleft.

Figure 6. Michaelis (lumbosacral) rhomboid

With a normal female pelvis, the vertical and horizontal dimensions of the rhomboid are approximately equal. The shape of the Michaelis rhomboid reflects the width of the female pelvis, providing an indirect indicator of the size of the birth canal.

In a normal pelvis the shape of the rhombus approximates a square with the following sizes: horizontal diagonal is 10-11 cm, vertical diagonal - 11 cm. In various types of contracted pelvis the horizontal and vertical diagonals are of different length, which changes the shape of the rhombus.

All those diameters are taken by external pelvimetry with the help of callipers (obstetrical examination). For measuring of transverse diameter of pelvis (distantia spinarum, cristarum and trochanterica) the patient lies on the back, the obstetrician is on the side facing her. To measure the conjugata externa the patient turns on the side, the lower leg is bent in the femoral and knee joint, the upper leg is straight. On the back the button of the pelvimeter should be placed between spinous processes of V lumbar vertebra and I sacral vertebra, that is, into the suprasacral pit coinciding with upper angle of the Michaelis rhomboid. In front the button should be placed into the middle of the upper edge of symphysis pubis.

The most important size of pelvis is *Conjugate vera* (syn: *true conjugate*, *obstetric conjugate*, *antero-posterior diameter of inlet*). It is the distance between the sacral promontory and midpoint of the inner border of the pubic symphysis. It can not be measured by pelviometer, but can be calculated by formulas:

Formula-1:

$$\text{Conjugate vera} = \text{conjugata externa} - 9$$

Formula-2:

$$\text{Conjugate vera} = \text{Conjugata Diagonalis} - \text{Soloviov's index (see later)}$$

Normally it measures about 11 cm.

Conjugata diagonalis is the anteroposterior dimension of the inlet that measures the clinical distance from the promontory of the sacrum to the lower margin of the symphysis pubica. Normally it should be 13 cm. *Conjugata diagonalis* can be measured during vaginal examination.

The obstetrician introduces index and long fingers into the vagina and moves them along the sacral hollow to sacral promontory. The tip of the long finger is fixed on its apex and palm edge rests on the lower margin of symphysis. The place where doctor's fingers touch the lower margin of symphysis is marked by the finger of another hand. When fingers are taken out of the vagina, the

distance between the tip of the long finger and the marked point of palm edge and lower margin of symphysis contact are measured by pelvimeter or tape measure.

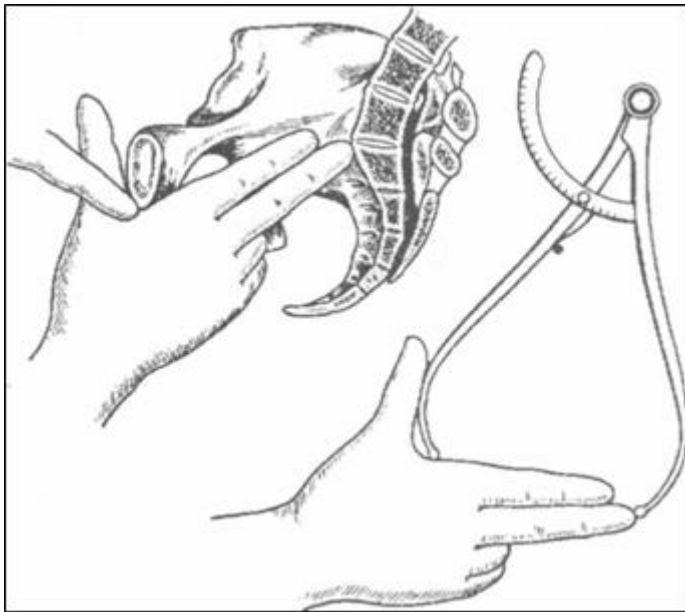


Figure 7. Measuring of conjugata diagonalis

Soloviov's index is the evidence for female bones thickness. It is calculated by formula: *Soloviov's index* = *Circumference of the radiocarpal joint in cm* / 10.

For example, *Conjugata Diagonalis* is measured during vaginal examination and it is 13 cm. Circumference of the radiocarpal joint is 15 cm. For *Soloviov's index* calculation it is necessary to divide circumference of the radiocarpal joint (15 cm) by 10. *Soloviov's index* is 1.5. To determine *Conjugata vera* it is

necessary to subtract 1,5 from Conjugata Diagonalis (13 cm). Thus, Conjugata vera is 11.5 cm.

Basic external sizes of pelvis and Conjugata Diagonalis are measured for all pregnant without the exception.

If during examination the basic sizes do not meet standard and there is suspicion on a narrow pelvis, the additional measuring is conducted.

The true pelvis.

In obstetrical practice the sizes of lesser (true) pelvis are of great importance. The course and outcome of labour for mother and fetus depend on it. But most sizes of lesser pelvis can not be measured directly.

The true pelvis is a bowl-shaped structure formed from the sacrum, pubis, ilium, ischium, the ligaments which interconnect these bones and the muscles which line their inner surfaces. The true pelvis is considered to start at the level of the plane passing through the promontory of the sacrum, the arcuate line on the ilium, the iliopectineal line and the posterior surface of the pubic crest. This plane, or 'inlet' lies at an angle of between 35 and 50° up from the horizontal and above this the bony structures are sometimes referred to as the false pelvis. They form part of the walls of the lower abdomen. The floor or 'outlet' of the true pelvis is formed by the muscles of levator ani. Although the floor is gutter shaped, it generally lies in a plane between 5 and 15° up from the horizontal.

Obstetrically it is divided into 4 planes:

1. plan of pelvic inlet
2. plane of mid cavity (plane of great pelvic dimensions)
3. plane of obstetrical outlet (plane of least pelvic dimensions)
4. plan of anatomical outlet.

Those are imaginary planes, not mathematical ones.

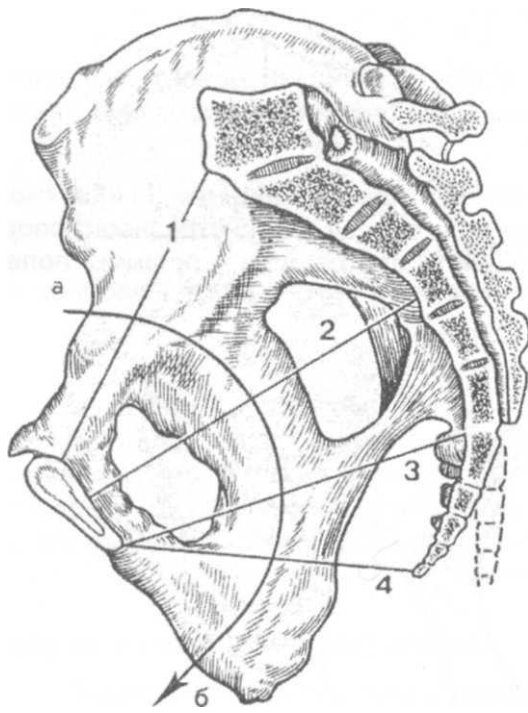


Figure 8. Planes of pelvis (a: 1 - inlet, 2 - cavity, 3 - obstetrical outlet, 4 - anatomical outlet) and pelvic axis (b)

I. Inlet — the circumference of the inlet is formed by the superior margin of the symphysis pubis (anteriorly), pectineal line (laterally), sacral promontory (posteriorly).

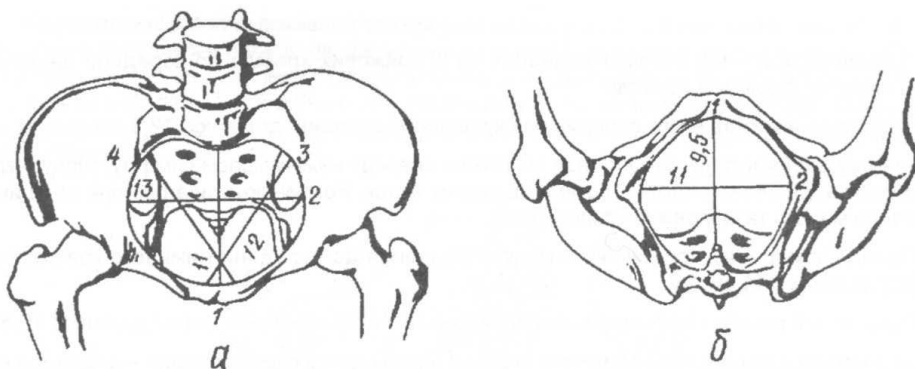


Figure 9. Sizes of true pelvis planes (1 - direct (anterior-posterior) diameter; 2 - transversal; 3, 4 - right and left oblique diameters): a - inlet, b - anatomical outlet (sizes are resulted in centimetres)

Shape: it is normally more oval than round with anteroposterior diameter being the shortest.

Diameters: the measurements of the diameters are all approximate.

1. *Antero-posterior diameter* (syn: *true conjugate*, *obstetric conjugate*, "*conjugate vera*"). It is the distance between the midpoint of the sacral promontory to the inner margin of the symphysis pubis. It measures about 11 cm. Its measurement is

inferred by subtracting 2.0 - 1.5 cm from the diagonal conjugate. Diagonal conjugate is the distance between the lower border of the symphysis pubis to the midpoint on the sacral promontory. It measures more than 12 cm. The distance between the midpoint of the sacral promontory to the outer margin of the symphysis pubis is called anatomical conjugate and its measure is 11.5 cm.

2. *Transverse diameter.* It is the distance between the two farthest points of the pelvic brim over the iliopectinal lines. It measures 13 - 13.5 cm. The diameter divides the brim into anterior and posterior segments.

3. *Oblique diameters.* There are two oblique diameters - right and left. Each one extends from one sacroiliac joint to the opposite iliopubic eminence and measures 12-12.5 cm. Right or left denotes the sacroiliac joint from which it starts.

II. Cavity. It is the segment of the pelvis bounded above by the inlet and below by the plane of the obstetrical outlet. This plane extends from the midpoint of the symphysis pubis to the junction of the second and third sacral vertebrae. It is called the plane of the greatest pelvic dimensions. It is the most bony limited plane of the pelvis.

Shape: It is almost round.

Diameters: 1. *Antero-posterior diameter* is 12.5 cm. It measures from the midpoint of the posterior surface of the symphysis pubis to the junction of the second and third sacral vertebrae.

2. *Transverse:* is 12.5 cm. It cannot be precisely measured as the points lie over the soft tissues covering the sacrosciatic notches and obturator foramina.

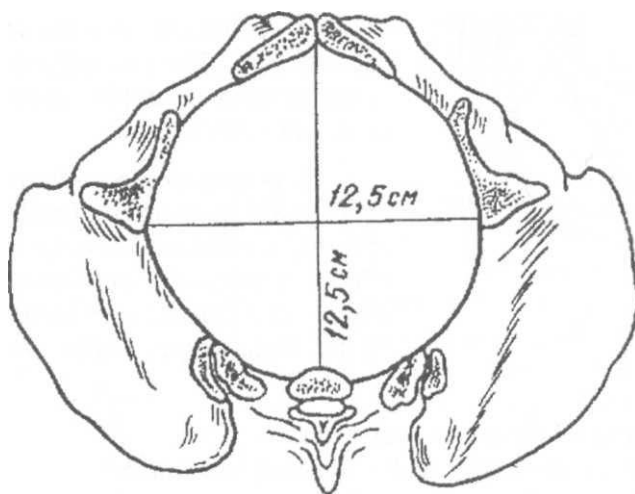


Figure 10. Sizes of cavity: antero-posterior (direct) and transverse diameters

III. Obstetrical outlet. It is the segment of the pelvis bounded above by the plane of the greatest pelvic dimensions and below by the anatomical outlet. Its anterior wall is formed by the pubic arch, its lateral walls are formed by ischial bones and the posterior wall includes the tip of the sacrum. It is the plane of the least dimensions or narrow pelvic plane. This plane extends anteriorly from the lower border of the symphysis pubis, laterally to the tip of ischial spines and posteriorly to the tip of the 5th sacral vertebra.

Shape: it is antero-posterior oval.

Diameters:

1. *Anterio-posterior:* is 11 cm. It extends from the inferior border of the symphysis pubis to the tip of the sacrum (or joint of the sacrum and coccyx).

2. *Transverse (syn.: bispinous):* is 10.5 cm. It is the distance between the tip of two ischial spines (the narrowest diameter of the pelvis).

IV. Anatomical outlet. It is bounded in front by the lower border of the symphysis pubis, laterally by the ischiopubic rami, ischial tuberosity and sacrotuberous ligament and posteriorly by the tip of the coccyx. Thus, it consists of two triangular planes with a common base formed by a line joining the ischial tuberosities. The apex of the anterior triangle is formed by the inferior border of the pubic arch and that of the posterior triangle by the tip of the coccyx. The plane is formed by a line joining the lower border of the symphysis pubis to the tip of the coccyx.

Shape: It is diamond-shaped.

Diameters:

1. *Antero-posterior.* It extends from the lower border of the symphysis pubis to the tip of the coccyx. It measures 9.5 cm. This size incises in labor, when the head of baby passing through this plan and the coccyx pushing back (on 2-2.5 cm till 11-12 cm).

2. *Transverse (syn.: intertuberous):* is 11 cm. It extends between the inner borders of ischial tuberosities.

The sizes of anatomical outlet can be measured directly. For this purpose the pregnant woman lies supine with her legs bent in coxae and knee joints, pulled apart and up to the abdomen. The measuring is done with special pelvimeter or tape measure. A direct size is measured between lower margin of symphysis and the tip of the coccyx. To measure transverse size it is necessary to add 1,5 sm to the obtained distance between interior surfaces of ischial tuberosity (9,5 sm) taking into account the soft tissues thickness.

A hypothetical curved line joining the centre point of each of the four planes of the pelvis, marking the centre of the pelvic cavity at every level is called pelvic axis.

Pubic angle is 90-100°, angle of pelvic inclination is 55-60°. Symphysis-fundal height is measured at vaginal examination and is 3,5-4 sm.

ANTROPOMETRIC INFORMATION ABOUT FETUS AT THE END OF PREGNANCY

Signs of fetal maturity:

- 1) Growth of mature fetus is more than 47 sm.
- 2) Body mass of mature fetus is more than 2500 g.
- 3) An umbilical cord is located on a middle between a mons pubis and ziphoid process.
- 4) A skin is rose, healthy, developed. Vernix caseosa is only in the inguinal and axillary areas of skin.
- 5) Nails cover the ends of fingers.
- 6) Length of hair on a head is 2 sm.
- 7) The cartilages of ears and nose are tight.
- 8) Boys' testicles are descended in a scrotum, girls' labia minora and clitoris are covered with labia majora.

The fetal skull. The study of the fetal skull is of great importance. The fetal skull is to some extent compressible, and made mainly of thin pliable flat bones forming the vault, and incompressible bones are at the base of the skull.

The skull is divided into several **zones of obstetrical importance**. They are:

- Vertex. It is a quadrangular area, bounded anteriorly by the bregma and coronal sutures, behind by the lambdoid sutures, and laterally by lines passing through the parietal eminences.
- Brow. It is an area bounded on one side by the anterior fontanelle and coronal sutures and on the other side by the root of the nose and supraorbital ridges of either side.
- Face. It is an area bounded on one side by the root of the nose and supraorbital ridges and on the other — by junction of the floor of the mouth with neck.
- Sinciput is the area lying in front of the anterior fontanelle and corresponds to the area of the brow and the occiput is limited to the occipital bone.

Flat bones of the vault are united by non-ossified membranes attached to the margins of the bones. These are called **sutures of fetal skull**.

The following sutures are more important in obstetrical practice.

- ♦ *The sagittal (longitudinal) suture* - between two parietal bones. Anteriorly it is bounded by the large fontanelle, and posteriorly — by the small fontanelle.
- ♦ *The frontal suture* is the junction of the two frontal bones. The direction is the same as of the sagittal one.
- ♦ *The coronal sutures* lie between parietal and frontal bones on either side. Its direction is perpendicular to the sagittal and frontal sutures.
- ♦ *The lambdoid suture* lies between occipital and parietal bones.

Fontanelle is a wide gap in a suture line, free of ossification. Fontanelle can facilitate the molding of the head during labor. The following fontanelles are of great importance in obstetrical practice:

- *Anterior (or large) fontanelle*. It is formed by joining the 4 sutures: frontal, sagittal and two coronal in the midplane. The shape is like a diamond. In mature fetus its diameter is about 30 mm.

- *Posterior (or small) fontanelle.* It is a triangular soft area, formed by junction of three sutures: the sagittal suture (anteriorly), and lambdoid suture (laterally on the left and right sides).

Diameters of the fetal skull. The following diameters are of great importance in obstetrical practice:

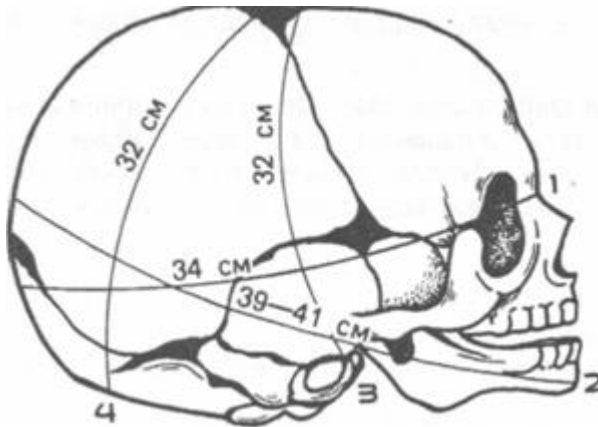


Figure 11. Circumflexion of the fetal

skull according to its diameters: 1- d. fronto-occipital; 2 - d. mentooccipital; 3 - d. sublingva-bregmatic; 4 - d.suboccipito-bregmatic)

- **The suboccipitobregmatic diameter**, called ***small oblique diameter***. It is the distance between the anterior angle of the large fontanelle and the lowest posterior point of the occiput. Usually it is about 9.5 cm, its circumference is about 32 cm.
- **The suboccipitofrontal diameter**, which is measured from the anterior margin of the haired part of the forehead to the lowest posterior point of the occiput. Usually it is about 10 cm, circumference is about 33 cm.
- **The mentooccipital diameter**, called ***large oblique diameter***. It is measured from the external occipital protuberance to the most prominent point of the chin. It is the largest diameter of the head, about 13 cm, and 35-36 cm in circumference.
- **The frontooccipital diameter** - from the midpoint of frontal bone (glabella) to the external occipital prominence. It is about 12 cm, and about 34 cm in circumference.

- **The vertical diameter** - between the vertex and sublingual area, is about 9.5-10 cm. The head circumference at this level 33 cm.

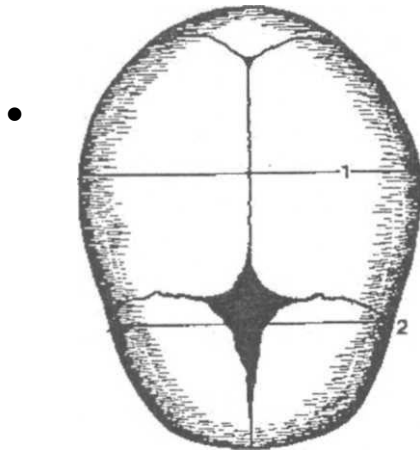


Figure 12. Transverse diameter of the fetal skull by: 1- d. biparietal; 2 - d. bitemporal;

- **The biparietal diameter** (called ***large transverse diameter***) it is the distance between the two parietal eminences, it makes up 9.5 cm.
- **The bitemporal diameter** (***small transverse diameter***) - is from the two extremities of the coronal suture, it makes up 8 cm.

The most important diameters of the fetal body are:

the biacromial diameter - from the extreme points of the shoulder girdle, the circumference is 35 cm;

the basilic diameter - from the two most remote points of the iliac crests, the circumference is 28 cm.

Control Questions

1. What is the soft part of birth canal ?
2. What are the anatomic portions of the uterus?
3. Describe the position of the uterus in the pelvis.
4. What are the histological layers of the uterine wall (from interior to exterior)?
5. What ligaments support the uterine position in the pelvis?
6. What are the major blood supplies to the uterus?

7. Describe the position of the vagina in the pelvis.
8. What is the major blood supply to the pelvic organs?
9. Name the ligamentous structures in the pelvis. Describe each.
10. What is the urogenital diaphragm?
11. Name the muscles of the urogenital diaphragm.
12. What forms the bony pelvis?
13. What is the the false pelvis and what is its significance in?
14. Describe the important diameters of the false pelvis.
15. What is Michaelis rhomboid?
16. What is Soloviov's index?
17. Describe the Obstetric conjugate.
18. Describe the Diagonal conjugate.
19. Describe the True conjugate.
20. What is the pelvic inlet?
21. What is obstetrical outlet?
22. What sizes are anatomical outlet?
23. Describe signs of fetus maturity.
24. Describe the fetal skull.
25. What are zones of obstetrical importance?
26. Describe sutures of fetul skull.
27. Name diameters of the fetal skull.
28. What is small oblique diameter of the fetal skull?
29. What is the suboccipitofrontal diameter of the fetal skull?
30. What is large oblique diameter of the fetal skull?
31. What is the frontooccipital diameter of the fetal skull?
32. What is the vertical diameter of the fetal skull?
33. What is the biparietal diameter of the fetal skull?
34. What is the small transverse diameter of the fetal skull?
35. Describe the most important diameters of the fetal body.

CHAPTER 2. PHYSIOLOGY OF PREGNANCY

DEVELOPMENT OF PHYSIOLOGICAL PREGNANCY

Fertilization is the joining of a sperm and an egg. After fertilization, the zygote begins a process of dividing by mitosis in a process called **cleavage**. It divides until it reaches 16 cells. It is now referred to as a **morula**.

As the morula floats freely within the uterus, it starts to bring nutrients into the cells. The morula fills with fluid and the cells inside start to form two separate groups. At this stage it is now a **blastocyte**.

The inner layer of cells is called the **embryoblast**, and will become the fetus. The outer layer is called a **trophoblast** which will develop into part of the placenta. The trophoblast contains specialized cells that become extensions, like fingers, that grow into the endometrium.

The embryoblast within the blastocyst forms 3 primary germ layers: ectoderm, mesoderm, and endoderm.

Ectoderm. This forms the nervous tissue and the epithelium covering the outer body surface. Epidermis of skin, including hair and nails, glands of skin, linings of oral cavity, nasal cavity, anal canal, vagina, brain, spinal cord, sensory organs, lens of eye and epithelium of conjunctiva, pituitary gland, adrenal medulla, and enamel of teeth.

Mesoderm. This forms all of the muscle tissue and the connective tissue of the body, as well as the kidneys and the epithelium of the serous membranes and blood vessels. All muscle tissue (skeletal, smooth, cardiac), all connective tissue (fibrous connective tissue, bone, blood, cartilage), dentin of teeth, adrenal cortex, kidneys and urethra, internal reproductive viscera, epithelium lining vessels, joint cavities, and the serous body cavities.

Endoderm. Forms the lining epithelium and glands of the visceral body systems. Lining epithelium and glands of digestive, respiratory, and parts of urogenital systems, thyroid and parathyroid glands, and thymus.

Human pregnancy lasts approximately 40 weeks from the time of the last menstrual cycle and childbirth (38 weeks from fertilization). The medical term for a pregnant woman is genetalian, just as the medical term for the potential baby is embryo (early weeks) and then fetus (until birth). A woman who is pregnant for the first time is known as a primigravida or gravida 1: a woman who has never been pregnant is known as a gravida 0; similarly, the terms para 0, para 1 and so on are used for the number of times a woman has given birth.

In many societies' medical and legal definitions, human pregnancy is somewhat arbitrarily divided into three trimester periods, as a means to simplify reference to the different stages of fetal development. The first trimester period carries the highest risk of miscarriage (spontaneous death of embryo or fetus). During the second trimester the development of the fetus can start to be monitored and diagnosed. The third trimester marks the beginning of viability, which means the fetus might survive if an early birth occurs.

The womb is expanding, the baby is growing and taking all the nourishment from the mother. What once started as a microscopic two-celled egg, will be formed into a baby in just 12 weeks. The baby develops from conception to term, in a month-to-month progress.(table. 2)

Table 2

Overview of Developmental Milestones

WEEK	CHANGES IN MOTHER	DEVELOPMENT OF BABY
		Pre-embryonic Development
1 week	Ovulation Occurs	Fertilization occurs, cell division begins and continues, chorion appears
		Embryonic Development

2 weeks	Symptoms of early pregnancy (nausea, breast swelling and tenderness, fatigue); blood pregnancy tests may show positive	Implantation occurs; amnion and yolk sac appear; embryo has tissue; placenta begins to form
3 weeks	First period missed; urine pregnancy test may show positive; early pregnancy symptoms continue	Nervous system begins to develop; allantoids and blood vessels are present and placenta is well formed
4 weeks		Limb buds form; heart is beating; nervous system further develops; embryo has tail; other systems are forming
5 weeks	Uterus is the size of a hen's egg; mother may need to urinate frequently	Embryo is curved, head is large, limb buds are showing division, nose, ears and eyes are noticeable
6 weeks	Uterus is the size of an orange	Fingers and toes are present and skeleton is cartilaginous
8 weeks	Uterus can be felt above the pubic bone	Fetus begins to look human; limbs are developing and major organs forming; facial features are becoming refined
		Fetal Development
12 weeks	Uterus is the size of a grapefruit	Head grows faster than the rest of the body; facial features are apparent, but there is no layer of fat yet and the skin is translucent; gender can be distinguished via ultrasound; fingernails appear
16 weeks	Fetal movement can be felt	Fine hair (lanugo) grows over the body; fetus resembles a tiny human being;

		skeleton is visible
20-22 weeks	Uterus reaches up to the level of umbilicus and pregnancy is obvious	Vernix caseosa, the protective fatty coating, begins to be deposited; heartbeat can be heard
24 weeks	Doctor can tell where baby's head, back and limbs are; breasts have enlarged and nipples and areola are darker, colostrum is produced	Fully formed but still thin; much larger and very active, all major organs are working, the lungs and digestive system need more time to develop; body is covered in fine hair called lanugo
32 weeks	Uterus reaches halfway between umbilicus and rib cage	Most babies are in a head down position in the womb; head is more in proportion to the body; eyes are open; babies born at this stage have a good chance of living
36 weeks	Weight gain is averaging about a pound a week; standing and walking are becoming very difficult because the center of gravity is thrown forward	Body hair begins to disappear, fat is being deposited
40 weeks	Uterus is up to the rib cage, causing shortness of breath and heartburn; sleeping is very difficult	Not much room to move in the womb; fully mature, baby moves less, and the surrounding fluid reduces and the womb expands its limits

NORMAL PLACENTAL DEVELOPMENT

In most mammalian species, the placental and fetal mass increase exponentially for at least a portion of pregnancy. Normal growth of the fetus is in turn dependent on normal placentation and growth of the placenta. The placenta is

a dynamic and multifaceted organ that serves as an interface between mother and fetus with the critical role of meeting the metabolic and circulatory demands of the growing fetus. The roles of the placenta include:

Nutritional: Provides oxygen, glucose, amino acid, and volume (fluid) transfer.

Immunologic: Protects the fetus from pathogens and the maternal immune system.

Endocrinologic: Produces numerous hormones, growth factors, cytokines, and other vasoactive mediators.

Metabolic: Serves as the respiratory and the kidney organ for the fetus and is responsible for elimination of carbon dioxide, metabolic acids, and other waste products from the fetus to maintain acid–base balance.

Placentation must be normal in order for these functions to be met.

Research has begun to provide an understanding of the complexity of the implantation and placentation processes, which requires production and coordination of numerous angiogenic growth factors (fibroblast growth factor, hepatocyte growth factor, placental growth factor, vascular endothelial growth factor), cell-adhesion molecules, cytokines, nitric oxide, extracellular matrix metalloproteinases, hormones, and transcription factors (hypoxia inducible factor). This process of coordination begins very early in pregnancy and can dictate whether the pregnancy grows in a normal or abnormal direction. During the luteal phase of the menstrual cycle, the endometrium becomes decidualized in preparation for acceptance of the products of conception. Shortly after entering the uterine cavity on day 4 postconception, the morula becomes a blastocyst with an inner cell mass at one pole that is called the embryoblast and an outer cell mass that is called the trophoblast. On day 7 postconception, the trophoblast differentiates into the cytotrophoblast, which envelops the blastocyst circumferentially. Simultaneously, the newly developed cytotrophoblast cells further differentiate into a sheet of syncytiotrophoblast cells. The syncytiotrophoblast produces proteins and steroid hormones. The cytotrophoblast,

made up of nucleated cells, continues to produce the anucleate syncytiotrophoblast throughout gestation primarily by mitotic activity and loss of cytotrophoblastic cell walls. By day 13, the cytotrophoblast layer has differentiated into invasive and noninvasive cytotrophoblast. The invasive cytotrophoblast forms invasive cell columns that invade the uterine epithelium to anchor the fetus and establish blood flow to the placenta and fetus. During this process, the invasive cytotrophoblast cells (extravillous trophoblast):

- migrate* through the syncytiotrophoblast and into the decidualized endometrium and myometrium

- invade* the vessel walls of the maternal-based spiral arteries in these areas

- transform* the spiral arteries from a high-resistance to a low-resistance vessel.

As the invasive cell columns of the cytotrophoblast penetrate the syncytiotrophoblast, spaces called *lacunae* are created, which subsequently fuse to form the intervillous space with intervening syncytiotrophoblast columns called *trabeculae*. The process of intervillous space formation and spiral artery transformation directs an increasing maternal cardiac output into the intervillous space. Loss of spiral artery vessel media is the mechanism by which the spiral arteries drop their resistance to blood flow.

The syncytiotrophoblast-based trabeculae branch laterally to initiate placental villi formation on approximately day 13. The extent of vascularization of the villus architecture defines the villus as stem or primary villus, secondary villus, or tertiary villus.

The stem villus is without vessels and only has trophoblast cells. The secondary villus is formed by central invasion of the primary villous core by the allantoic mesenchyme of the embryoblast. The tertiary villus forms during vasculogenesis, which is the development of de novo blood vessels from mesenchymal cells differentiating into hemangioblasts. Hemangioblasts are precursors of endothelial cells. This process begins in the 5th week of gestation.

Each cotyledon, labeled by some as a fetal unit, is characterized by a villous tree that contains three basic types of villi:

1. stem villi
2. intermediate villi
3. terminal villi.

These three villous types represent progressively smaller generations of villous branching with the terminal villi serving as the end point. The stem villi extend from the chorionic plate to the basal plate. The stem villi contain a single truncus that progressively branches into the rami chorii, which in turn branches into the ramuli chorii. It is from the ramuli chorii that the intermediate villi appear of which there are two types: the immature and mature intermediate villi.

The terminal villi are the primary gas exchanging villi, which have actually been identified at all levels of branching. They account for 55% of the total number of cross-sectional villi in the peripheral villous tree. Smooth muscle staining shows that vessels coursing through the villi contain smooth muscle media down to the level of the immature villi.

This distinguishes the stem and immature villi from the gas-exchanging mature and terminal villi. It has been noted that the intermediate villi, because of the smaller arterioles, venules, pre- and postcapillaries contained within, may serve a hemodynamic regulatory function (i.e., control of blood pressure and flow). The concept of blood flow control at this level is further supported by previously described sphincterlike precapillary structures.

In contrast to vasculogenesis, angiogenesis represents the formation of new blood vessels from endothelial cells and is classified into branching and nonbranching angiogenesis.

Branching angiogenesis occurs primarily in the first and second trimesters and leads to the formation of the immature villous tree. Branching angiogenesis continues until the end of the second trimester when there is a transition to *nonbranching* angiogenesis.

During this process there is a dramatic increase in mature intermediate and terminal villi. The nonbranching angiogenesis forms terminal capillary loops with minimal branching and provides the network of capillaries for the intermediate and terminal villi. A dramatic decrease in vascular resistance and an increase in blood flow through the placenta are coincident with this process.

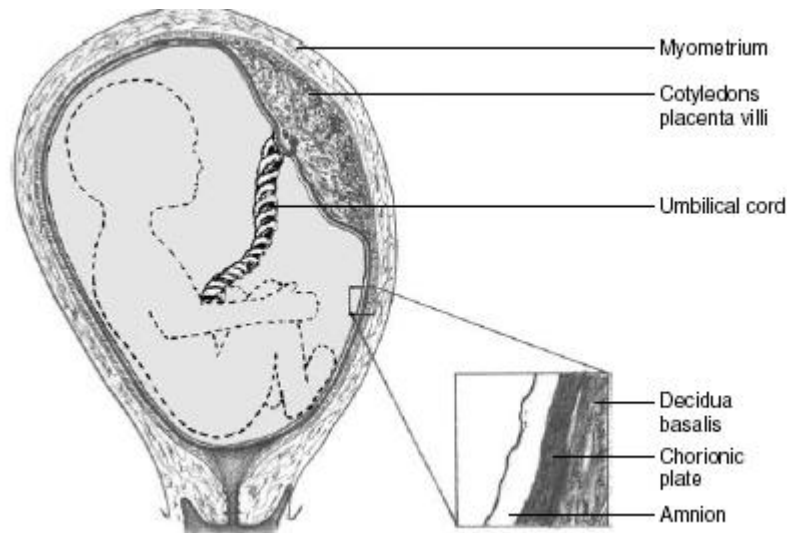


Figure 13. Placental membranes and uterine layers (fetal to maternal):
 amnion, chorion (with villi composed of syncytial trophoblasts and cytotrophoblasts), decidua parietalis (endometrium), myometrium (undergoes hyperplasia early in pregnancy with subsequent hypertrophy and distension), serosa

PHYSIOLOGICAL CHANGES OF WOMEN'S ORGANISM DURING PREGNANCY

Pregnancy is the additional loading on the woman's organism. There are the substantial changes in the mother's organism which touch practically all systems of organism for providing of vital functions, growth and development of embryo and fetus. The compensatory changes in organs and systems of pregnant female organism result in homeostasis to be in a state of unstable tense equilibrium. The unbalances can entail the changes of homeostasis and realization of either obstetric or extragenital pathology and doctors of all specialities need to know that.

During pregnancy in the organism of woman there are the substantial changes which touch practically all systems of organism.

Psychological state.

The changes of the psychological state manifest as the emotional feelings: irritation, depression and other. The following factors influence on psychological violations development during pregnancy:

- hormonal and physiological changes;
- personal qualities;
- social and economic status;
- relations in family;
- unsolved conflicts;
- genetic predisposition (for example, towards depression);
- physical and mental diseases;
- alcohol and drugs using.

Doctors must take into account emotional and physical feelings of future mothers during the supervision over pregnancy progress, during labor and postnatal period.

Discomforts states.

The typical discomforts states rather often develop during pregnancy they do not have serious consequences, but result in considerable discomfort and unpleasant feelings for pregnant. They are: fatigue, morning vomiting /nausea, heartburn, aches in back, haemorrhoids, edema of legs. Doctor's timely elucidation to pregnant about such feelings essence and his/her professional advice will considerably improve the quality of pregnant woman's life.

Immune system

- the factors of local and general immunity are inhibited. The reactions are conditioned by action of HCG (Human Chorionic Gonadotropin), placental lactogen, adrenocortical hormones, estrogens, progesterone, alpha-fetoprotein, alpha-2-glycoprotein, trophoblast specific globulin;
- immunological tolerance between maternal organism and fetus is formed .

Endocrine system

hypothalamus: supraoptic and paraventricular nuclei strengthen oxytocin and antidiuretic hormone formation. They also take part in secretion regulation by adenohypophysis of follicle-stimulated hormone, prolactin, adrenocorticotrophic hormone and thyrotropin;

hypophysis: increase of anterior hypophysis due to its cells hyperplasia and hypertrophy; the secretion of gonadotropic hormones increases, as well as production of prolactin, the production of growth hormone is inhibited;

thyroid gland: it is enlarged in size (in 35-40% of pregnant women); its function increases, but it remains euthyroid, the production of thyroglobulin increases (action of estrogens), the levels of general T_3 and T_4 rise, level of free T_4 remains within the limits of norm;

parathyroid glands function with an overactivity, hypocalcemia develops in case of their function decline, that manifest in cramps, spasms of pyloric area of stomach, asthmatic phenomena;

renal glands strengthen the production of glucocorticoid, which regulate protein and carbohydrate metabolism, as well as mineralocorticoids, which regulate mineral metabolism;

insulin resistance (sensitivity to insulin goes down 50-80%) rises, the use of glucose by tissue goes down as well as the level of glucose in blood;

ovaries: a new ductless gland appears, a yellow body, that produces progesterone (reduces excitability and contractile ability of uterus, creates conditions for fetal egg implantation and proper development of pregnancy), functions the first 3,5-4 months of pregnancy;

placenta: from the 7-th day of pregnancy increase of Human Chorionic Gonadotropin (HCG) and progesterone concentrations is marked, estrogens are synthesized mainly by a fetus-placenta complex from the mother's cholesterol metabolites, and their production in a norm is steadily multiplied, providing uterus growth and development, biochemical processes regulation in a myometrium,

increase of enzymic systems activity, as well as energetic metabolism, accumulation of glycogen and ATP. Placental lactogen is formed by syncytiotrophoblast of placenta from the 5-6 week of pregnancy (90% of placental lactogen is in pregnant's plasma and 10% - in amniotic fluid) and its maximal concentration concerns on the 36-37 week of pregnancy, then its level is stabilized and begins to go down from the 40-41 week of pregnancy. Concentration of placental lactogen directly correlates with fetus mass and sharply increases in case of renal disease in mother.

Central nervous system

excitability of brain cortex goes down to 3-4 months, and then gradual increase of excitability occurs (it is related to hyperexcitability focus formation in brain cortex - gestational dominant that shows up certain dormancy of pregnant and her interests direction towards pregnancy);

reduced excitability of central nervous system parts, which are below, and also reflex apparatus of uterus. On the eve of child birth the excitability of spinal cord and nervous elements of uterus is increased;

tonicity of the vegetative nervous system is changed that predetermines such symptoms as somnolence, enhanceable crabbiness, tearfulness, dizziness during the early terms of pregnancy.

Cardio-vascular system

decrease of adaptation to the physical loadings is marked as well as increase of jugulars veins blood filling, edema of peripheral tissue ;

heart: systolic murmur (95%) and systolic gallop rhythm (90%);

central hemodynamic: the increase of circulated blood volume begins from the 6 week of pregnancy, it is quickly multiplied to 20-24 weeks and in 36 weeks the increase is 35-45%. The increase of circulated blood volume takes place due to the increase of circulated plasma volume ;

cardiac output or minute cardiac volume: it rises on 30-40% beginning with

the early terms of pregnancy and achieving its maximum in 20-24 weeks of pregnancy. During the first half of pregnancy cardiac output is multiplied due to increase of stroke output of heart (on 30-40%). During the second half of pregnancy it occurs mainly due to the increase of heart beat rate on 15%. Increase of minute cardiac output is explained by action of placenta hormones (estrogens and progesterone) on myocardium and partly as a result of uterine-placental blood circulation forming ;

decrease of systolic and diastolic blood pressure from the beginning of pregnancy to 24 weeks of pregnancy (on 5-15 mm Hg);

decrease of systemic vascular resistance on 21%;

decrease of pulmonary vessels resistance on 35% (it is explained by vasodilatational effect of progesterone);

peripheral vascular resistance goes down (relaxed action on the vascular wall of HCG, estrogens, progesterone, and forming of uterine-placental blood circulation, which has low vascular resistance);

central venous pressure during the III trimester is in average 8 (4-12) sm, while it is 3,6 (2-5) sm in women who are not pregnant;

increase of venous pressure (7-10 mmHg) in lower extremities (it is conditioned by mechanical pressure of uterus on vena cava inferior and veins of pelvis 10 times more by growing uterine blood supply during pregnancy), by relaxed action of progesterone on a vascular wall, decrease of blood osmolality, enhanceable penetration of capillaries (action of progesterone and aldosterone), increase of intrahistionic pressure, that explains tendency to edema, phlebeurysm and haemorrhoids;

heart disposition closer to horizontal and diminishing of aortal arch angle, that is related to diaphragm raising and results in the loading increase on the left ventricle of heart;

ECG- displacement of electric heart axis.

System of blood

plasma volume grows with 2600 ml on 45% (1250 ml during the first pregnancy, and 1500 ml during next pregnancies) and is 3900-4000 ml;

the total volume of red blood cells is multiplied from 1400 ml on 33%, that is explained by action of erythropoietin, HCG or placenta lactogen;

physiological hyperplasmia is characterized by the decrease of hematocrit to 30%, hemoglobin from 135-140 to 110-120 g/l. It is necessary for the needs of mother and fetus, protects from the syndrome of vena cava inferior compression, compensates bloodloss during labor, reduces blood viscosity and thereby reduces peripheral resistance;

the level of hematocrit and albumen goes down on 25% (result of hemodilution);

the level of hemoglobin changes and on the average it makes up 122 g/l to 12 weeks of pregnancy, to 28 week - 118 g/l, to 40 about 129 g/l;

the amount of leucocytes is multiplied in a peripheral blood and during the first trimester of pregnancy their amount is 3000-15000/mm³, during the second and third trimesters - 6000-16000/mm³, during labor the amount of leucocytes can reach 20000-30000/mm³;

the amount of thrombocytes is within the limits of standarts (for pregnant), but with the pregnancy progress gradual decrease of their level takes place;

system of hemostats: the state of hypercoagulability is common (the increase of fibrinogen level (I factor) constantly during the whole pregnancy progresses in 2 times (to 600 mg%) and VII-X factors, fibrinolytic activity of blood goes down;

Blood sedimentation rate is multiplied to 40 - 50 mm/h;

blood pCO₂ decrease (on 15-20%), that is instrumental in transition of carbonic acid through placenta;

pO₂ rises;

delivery of oxygen to tissue and placenta is multiplied;

the excretion of bicarbonates rises.

Respiratory system

appearance of breathlessness (65% of women) is marked, as well as edema of nose mucus, nasal-bleedings, increase of thorax circumference, dome of diaphragm is to 4 cm higher, the lower aperture of thorax broadens;

necessity in oxygen rises, as well as pressure of oxygen, respiratory volume (30-40%), capacity of inhalation (5%), vital capacity of lungs, minute output (on 40%);

functional remaining volume and volume of exhalation goes down approximately on 20%, as well as total capacity of lungs (on 5%), content of carbon dioxide (moderate respiratory alkalosis)

Gastrointestinal tract

an appetite is multiplied, sometimes with unusual tastes passions;

morning nausea (almost in 70% pregnant) is marked, its frequency is maximally on the 8-10 week of pregnancy and discontinues between 14 and 16 weeks (it is explained by the increase of progesterone, HCG, relaxing of smooth muscles of stomach);

frequency of gingivitis rises, abundantly vascularized tumors can appear which regress after labor;

likelihood of gastric ulcer development goes down (it is connected with enhancing of mucin secretion by gastromucous membrane and secretion reduction of hydrochloric acid);

the risk of gastroesophageal reflux is multiplied, that is conditioned by blood pressure low to the gullet, tonicity decrease of gastro-esophageal sphincter and anatomical displacement of stomach;

frequency of constipation grows (to 30%) (conditioned by the decrease of intestine peristalsis and expansion of haemorrhoidal veins due to the increase of central venous pressure and action of progesterone);

the risk of gall-stones formation rises due to expansion and worsening of bile evacuation from a gall-bladder and increase of cholesterol contents in blood;

liver: blood circulation increases, the liver are not enlarged, alkaline

phosphatase content rises (due to additional formation in placenta), activity of asparticaminotransferase (ACT) is multiplied, albumins production goes down and globulins concentration rises, there is the increase of liver synthetic function (lipidemia with high level of cholesterol and its ethers), the antitoxic function of liver goes down;

frequency of haemorrhoids is multiplied as a result of constipation, increased venous pressure and relaxing action of progesterone on a vascular wall.

Metabolism

a basic exchange is multiplied on 20%;

thenecessity in kilo-calories is multiplied in avarage to 2000 - 3200 kkal a day (150 kkal/day during I trimester and 350 kkal/day during the II and III trimesters of pregnancy);

plastic processes increase (advantage of anabolism to catabolism processes);

lipometabolism – fats assimilation rises, the process of their oxidation goes down, that results in accumulation of ketonic bodies, γ -oxyoleum acid and acetoacetic acids in blood, deposition fat in different organs and tissues (adrenal glands, placenta, skin, mammary glands etc.) is multiplied;

carbohydrate exchange: labile level of sugar in blood (slightly above normal) and periodic appearance of sugar in urine;

the exchange of vitamins and microelements: is multiplied due to considerable activation of cell metabolism processes in the organism of mother and fetus.

Kidneys

anatomical changes: enlargment of kidneys (in avarage on 1-1,5 cm), expansion of the pyelocaliceal system (on 15 mm in right kidney and on 5 mm in left kidney), increase of ureters diameter on 2 cm (more frequent of right ureter due to a curvuture and metrectopia to the right and ureter pressing upon the terminal line of pelvis) stipulate higher risk of pyelonephritis development.

Dilatation of urinary passageways begins during I trimester and achieves a maximum during the II and III trimesters of pregnancy (it is explained by action of placental progesterone and less compression of urinary passageways by uterus);

functional changes: Filtration ability of kidneys changes – to the 16 week of pregnancy renal blood circulation grows on 75%, glomerular filtration rises already from the 10 day of pregnancy to 50% (it is related to arteriodilatation and secondary delay of Na and water in organism). During the II and III trimesters of pregnancy glomerular filtration diminishes, and reabsorption remains unchanging, that causes the increase of fluid total amount in the organism of pregnant (to 7 litres). The clearance of kreatinine is multiplied on 40%, the excretion of glucose is multiplied, filtration of albumens does not change. Sometimes can be physiological (orthostatic) albuminuria (signs of albumin) and glucosuria, can develop that is related to the increase of capillaries permeability.

Genital organs

the size of uterus is multiplied, its volume 1000 times grows, the weight of uterus is multiplied from 50-60 g in nonpregnant condition to 1000 g at the end of pregnancy (the increase is mainly due to myometrium hypertrophies);

the form of uterus is prolonged, spherical withing the 8 week and again prolonged withing the 16 week of pregnancy;

position of uterus: the uterus goes out from the cavity of pelvis, comes back and deviates to the right;

consistency of uterus is progressively softened, that is due to increased vascularity and presence of amniotic fluid;

cervix of uterus is softened and becomes cyanotic;

the border between endo- and exocervix - the border of transitional epithelium is displaced outside and the ectopia of columnar epithelium, which is not considered to be "erosion", is formed;

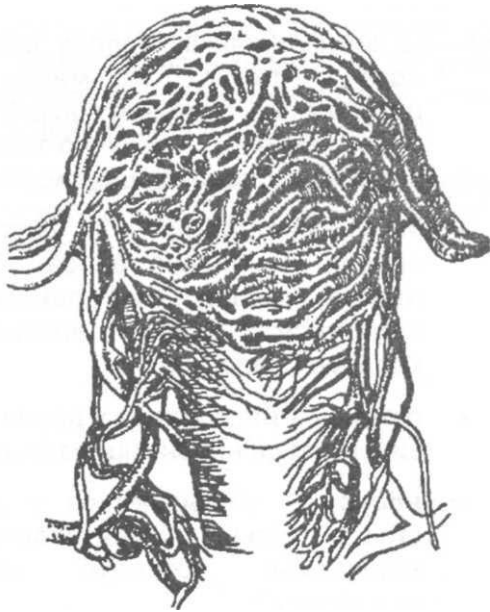
contractions of uterus from the first trimester are irregular and painless (Braxton-Hicks contractions), but in late terms it causes discomfort and can be the

reason of false contractions ;

the capacity of uterus grows from 4-8 ml in nonpregnant condition to 5000 ml at the end of pregnancy;

myometrium is hypertrophic (effect of estrogens), hyperplasic (effect of progesterone), separate muscular fibres are 15 times longer;

the bloods vessels of uterus are widen, prolonged, especially venous, new



vessels appear, causing uterine circulation more than 10 times as large (before pregnancy it is 2 - 3% of minute cardiac volume (MCV), and during late terms of pregnancy it was 20-30% of MCV - 500-700 ml/min). The uterine blood circulation is formed, it is the so called "second heart" which is closely associated with placental and fetal blood circulation (see figure 14);

Figure 14. Vascular system of uterus during pregnancy

nervous elements of uterus - the number of sensitive, baro-, osmo-, chemo- and other receptors is multiplied;

biochemical changes: considerable growth of actomiosine, creatinphosphate and glycogen amount, the activity of enzymes systems (ATP actomiosine and others) grows, high-energy compounds (glycogen, macroenergetical phosphates) muscular proteins and electrolytes (ions of calcium, sodium, potassium, magnesium, chlorine and others) accumulate;

fallopian tubes - are thickened, blood circulation considerably increases there;

ovaries - are somewhat enlarged, but cyclic processes are discontinued there. A yellow body (corpus luteum) involutes in 16 weeks of pregnancy ;

uterine ligaments - are considerably thickened and prolonged, especially

round and uterosacral ligaments;

cyanosis of vagina is the result of enhanceable blood circulation, difficulty of blood outflow through veins which are compressed by uterus, and vessels tonicity decline;

hyperpigmentation of vulva and perineum skin - is explained by the increase of estrogens and melanin stimulation hormone concentration;

the increase of vaginal leucorrea amount and their pH (4,5-5,0) reduction is the result of vaginal epithelium hyperplasia, increase of blood circulation and transudation;

Body weight

average increase is 10 - 12 kg and depends on constitution;

weight gain takes place mainly during the second and third trimesters (350 - 400 g/week);

little more than a half from gained weight is for mother's tissues (blood, uterus, fat, breasts) and the remaining is for fetus (3000-3500 g), placenta (650 g), amniotic fluid (800 g) and uterus (900 g).

Skin

vascular asterisks are on face, arms, upper part of trunk;

palm's erythema is predefined the 20% increase of total metabolism and 16% of capillaries number which did not function before;

striae gravidarum are on the lower regions of abdomen, mammary glands and thighs which are pink purple color at first (it is due to stretch of connective-tissue and elastic fibres of skin); (see figure 15)

hyperpigmentation is in the area of umbilicus, areola of mammary glands, white line of abdomen, skin of external genitals, the "mask of pregnancy", whether chloasma can develop;

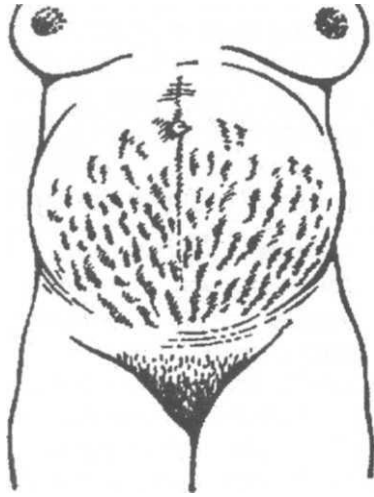


Figure 15. Striae gravidarum of pregnant in the region of abdomen

umbilicus - is smoothed out during the second half of pregnancy and is knobbed at the end of it;

nevi - are enlarged and becomes more pigmentical (the sharp increase needs specialist consultation);

sweat and sebaceous glands - their hyperproduction sometimes results in acne development;

hair on the skin of face, abdomen and thighs - the growth of hair is sometimes marked, that is due to enhanceable production of androgens by adrenal glands and partly by placenta. Considerable hair loss occurs during the first 2-4 months and restoration of normal hair growth is in 6-12 months after delivery.

Mammary glands

prickly and bloated sensation - is related to the considerable increase of mammary gland blood supply;

development of excretion ducts (influence of estrogens) and *alveoli* (influence of progesterone);

smooth muscles of nipples activating and increase of Montgomer's follicles and little humps near areola;

weight increase from 150-250 g (before pregnancy) to 400-500 g (at the end of it);

colostrum is produced - more frequent in gravida (compatible action of estrogens, progesterone, prolactine, placental lactogen and insulin).

Skeletal and muscular system

increase of compensatory lumbar lordosis that is manifested by aches in the lower back;

development of ligaments relative weakness is the action of relaxine and progesterone. The pubic coarticulation becomes mobile and 0,5-0,6 cm widens approximately during 28-30 weeks, that results in unsteady step (symphysopathia);

increase of lower aperture of thorax;

calcium exchange : the concentration of calcium ionized form in blood serum does not change due to the increase of parathyroid hormones production, the total amount of calcium goes down due to its mobilization on the necessities of fetus. During physiological course of pregnancy the exchange of salts in bones is multiplied (influence of calcitonin), but the density of bones is not lost;

increase of hernia defects, especially in umbilicus area and along the middle line (diastasi recti abdominis) is the result of uterus increase and its pressing on anterior abdominal wall from inside.

EARLY DIAGNOSIS OF PREGNANCY

Prophylactic tendency of modern obstetrics, the dynamic supervision after pregnant woman in maternity welfare centre is the main task of polyclinic service for women.

Early diagnostics of pregnancy (up to 12 weeks) is important in general training of any doctor, as the early revealing of pregnancy allows in good time to diagnose obstetric and extragenital pathology and solve the problem concerning the expedience of the further pregnancy. Only such approach is the guarantee of favorable completion of pregnancy for mother and fetus.

Early period of pregnancy is determined by the whole complex of anamnesis information, certain subjective and objective signs, given gynecological examination instrumental and laboratory methods of study.

The signs of pregnancy are distributed into 3 groups.

1. *Doubtful signs* are different subjective feelings and also objectively

determined changes in organism, except for the changes in internal reproductive organs:

a) the subjective phenomena are nausea, vomiting, loss or increase of appetite, tastes whims (liking for salt or sour meal, to the chalk, etc.), changes of the olfactory feelings (disgust for the smell of meat meal, tobacco smoke and others like that), easy fatigue, somnolence.

б) the objective phenomena are pigmentation of facial skin, white line of abdomen, external genital organs, pigmentation intensification of nipples and round them.

2. *Probable signs* are objective signs, concerning genital organs, mammary glands, and which are also revealed by immunological reactions to pregnancy. They are typical for pregnancy, although sometimes they can occur from other reasons. Such signs are: discontinuation of menstruation in child-bearing age, increase of mammary glands and excretion of colostrum or milk from the nipples.

Probable signs also involve data of gynecological examination: inspection of external genital organs, cervix of uterus using speculum, bimanual gynecological inspection. It is thus possible to observe loosening and cyanosis of vulva, vagina and cervix of uterus; increase and softening of uterus, change of its form; increase of contractile ability of uterus (compression of the softened uterus of short duration).

During examination of pregnant uterus the following signs are the most important:

Genter's sign: during vaginal examination of early periods of pregnancy there is a comb-shaped projection on the anterior surface of uterus just along its midline, which spreads neither on a fundus, nor on the posterior surface of uterus nor on cervix (see figure 16).

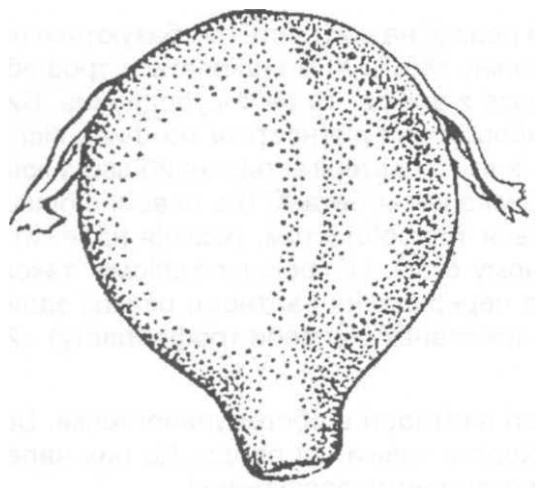
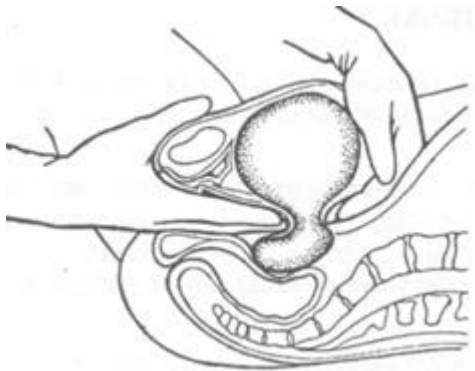


Figure 16. Genter's sign

Horwitz-Hegar's sign: during vaginal examination softening in the area of isthmus is revealed and the fingers of internal and external hand meet as a result here easily. A cervix is felt as more dense body (see figure 17).



Picture 17. Horwitz-Hegar's sign

Piscachec's sign: during vaginal examination the contours of uterine fundus and area of its angles appear to be irregular. The angle which corresponds to place of egg's implantations comes forward considerably more than the opposite one. The uterus whole appears to be asymmetrical. (see figure 18).

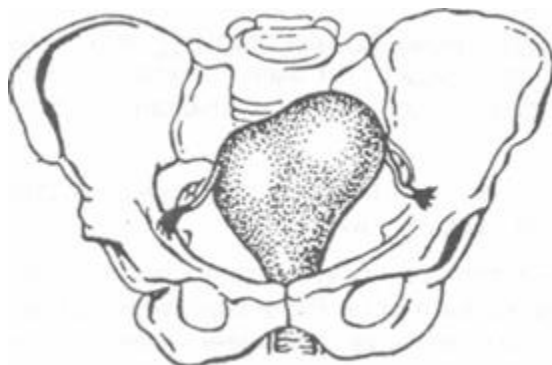


Figure 18. Piscachec's sign is the external prominence out of right angle of uterus, if the term of pregnancy is about 12 weeks

Snegiryov's sign: during vaginal examination of pregnant uterus it begins to contract and becomes more dense, as a result of mechanical irritation of fingers.

The probable signs of pregnancy involve immunological reactions to pregnancy, which are based on determination of human chorionic gonadotropine (HCG) in urine or in plasma of blood. HCG is secreted by trophoblast, then by a chorion, placenta. This hormone consists of α - and β - subunits. The secretion begins from the 7-8 day after fertilization, thus laboratory diagnostics is possible after this period. It is needed to take morning urine with most concentration of hormone for study, as the method has the threshold of sensitivity. Determination of β - HCG in plasma is more reliable. It is needed to underline that although HCG is secreted by trophoblast, the reaction belongs only to the probable signs, because at such pathosis, as chorionepithelioma, there is also positive reactions to HCG. Furthermore, after interruption of pregnancy reactions remain positive for 7-10 days, and in case of pathologies (trophoblast diseases) - 2-4 months. Low bound of test-sensitivity is 5 U/L.

3. *True signs* are convincing evidence of pregnancy in inspected woman. All signs of this group have only the objective character and originate only from fetus. They involve signs revealed during intravaginal ultrasonic examination.

Other reliable signs are revealed from 20 weeks of pregnancy and does not belong to the signs of early periods of pregnancy. They include:

- moving of fetus, which is determined by hand or at auscultation (the feelings of pregnant woman herself are not considered to be reliable);
- auscultation of fetal cardiac sounds;
- palpation of fetus's parts (head, legs, buttocks, arms);
- determination of fetus's heart beat by cardiotocography.

It is necessary to pay attention to prohibition of color ultra sound Doppler application until the termination of organogenesis critical period. It is related to the fact that the use of the newest Doppler's technologies at transvaginal echographies in the terms of pregnancy up to 10 weeks has the potential threat of teratogen thermal effect as a result of embryo's heating.

Nowadays the standard of early diagnostics of pregnancy is two methods combination:

- Determination of β -HCG in urine or in plasma of blood;
- Transvaginal ultrasonic examination.

The size of uterus during the first 3 months of pregnancy, when it is yet in the cavity of small pelvis, is determined by bimanual gynecological examination, then by palpation of abdomen according to the fundal height of the uterus.

Accuracy of pregnancy term establishment depends on the early address of woman to maternity welfare centre. Two physicians are recommended to inspect a woman during primary examination. Because of difficulties of fertilization term determination, the diagnosis is made with a week interval (for example: pregnancy is 8-9 weeks). The term of pregnancy is determined more exactly on the basis of embryo and fetus parameters measuring by method of ultrasonic examination.

Modern scientific proofs ground to recommend ultrasonic examination to all women at the end of the first trimester for more exact determination of pregnancy term (especially in case if it is impossible to define exactly the first day of last menstruation) and exposure of multifetation. Correct determination of pregnancy term promotes validity of some screening-tests (Down syndrome tests), and reduces frequency of labor induction after 41 week of pregnancy.

For the most exact determination of gestational age ultrasonic examination must be conducted during 10-13 weeks of pregnancy.

OBSTETRIC EXAMINATION OF PREGNANT WOMAN

Modern methods knowledge of pregnant examination is the base for adequate work of obstetrician - gynecologist, helps in good time to discover and warn development of different complications concerning mother and child, to choose the proper management of antenatal care resulting in decline of maternal and perinatal morbidity and death rate.

Obstetric examination of late pregnancy is conducted in order to:

- specify or define the term of pregnancy
- define the state of maternity passages

- determine size, position and state of fetus
- define the state of placenta and amniotic fluid.

Obstetric examination of pregnant women in late terms consists of the following parts.

1. *Pelviometry* (see chapter 1) .
2. *Circumference of the abdomen* (see Figure 19).

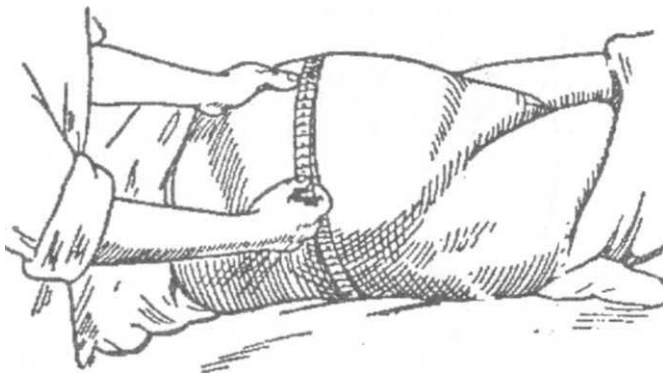


Figure 19. Measuring of abdomen circumference

The greatest circumference of the abdomen is measured with a centimeter tape on the level of the navel; at the end of gestation this circumference is 90-100 cm

3. *The fundal height* is measured between the upper edge of symphysis pubis and uterine fundus (see Figure 20).

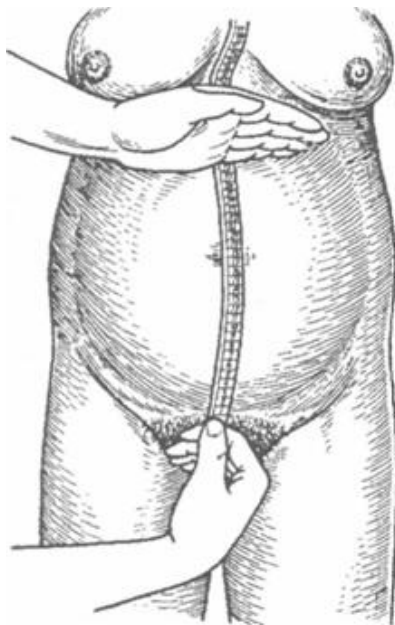


Figure 20. Measuring of the fundal height

At the end of gestation the fundal height of uterus is 34-37 cm, on average. The result of the fundal height of uterus measuring are compared with standart gravidogram (see Figure 20). Measuring the abdomen enables the obstetrician to determine the age of gestation, the supposed fetal weight, to reveal disorder of fat metabolism, hydramnion, or multiple pregnancy.

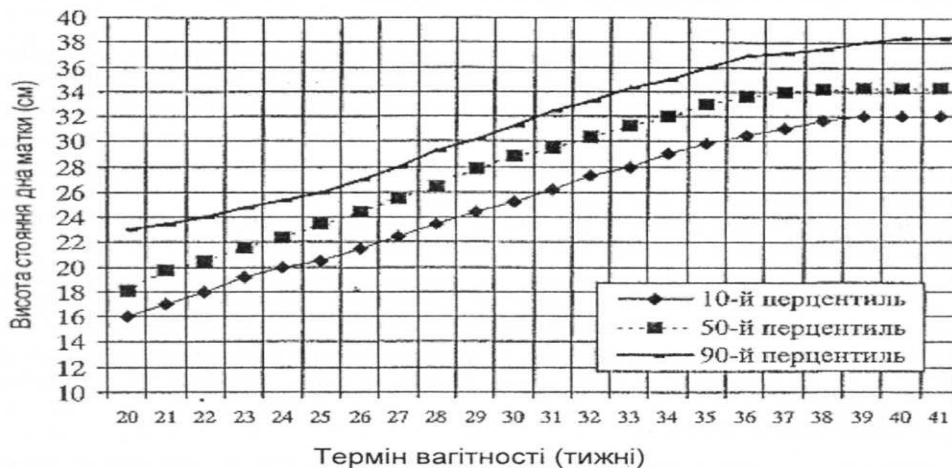


Figure 20.
Gravidogram

4. *Hypothetic weight of the fetus* is determinate by the formula:

Hypothetic weight of the fetus= Circumference of the abdomen× fundal height

5. *Estimation of labor activity*: the uterus in normal tone (norma or pregnancy), excitable upon palpation, contractions of uterus or “bearing down” regular, irregular duration contractions and pause between them.

6. *Determination of fetus arrangement.*

The location of fetus in the cavity of uterus during the last months of pregnancy matters very much, as motion of births depends largely from it. For evident presentation of location of fetus in the cavity of uterus there are obstetric concepts: lie, presentation, position and type of fetus (see Figure 22).

Lie of the fetus – is the relation of the long axis of the fetus to the long axis of the mother and is either longitudinal or transverse.

1. Longitudinal lie of the fetus – in most labors (more than 99%) at term, the fetal head is up or down in longitudinal lie.
2. Transverse lie. The fetus is crosswise in the uterus.
3. Oblique lie. The long axis of the fetus cross the long axis of the mother.

Fetal presentation is determined by the portion of the fetus that can be felt through the cervix.

1. Cephalic presentation is classified according to the position of the fetal head in relation to the body of the fetus.

Attitude (is the degree of flexion of the head on the neck):

- vertex presentation (presenting part is the occiput of the fetal head); well flexed.
- bregma presentation; deflexed
- brow presentation; extended
- face presentation; hyperextended

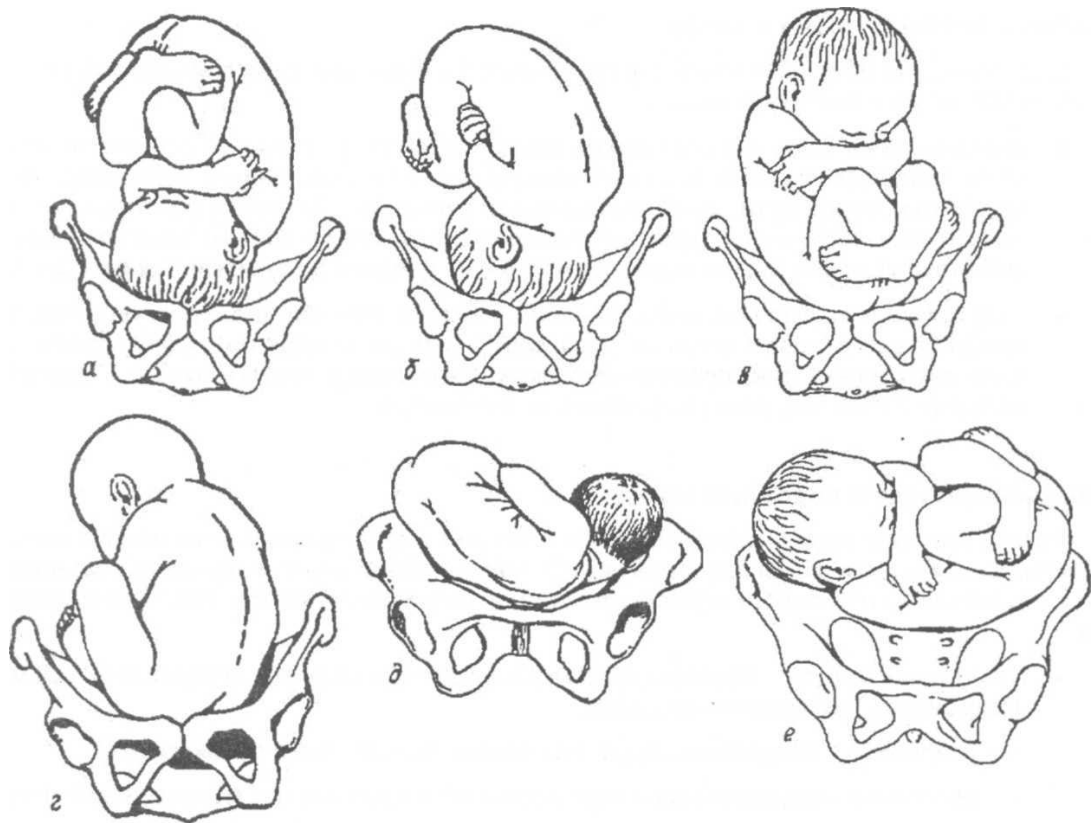


Figure 22. Arrangement of fetus:

a – cephalic presentation, I position, posterior type; б - cephalic presentation, I position, anterior type; в – breech presentation, II position, posterior type; г - breech presentation, I position, anterior type; д - transverse lie, I position, anterior type; е - transverse lie, II position, posterior type.

2. Breech presentation (presentation of the buttocks) may be different:

- flank breech (incomplete) presentation (only buttocks can be felt)
- complete breech presentation (buttock and legs of fetus can be felt).
- Footling presentation (one or two leg of fetus can be felt)

Position is the relation of the back of fetus to the left (first position) or right (second position) wall of uterus. At transversal and oblique lie of fetus position

concerns by the location of head: a head on the left of middle line of abdomen - is the first position, on the right - is the second position.

Type is the relation of the back of fetus to the anterior (front type) or posterior (back type) wall of uterus.

Figure 21 demonstrates different variants of fetus arrangement.

For determination of location of fetus in the cavity of uterus at the external obstetric inspection use palpation by the Leopold's maneuvers.

Leopold's maneuvers consist 4 palpatory maneuver. The patient is lying on the back.

The first maneuver (see Figure 23a)

Aim: to determine the fundal height of uterus and the fetal part localized in the uterine fundus.

Methodic: the obstetrician is on her right facing her. The obstetrician places both palms on the uterus so that they cover the whole fundus.

Result:

1. The fundal height of uterus is determined in fingers from oriental point such as margin of chest, umbilicus, symphysis pubis. For example: the fundal height of uterus is on the 2 fingers below margin of chest, on the half distance between chest and umbilicus, on the umbilical level, on the 3 fingers higher than symphysis pubis.
2. The fetal part localized in the uterine fundus may be head (when breech presentation) and pelvic extremity of the fetus (when head presentation).
When transverse and oblique lye of fetus the fetal part localized in the uterine fundus can not be palpated.

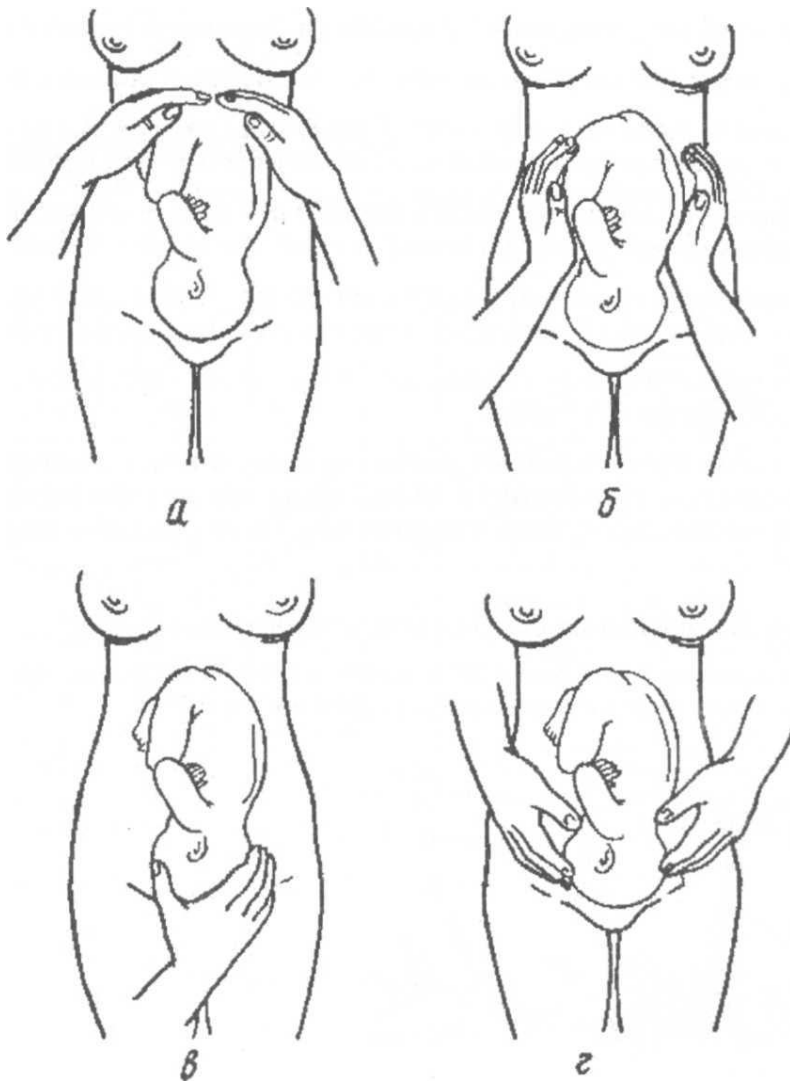
The second maneuver (see Figure 23 б)

Aim: determines fetal position and aspect. Methodic: the obstetrician is on her right facing her. The obstetrician gradually slides the hands from uterine fundus along its right and left sides.

Result: pressing gently on the right and left side with palms and fingers, the obstetrician determines the fetal back on one side as it has a wide dense surface, and the other fetal organs (arms and legs) on the other side.

1. Determination of position of fetus: if the back of fetus localizes by the left wall of uteri - it is first position. If the back of fetus localizes by the right wall of uteri - it is second position.
2. Determination of type of fetus: if the back of fetus localizes by the anterior wall of uteri - it is front type. If the back of fetus localizes by the posterior wall of uteri - it is back type.

Figure 23. Leopold's maneuvers



The third maneuver (see Figure 23 в)

Aim: to identify the presenting part and its ballotement.

Methodic: the obstetrician is on her right facing her. The obstetrician embraces the presenting part with one hand and determines whether it is the head or breech.

Result: if the obstetrician palpates hard and balloted part – it is cephalic presentation. If the obstetrician palpates soft and not balloted part – it is breech presentation.

The fourth maneuver (see Figure 23 г)

Aim: to determine the localization of fetal head in relation to the inlet of pelvis.

Methodic: the obstetrician stands facing the patient's feet; he puts the hands along both sides of lower uterine segment so that the fingers meet over the plane of pelvic inlet. The obstetrician palpates the presenting part.

For estimation of stages of advancement of head by berth canal large value have the concept of large and small segments of head of fetus.

The large segment of head is the circumference of most size heads to which she passes through the planes of small pelvis. At occipital presentation, when a head is inserted in a pelvis in flexed, it will be most circumferences and, which answers the circumferences of small oblique size. At the deflection presentation of head a large segment will be other (depending on the degree of deflection).

The small segment of head is part of head by which she passes through the planes of small pelvis less for a large segment.

The IV maneuver of Leopold's method allow to get such dates:

- Head mobiled above the inlet - if the fingers of hands can be brought under a head
- Head pressed to the inlet - are the ends of fingers of hands do not meet under a head, however much the back of head and all facial part palpated above the inlet.
- Head by a small segment in the inlet is occipital part of head comes forward above the inlet on two fingers, and facial part - fully.

- Head by a large segment in the inlet is occipital part of head do not palpated above the inlet, and the facial comes forward on a 2-3 finger
- Head in the cavity of pelvis - palpated only chin or does not quite concerned parts of head of fetus.

7. *Auscultation of fetal heart tones* (see Figure 24).

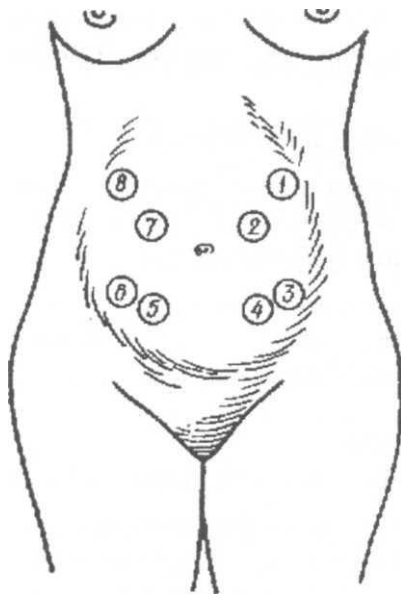


Figure 24. Point of better listening to fetus heart beat:

- 1- breech presentation, I position, back type;
- 2- breech presentation, I position, front type;
- 3- cephalic presentation, I position, back type;
- 4- cephalic presentation, I position, front type;
- 5- cephalic presentation, II position, front type;
- 6- cephalic presentation, II position, back type;
- 7- breech presentation, II position, front type;
- 8- breech presentation, II position, back type;

Aim: Auscultation enables the obstetrician to listen to fetal heart tones and thus to establish the presence of pregnancy, vital fetus or multiple pregnancy.

Method: Auscultation of fetal heart tones is done with obstetric stethoscope with a flared end. Pressing it to the anterior abdominal wall and moving it gradually around the whole abdomen the obstetrician finds the point of clearest fetal heartbeat. In cephalic presentation fetal heartbeat is best heard below the navel, in pelvic presentation - above the navel. Fetal heartbeat suggests fetal lie (hearing the heartbeat on the right or left of the navel), and fetal position (hearing the heartbeat above and below, or on the level of the navel).

Result: Using a DeLee stethoscope (equipped with a head-mount), you can sometimes hear the heartbeat by 16 weeks but unless you are practiced with it, you won't hear it until 20 weeks, at which time the mother can usually tell you that she feels the baby moving. Fetal heartbeat has three main auscultation parameters:

rate, rhythm and clarity. A normal heart rate varies between 120 and 160 beats per minute. The heartbeat should be rhythmical and clear.

8. *Gestational age* may be definite by next way:

- according to past history findings
 - a. date of last normal menstruation
 - b. date of ovulation,
 - c. first fetal movement:
 - in parous first fetal movement starts with 18 weeks gestation
 - in nulliparous first fetal movement starts with 20 weeks gestation
- according to prenatal dispensary records:
 - d. first referral to the dispensary,
 - e. date of issuing prenatal sick-list(in 30 weeks gestation; see tabl. 3)
- objective findings, including formulas by Skukolsky and Giordania:
 - formula by Skukolsky

$$\text{Term of pregnancy} = (L \times 2) - 5 / 5$$
 - formula by Giordania

$$\text{Term of pregnancy} = L + C$$

In this formulas *C* is distance between the most far point head of fetus, *L* is distance between final points on the head and pelvic extremities of fetus. It is measured with pelviometer.

Table 3

Signs of 30-a week pregnancy

№	Signs
1	the fundus of uterus is on a middle between a umbilicus and chest
2	fundal height of uterus above mons pubis at measuring by a centimeter ribbon is 25-28 cm (in middle 26 cm);
3	the circumference of abdomen is 83-85 cm.
4	head of fetus in primagravida is mobile above inlet;

5	vaginal part of cervix of uterus is unabbreviated;
results of the ultrasonic measuring:	
6	the biparietal size of fetal head on the average is an 75-76 mm;
7	the middle diameter of thorax is 77-78 mm;
8	the middle diameter of abdomen is 79-80 mm;
9	length of thigh is 57-58 mm.

9. *Internal (vaginal) examination.*

During physiological course of pregnancy internal (vaginal) obstetric examination is carried out at the first visit of patient in woman center during the early terms of pregnancy and during the last weeks to determine the degree of cervix of uterus maturity.

In case of indications presence (deviation from normal course of pregnancy) internal examination is carried out during any term, but in most cases with beginning of labor and during it .

Doctor's hands should be treated by alcohol antiseptics or washed with soap prior to be gloved. Vulva is processed by antiseptic which does not contain an alcohol. The examination is carried out on a gynecological arm-chair or on coach.

Internal (vaginal) examination includes state assessment of external genitals, vagina (parous, nulliparous), cervix (-length of vaginal portion of uterine cervix in cm; - preserved, shortened, effaced;- extent of opening in cm;- edges of the cervix - thin, thick, distensible, dense;- position: inclined backwards, forward, centered;- score of "maturity" of the cervix), condition of fetal sac (not detected, intact, absent, well or poorly pronounced)? presenting part (describe it in detail, state the pelvic plane in which it is found currently and position of reference points (sutures, fontanelles)), examination of bony pelvis (any bone changes (exostoses) in the small pelvis), measuring of diagonal conjugate (see chapter 1), and vaginal discharge.

Vaginal examination is ending make to diagnosis. Obstetrical diagnosis consecutively includes:

- Pregnancy and its number,
- gestation age,
- fetal lie, presentation, position, type
- accompanying extragenital diseases
- complications of pregnancy on the part of the mother and fetus

PRENATAL CARE

At the first prenatal visit, take a careful history, looking for factors that might increase the risk for the pregnant woman. One important aspect of prenatal care is education of the pregnant woman about her pregnancy, danger signs, things she should do and things she should not do.

Routine visits:

- every 4 weeks until 30 weeks' gestation
- every 2 weeks until 36 weeks' gestation
- every week from 36 weeks to delivery

At each prenatal visit:

- check weight,
- blood pressure,
- measure fundal height,
- listen for the heartbeat,
- check for edema,
- check protein and glucose,
- ask about fetal activity and any new symptoms (the development of pain, bleeding, vaginal discharge or fluid loss, or neurologic symptoms (visual changes, disequilibrium) can be significant),
- do laboratory tests.

Some routine lab tests are done on all pregnant women at different times during the pregnancy. Other tests are done for a specific indication.

As early in pregnancy as feasible, obtain:

- Hemoglobin or hematocrit
- White blood count and platelet count
- Urinalysis
- Blood group and Rh type
- Atypical antibody screen
- Rubella antibody titer
- Hepatitis B screen
- Pap Smear
- Chlamydia/Gonorrhea.

Methods of research of the state of fetus

The ultrasonic fetometry of fetus is informing from 20 week of pregnancy and includes determination of sizes of head, circumference of abdomen and length of thigh. At determination of disparity of one or a few basic fetometric indexes of term of pregnancy the extended fetometry is conducted and correlations of frontal-occipital size to biparietal size, circumferences of head to the circumference of abdomen, biparietal size to length of thigh, lengths of thigh to the circumference of abdomen are calculated. The forecast mass of fetus is the most valuable index.

By foundation for the leadthrough of ultrasonic fetometry in the late terms of pregnancy there is suspicion on the delay of growth of fetus from data of the external measuring of fundal height and circumference of abdomen of pregnant at the known term of pregnancy, and also, in special cases, for determination of term of pregnancy after the special tables, if it is heavy to set its term from anamnestic data and methods of standard inspection.

Cardiotocography (CTG) is synchronous record of cardiac rhythm of fetus and uterine contractions in prolong 10-15 minutes by a vehicle - cardiotocographe.

Cardiotocographe simultaneously writes down the curve of pulses shots of fetus and retractive activity of uterus. During pregnancy execute a record only heart-throbs of fetus, minimum time of record of which must make 30 minutes at position of pregnant on left. The study of reaction of the cardio-vessels system of

fetus in response to his/her motions during such record is named an unstressing test.

At the analysis of CTG estimate such parameters: basal frequency of heart-beats (BFHB), variability FHB, presence and type of temporal changes of BFHB as acceleration or deceleration of cardiac rhythm.

Basal frequency of heart-beats is an average between the instantaneous values of frequency of heart contractions of fetus, here does not take into account acceleration and deceleration.

At description of BFHB take into account its variability - frequency and rangeability instantaneous frequency of heart-beats (instantaneous oscillations). Amplitude of oscillations is determined after the size of deviation from BFHB, frequency of oscillations is determined after the amount of oscillations after 1 min. The count of these indexes is executed every 10 minutes.

Diagnostic criteria.

At the normal state of fetus for CTG characteristically: BFHB from 110 to 170 beat/min. (normocardia), variability (width of record) - 10-25 beat/min with frequency of oscillations 3-6 cycle/min. (undulating type), presence of acceleration FHB and absence of deceleration.

Biophysical type of fetus (BTF) (from the 30 weeks of pregnancy) - the sum of marks of separate biophysical parameters is estimated (respiratory motions of fetus, tone of fetus, motive activity of fetus, reactivity of cardiac activity of fetus on an unstressing test (UST), volume of amniotic waters) (table 4)

Dopplerometry of bloodstream speeds in the artery of umbilical cord represents by the state of microcirculation in fetal part of placenta, vascular resistance of which takes basic part in fetoplacental hemodynamics.

Doppler ultrasound is a technique for making non-invasive velocity measurements of blood flow in vessels of fetus, placenta, uterus. Measurements of blood flow in the arteries of umbilical cord and uterus have most practical value.

Table 4

Results estimation of determination of fetus biophysical type indexes

<i>Parameters</i>	<i>Marks</i>		
	<i>2</i>	<i>1</i>	<i>0</i>
Unstressing test (reactivity of cardiac activity of fetus after his/her motions by data of CTG)	5 and more accelerations FHB with amplitude not less than 15 beat/min, by duration not less than 15 c, related to motions of fetus for 20 minutes of supervision	2-4 accelerations FHB with amplitudes not less than 15 beat/min, by duration not less than 15 c, related to motions of fetus for 20 minutes of supervision	1 acceleration or its absence after 20 min. supervision
Respiratory motions of fetus (RMF)	Not less than one episode by RMF duration 60 c. and more after 30 min. of supervision	Not less than one episode by RMF duration from 30 to 60 c. after 30 min. of supervision	RMF duration less than 30 c. or their absence after 3 min. of supervision
Motive activity of fetus	Not less than 3 general motions after 30 min. of supervision	1 or 2 general motion after 30 min. of supervision	Absence of general motions
Tone of fetus	One episode and more unbending returns to bend position of spine and extremities after 30 min. of supervision	Not less than one episode of unbending returns to bend position after 30 min. of supervision	Extremities in deflexion position

	supervision		
Volume of amniotic waters	Water is in the uterus, vertical diameter of free area of waters is 2 cm and more	The vertical size of free area of waters is more than 1 cm, but not less than 2 cm.	Close location of shallow parts of fetus, vertical diameter of free area is less than 1 cm
Estimation of BTF	7-10 points is the satisfactory state of fetus; 5-6 points is doubtful test (to repeat in 2-3 days) 4 points and low is pathological estimation of BTF (to decide a question about urgent delivery)		

Estimation of hemodynamic indexes in the system “mother-placenta-fetus” is conducted by the curves of speeds of blood in uterine arteries and artery of umbilical cord. Estimate high and minimum systolic speed of bloodstream. During the analysis of dopplerograms calculate the systolic-diastolic relation (SDR), that characterizes peripheral vascular resistance and also index of resistance (IP). These indexes calculated are by the special formulas.

Diagnostic criteria of normal of bloodstream: high diastolic component on dopplerogram in the artery of umbilical cord in relation to isoline, correlation of amplitude of systole to the diastole puts no more than 3.

Ultrasonic tomography of fetus and organs of small pelvis in the late terms of pregnancy is conducted by indication for diagnostics of multiply pregnancy, habitus and arrangement of fetus in an uterus, some defects of development of fetus, oligo- and polyhydramnion, pathology of placenta location or partial abruption of placenta, anomalies of development and tumours of uterus or other organs of small pelvis and others like that.

Methods of placenta state examination.

An ultrasonic placentography allows to set placenta localization, its thickness, structure (state of chorial membrane, parenchima). The method allows to define the degree of placenta ripening.

At uncomplicated duration of pregnancy after 26 week register I stage of ripening of placenta, from 32 weeks - the II stage, from 36 week - III. Appearance of ultrasonic signs of different degrees of structure of placenta early than set terms is estimated as "senilism" of placenta.

Estimation of its hormonal function is the important method of research of the functional state of placenta. Most practical value has research of level of progesterone and estriol. The level of progesterone depends on the term of pregnancy and constantly rises to 37-38 week. The secretion of estriol depends mainly on testoid predecessors, that products by renal glands by fetus. The level of this hormone in the blood of pregnant represents the state of placenta not only, and also fetus to.

Methods of amniotic waters examination

During ultrasonic research estimate the volume of amniotic waters (see the biophysical type of fetus), estimation of their structure possible also.

Amniocentesis is receipt of amniotic waters by the method of puncture of amniotic cavity through an abdominal wall (trancabdominal access), or through vagina (transvaginalis). After 20 week of pregnancy apply trancabdominal access under the ultrasonic control, electing a place for puncture, where no placenta is. Get amniotic water for biochemical, hormonal, immunological, citological, genetic research, depending on the purpose of amniocentesis.

Screening for Gestational Diabetes

The 1-hour, 50-g oral glucose screen is used to detect glucose intolerance in pregnancy. Following an abnormal screen, a 3-hour glucose tolerance test, commencing with a fasting blood sugar, followed by a 100-g Glucola, is currently recommended. Two or more abnormal values on this test are considered diagnostic of gestational diabetes mellitus (GDM). Universal screening is controversial,

though most clinicians have opted for a universal approach. Risk factors for GDM include:

- maternal age greater than 30 years
- previous macrosomic, malformed, or stillborn infant
- GDM in a previous pregnancy
- family history of diabetes
- maternal obesity
- persistent glucosuria
- chronic use of certain drugs such as sympathomimetics or corticosteroids.

Proponents of universal screening argue that screening only those patients with risk factors will detect no more than half of patients with glucose intolerance.

Opponents argue that the inconvenience and expense of testing are not necessary in patients without these risk factors, because the incidence of frank GDM in this population is so low. Routine screening, if used, is performed on all patients between 26 and 28 weeks gestation. Selective screening based on risks may be performed earlier and repeated as needed, if negative at earlier gestations. A patient may be tested in the fasting or nonfasting state. One hour after administration of a 50-g glucose load, the patient's blood is drawn. A patient with a glucose value greater than 140 mg per dL of serum is a candidate for a 3-hour, 100-g glucose tolerance test.

The significance of GDM lies not in an increased risk of fetal loss but in the risk of excessive fetal growth with its attendant birth-related morbidities. In addition, women with GDM have a 60% likelihood of developing overt diabetes mellitus within 16 years.

Rescreening for Rh Antibodies

All Rh-negative women who are unsensitized at the beginning of pregnancy should be retested at approximately 26 to 28 weeks gestation. If the antibody screen remains negative, the mother should receive Rh 0(D) immune globulin 300 mcg at 28 weeks, to prevent isoimmunization in the third trimester. Approximately

1% of Rh-negative women will become sensitized if not given Rh immune globulins.

Screening for Bacterial Vaginosis

Bacterial vaginosis (BV) is a condition in which the normal flora of the vagina (specifically lactobacilli) are reduced in number and replaced by an overgrowth of anaerobic organisms. Studies have linked BV with an increased incidence of preterm labor, endometritis, and premature rupture of the membranes. A simple and effective screen, performed late in the second trimester, consists of a pelvic examination and wet mount to detect BV. A Gram stain is an alternative diagnostic tool. The treatment for women who are positive for BV includes either metronidazole or clindamycin (Cleocin). Because BV is often asymptomatic, a test of cure may be appropriate. Routine screening is not recommended, as studies have not shown that screening and treatment decreases preterm labor and delivery. However, symptomatic women, women with cerclage, or women with preterm dilated cervices should be screened and treated.

Testing for Group B Streptococci

Group B streptococci (GBS) are part of the normal vaginal, genitourinary, and gastrointestinal tract flora in up to 30% of healthy women. GBS have been implicated in amnionitis, endometritis, and wound infection in the mother. Vertical transmission during pregnancy, labor, and delivery may result in generalized sepsis in the newborn and related long-term morbidity or neonatal death. Prevention strategies have focused on detection of the bacteria in the mother and early onset of GBS disease in the newborn. The recommended strategy involves routine anogenital cultures of all pregnant women at 35 to 37 weeks gestation. Cultures are obtained from the lower third of the vagina and perianal area. Cervical cultures are not reliable and a speculum is not necessary to obtain an adequate culture sample. Culture-positive women are treated during labor with antibiotic prophylaxis to prevent fetal–neonatal GBS infection. Women with a positive urine culture for GBS should be given antibiotic prophylaxis in labor. These women do not need to be recultured.

Testing Based on Symptoms or Clinical Risk Assessment

A part of prenatal care of the normal patient consists of ongoing risk assessment and intervention or referral if a risk is identified. Several clinical signs or symptoms warrant further evaluation. Symptoms suggestive of urinary tract infections should prompt examination of a clean-catch urine specimen and cultures when appropriate. High-risk behaviors, identified during the course of a pregnancy, should prompt a test (or retest) for sexually transmitted diseases (STDs) or performance of a urinary drug screen. Repeated testing of hemoglobin should be done if the patient is symptomatic or at nutritional risk for anemia. Other testing, performed on an as-needed basis, includes ultrasound to detect abnormal fetal growth, antepartum fetal monitoring to assess fetal oxygenation status, or comprehensive targeted ultrasound examinations.

Discussion with Patients and Families: Answering Questions

Patients need the opportunity to engage in dialogue with their health care provider and to feel confident that their concerns are heard. Patients and families will often interact with a nurse or triage person in a physician's office. These individuals need to be trained in careful assessment and evaluation. The value of information ancillary personnel can provide cannot be overemphasized. The prenatal visits are a time to stress the involvement of the entire family in the pregnancy process, including the role of the father and siblings. Therefore, an important part of the prenatal visit is discussion with the patient, her partner, or her family, both to exchange questions and answers, and to provide reassurance and education. The exact content of these discussions will vary from visit to visit. Reaffirming the importance of appropriate social behaviors, such as smoking cessation, is beneficial, as are periodic evaluations of the social support systems and help in the home, both now and after the birth of the infant. Ongoing risk assessment requires that the patient be educated about the signs and symptoms of preterm labor and preeclampsia. The list of warning signs for which an emergent telephone call is warranted includes the following:

- vaginal bleeding

- leaking of fluid from the vagina
- rhythmic cramping pains of more than six per hour
- abdominal pain of a prolonged or increasing nature
- fever or chills
- burning with urination
- prolonged vomiting with inability to hold down liquids or solids for more than 24 hours
- severe continuous headache, visual changes, or generalized edema
- a pronounced decrease in the frequency or intensity of fetal movements.

Control Questions

1. What are the developmental stages of early pregnancy?
2. How does pregnancy affect cardiac output, blood volume, and blood pressure?
3. What is the effect of pregnancy on renal function?
4. When does morning sickness occur?
5. What is hyperemesis gravidarum?
6. What impact does estrogen have on hepatic metabolism?
7. What is HCG and where is it formed?
8. What happens to the adrenal hormones during pregnancy?
9. How is maternal glucose metabolism changed during pregnancy?
10. What are striae distensae or striae gravidarum?
11. What other vaginal changes occur in pregnancy?
12. What changes occur to the cervix and uterus during pregnancy?
13. What breast changes occur in pregnancy?
14. What are the early signs and symptoms of pregnancy?

15. How is pregnancy diagnosed?
16. When does HCG become positive?
17. What measurements are taken during each standard prenatal care visit?
18. What are important parameters in evaluating the pelvic shape?
19. What are routine intake prenatal labs?
20. How is Rh isoimmunization prevented?
21. What is an amniocentesis?
22. What is biophysical type of fetus?
23. What is cardiotocography?
24. Describe signs of 30 week pregnancy
25. Describe places for auscultation of fetal heart tones
26. Describe Leopold's maneuvers
27. How is the diagonal conjugate used?
28. How is the diagonal conjugate measured?
29. What is the interspinous diameter and what is its significance?
30. What is the fetal lie?
31. What types of fetal lie are there?
32. What is the fetal presentation?
33. What is the most common fetal presentation?
34. What are the other types of fetal presentation?
35. What information is gathered during a manual pelvic examination?

CHAPTER 3. PHYSIOLOGY OF LABOR

CLINICAL COURSE AND MANAGEMENT OF PHYSIOLOGICAL LABOR AND DELIVERY

Normal (physiological) labor is labor with the spontaneous beginning and progress of contractile activity in pregnant with low risk degree within 37-42 weeks of pregnancy, occipital presentation of fetus and satisfactory state of mother and new-born after labor.

The period of precursors precedes to onset of labor (preliminary period). The precursors to labor are characterized by the following signs: descent of uterine fundus, due to that breathing of woman is facilitated; increase of uterus respond to mechanical irritants; discharge of mucus plug from the canal of uterine cervix. The «mature» cervix of uterus is a basic sign of organism availability to labor.

A woman who has never given birth to a child is called nullipara, and a woman who has given birth two or more times is called multipara.

There are three stages of labor:

- I stage- dilation of uterine cervix
- II stage – fetal expulsion
- III stage - expulsion of placenta and membranes.

The first stage (stage of delation) starts from the beginning of regular contractions of uterus and lasts to the full delation of the cervix (10 cm).

Diagnostics and confirmation of labor onset:

- after 37 week pregnant woman has spasmodic pains at the low abdomen and sacrum with mucous-hemoregical or watery (in case of amniotic fluid escape) discharge from vagina;
- the presence of 1st labor contraction during 10 minutes, that lasts for 15-20 seconds;
- change of uterine cervix form:

- effacement (prior to birth, the cervix begins to soften and thin, a process known as effacement. The only way to detect effacement is for a physician to examine the cervix during a vaginal exam. The degree of effacement is expressed as a percentage from 0 to 100, and the cervix must be completely thinned out prior to vaginal delivery)
- opening (dilation) of cervix canal;
- gradual descent of fetal head to the small pelvis in relation to the inlet (from data of external obstetric exam), or in relation to lin. interspinalis (internal obstetric exam).

The labor contractions are involuntary contractions of uterine muscles. Intervals between the contractions are called a pause. Regular labor activity is such contractile activity which causes structural changes of cervix of uterus (effacement and dilation of cervix canal).

Effacement of cervix is diminishing of its canal length due to movement of muscular fibres of internal orifice to the lower uterine segment.

Dilatation of cervix is characterized by the increase of cervix canal diameter to 10 cm, that provides possibility of fetus advancement. Dilatation of cervix of uterus is carried out mainly due to contraction and muscular fibres of uterine body and fundus moving (retracton) in relation to each other, and also due to the stretching (distraction) of cervical muscles and partly of lower segment of uterus. In pauses between the labor pains contractions of uterus completely disappear, and retraction disappears partly.

During each labor pain increase of intrauterine pressure is passed on fetal membranes, amniotic water and fetus. Under intrauterine pressure amniotic water moves downward to the exit passageway from the uterus; as a result a fetal membranes squeezes into the canal of uterine cervix. The presented part (head) is fixed in the inlet and forms the internal zone of fitting. Amniotic water is here divided into front and back. The external zone of fitting appears between the walls of pelvis and lower uterine segment.

Effacement and dilatation of cervix in nulliparas and multiparas occur in different ways. In nulliparas effacement is prior to dilation (see fig. 25), and in multiparas these processes are simultaneous (see fig. 26).

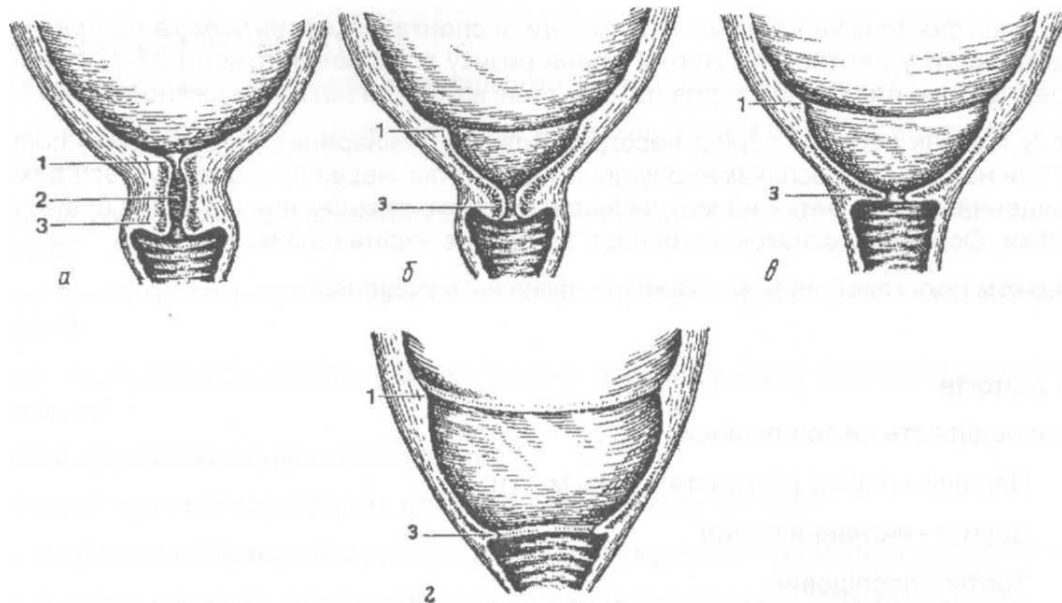


Figure 25. Uterine cervix of nullipara: a - before labor onset; b - the beginning of uterus dilation; c- the first period of labor (cervix effacement); d - the end of the first period of labor (full dilation of cervix): 1- internal orifice of cervix canal; 2 – canal of uterine cervix; 3 - external orrifice

In physiological labor the amniotic sac is ruptured and amniotic water is escaped at the end of the first period. Such escape of amniotic water is called timely escape. Amniotic water escape prior to labor activity is called premature, and its escape prior to cervix delation to 5 sm is called the early one.

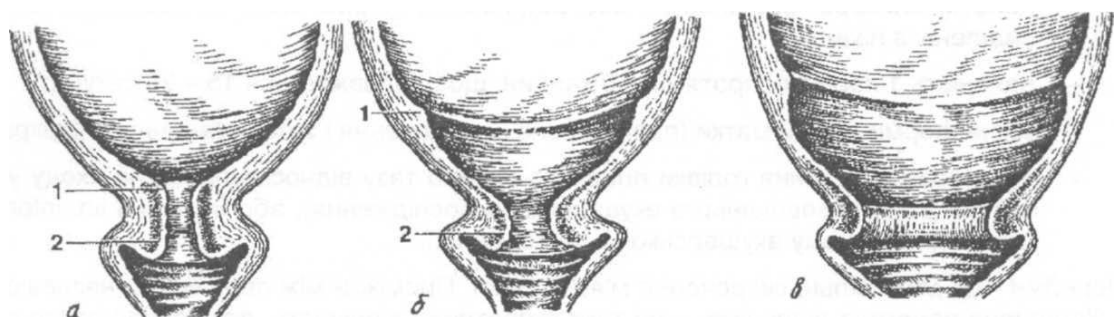


Figure 26. Uterine cervix of multipara: a - I stage of labor onset; b - simultaneous dilation of internal (1) and external (2) orifices of cervical canal; c – full delation of cervix

The first stage of labor is divided into two successive phases:

- *Latent (hidden, early labor) phase* is interval of time from the beginning of regular labor activity to the complete effacement of cervix with its dilation to 3 cm in nulliparas or to 4 cm in multiparas. This phase usually lasts to 6-8 hours in nulliparas and 4-5 hours in multiparas.

- During the *active phase* the cervix of uterus is dilated from 3-4 cm to 10 cm inclusive (full dilation). Minimum speed of cervix dilation during active phase is considered to be normal 1 cm/h both in nulliparas and multiparas. Usually dilation progress in multiparas lasts more than in nulliparas.

The active phase is divided into three subphases: acceleration of cervix dilation progress, maximal rise and deceleration cervix dilation progress (transmission). The subphase of acceleration in nulliparas proceeds to 2 hours, in multiparas - to 1 hour. The subphase of maximal rise lasts as many hours accordingly. The subphase of deceleration (transmission) is dilation of cervix from 8 to 10 cm and it lasts 1-2 hours in nulliparas and 0,5-1 hour in multiparas. Deceleration of cervix dilation progress at the end of the first stage of labor is explained by cervix sliding from the head of the fetus, that moves down.

The conclusion concerning efficiency of labor contractions is based on their intensity, duration and frequency, cervix dilation in dynamics, and on the signs of head advancement in relation to the inlet. But the most objective criterion of labor activity efficiency during I stage is cervix dilation.

During the active phase of the first stage of labor effective contractile activity of uterus must satisfy the following features: 3-4 pains per 10 minutes, each by duration more than 40 seconds.

The second stage (period of fetus expulsion) is the time from full cervical dilation to delivery of the fetus. It is important to distinguish the early phase of the second stage - from the full dilation to beginning of "bearing down" efforts, and the active phase - "bearing down" efforts themselves.

"Bearing down" efforts (strain) are rhythmic combinations of contraction of uterine musculature, abdominal press, diaphragm and pelvic bottom.

Maximally possible duration of the second stage is 2 hours in nulliparas and 1 hour in multiparas. Duration of II stage with epidural anaesthesia is longer and lasts 3 and 2 hours accordingly. The early phase takes the most part when the head gradually moves down the birth canal to the pelvic floor without “bearing down” efforts firstly. After that when the presenting part of fetus attains the pelvic floor “bearing down” efforts gradually appear and become more intensive.

Full-grown(spontaneous and active) powerful activity occurs only when a head is on a pelvic floor (active phase). Stimulation of “bearing down” efforts during the early phase under normal state of fetus and mother usually quickly results in the fatigue of woman, injuring of maternity ways and head of fetus, violation of fetal cardiac activity, superfluous medical interference and violation of labor mechanism (normal mechanism of labor see below).

The third stage (period of placenta and membranes delivery) lasts from birth of fetus to the delivery of placenta with membranes. Its duration must not exceed 30 minutes in case of bleeding signs absence.

The III stage of labor is divided into 2 phases:

- phase of placenta separation from the wall of uterus;
- phase of placenta with membranes expulsion from the uterus.

The mechanisms of the normally placed placenta separation from the wall of uterus can be different.

Separation of placenta from the uterine wall beginning at the center with retroplacental haematoma formation and expulsion of the placenta with the fetal surface foremost is called Schultze’s mechanism (see fig. 26)

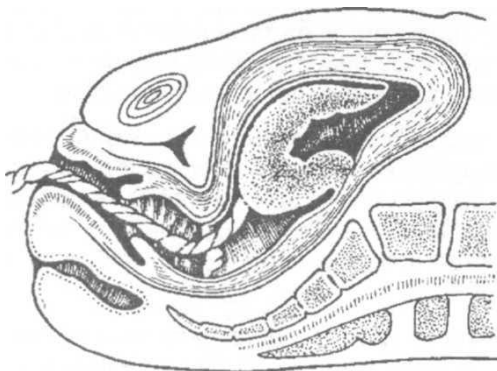


Figure 26. Central separation of placenta (variant by Schultze): retroplacental haematoma

If placenta starts separating not from

the center, and from the edge, such mechanism is called Duncan's mechanism (see fig. 28).

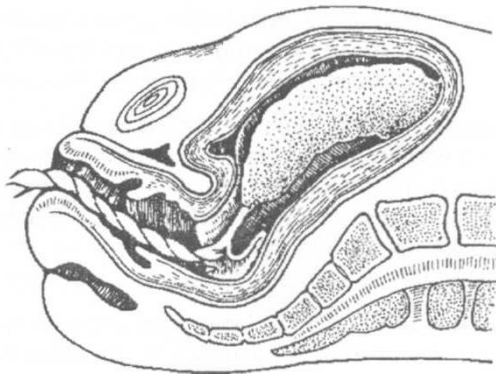


Figure 28. Placenta separation from the edge (Duncan's variant)

Blood loss during the III stage of labor, that makes 0,5% mass of women, but does not exceed 500 ml is considered to be physiological blood loss. The only objective method of blood loss estimation is measuring.

Evaluation methods of labor progress

External method of cervix dilation degree assessment

External method of cervix dilation degree assessment can show only rough pattern. Approximate judgment of cervix dilation degree in labor and delivery is based on contraction ring height (the border between the hollow contractile muscle and dilated lower segment of uterus). The size of cervix dilation in labor is usually corresponds to the size of contraction ring location above the pubic arch when measured by transverse fingers.

Internal method of cervix dilation degree assessment

To determine dynamics of cervix dilation and fetal head location internal obstetric examination is carried out.

Indications to internal vaginal examination:

- woman's admission to the department
- beginning of labor activity
- every 4 hours during the first period of labor
- after escape of amniotic waters (for timely diagnostics of possible prolaps of umbilical cord and tiny parts of fetus with

the amniotic liquid).

Due to the risk of birth canal ascending infection additional internal obstetrical examinations during the first period of labor and delivery are required only when there are indications for them:

- pathological rate of fetal heart beat to find out the reason of its state abnormality (e.g. prolapse of cord) and to solve the problem of delivery method (cesarean section, vacuum extraction or obstetrical forceps);
- multiple pregnancy after the first fetus delivery;
- abnormal fetal lie, or suspicion of deflexion attitude of fetal head in the inlet;
- delay of labor progress due to uterine contractions ineffectiveness (for amniotomy or before oxytocin stimulation);
- necessity of operative vaginal delivery;
- bleeding after 22 weeks of pregnancy (in operating-room).

The degree of fetal head descent can also be assessed by external and internal methods.

External methods for assessment of the fetal head descent level

The fetal head descent level in relation to the plane of pelvic inlet can be assessed by the Fourth Leopold's Maneuver (see chapter 2).

The method of abdominal palpation is also recommended to determine the fetal head level by digital examination (number of transverse fingers above symphysis):

5/5 – the fetal head is located 5 fingers width above symphysis with the head above the inlet;

4/5 – the width is 4 fingers, the head is attached to the inlet;

3/5 – the width is 3 fingers, the small segment of the head is in the inlet;

2/5 – the width is 2 fingers, the large segment of the head is in the inlet;

1/5 - 0/5 – the width is 1 finger or the head is not determined, the head is in the pelvic cavity.

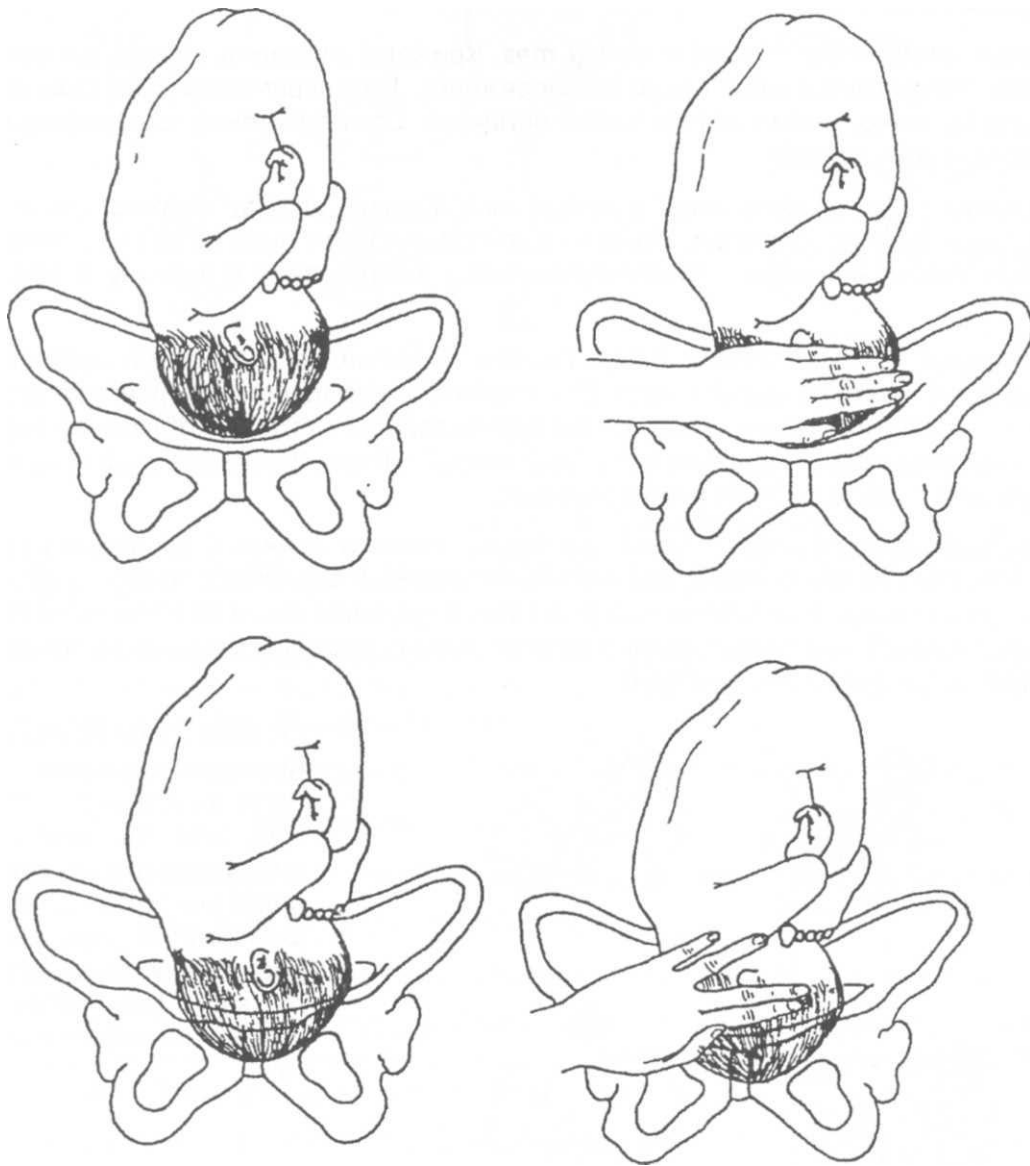


Figure 29. Assessment of fetal head descent amount in the pelvic canal by the method of abdominal palpation.

External head palpation must be carried out immediately before the internal obstetric examination. It gives possibility to prevent mistakes in fetal presentation in case of large edema of presenting part of fetal head forming.

Assessment of fetal head descent during internal obstetric examination (see fig. 30)

- The head is above the inlet. The pelvis is free, the head is highly located, it does not interfere with palpation of line innominate of pelvis, promontorium; sagittal suture is in a transversal size on identical distance from a

symphysis and promontorium, large and small fontanelles are at the same level.

- The small segment of the head is engaged in the inlet. Sacrum is free, it is possible to reach to the promontorium by an arcuated finger (if it is accessible). Internal surface of symphysis is accessible at examination, small fontanelle is beneath the large one. A sagittal suture is located in slightly oblique size.

- The large segment of the head is engaged in the inlet. The head occupies upper thirds of symphysis and sacrum. A promontorium is unattainable. A head is flexed, small fontanelle is beneath the large one, the sagittal suture is in one of oblique sizes.

- The head is engaged in pelvic cavity. The most circumference of the head has passed the cavity of pelvis. Two thirds of internal surface of pubic coarticulation and upper half of sacrum are occupied by the head. The IV and V sacral vertebrae are easily palpated. The sagittal suture is located in one of oblique sizes, small fontanelle is beneath the large one.

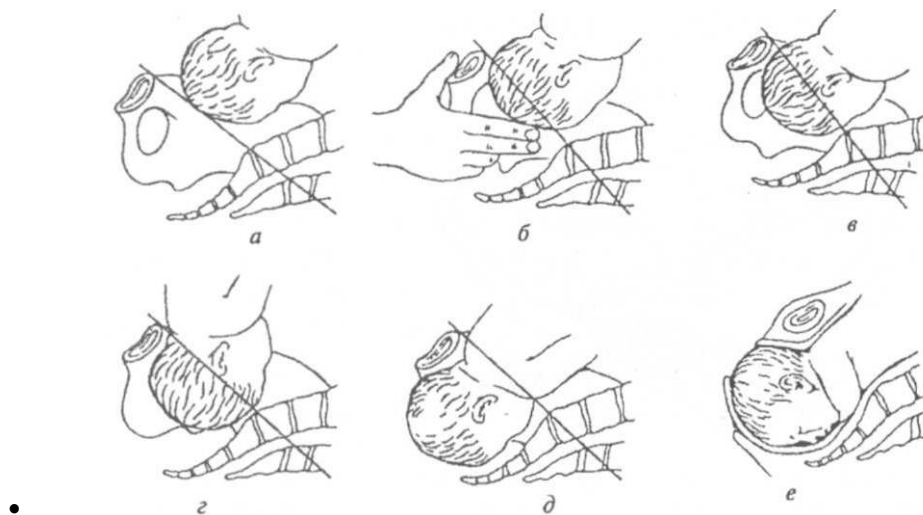


Figure 30. Fetal head position during cardinal movements: a - above the inlet, b- attached to the inlet, c - small segment is engaged in the inlet, d - large segment is engaged in the inlet, e - in the cavity of small pelvis, f - in the anatomical outlet.

- The head is in obstetrical outlet. The two upper thirds of sacrum and whole internal surface of pubic coarticulation are occupied by the head. Ischial

spines are difficult to reach. The head is close to the pelvic floor, its internal rotation is not completed, the sagittal suture is in one of oblique sizes, it is close to direct one. Small fontanelle is beneath the large one.

- The head is in the anatomical outlet. Sacrum is completely occupied by a head, the sagittal suture is located in the direct size of anatomical outlet. Small fontanelle is beneath the large one.

The transvaginal assessment of the station of the fetal head can also be done in relation to levels of ischial spines – linia interspinalis (“0” position). The distance between ischial spines and the plane of inlet corresponds to the distance between ischial spines and the outlet. “Plus” sign (+) means that the head is above the ischial spines (closer to the inlet). “Minus” sign (-) means that the fetal head is beneath the ischial spines (closer to the outlet).

Head position is assessed as follows (see fig. 31):

- 3 the head is above the inlet;
- 2 the head is attached to the inlet;
- 1 small segment of the head is engaged in the inlet
- 0 large segment of the head is engaged in the inlet
- +1 the head is in the pelvic cavity;
- +2 the head is engaged in obstetrical outlet
- +3 the head is engaged in anatomical outlet.

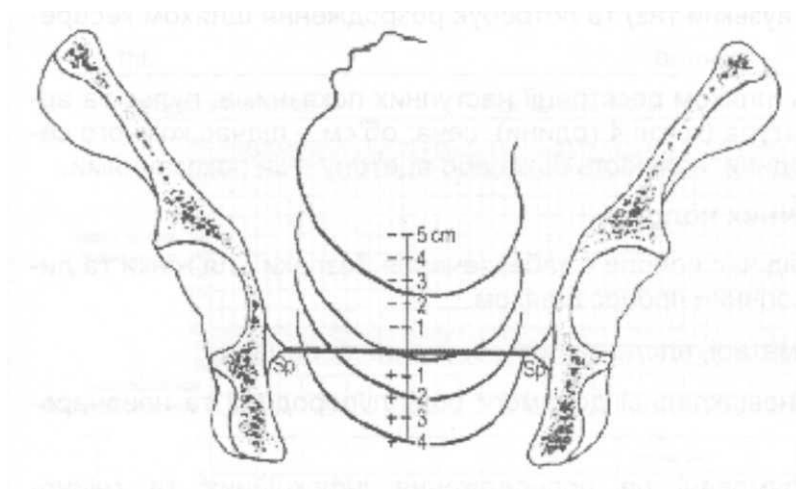


Figure 31. Fetal head position during internal examination

Fetal monitoring

Fetal status must be monitored during labor. The main parameters are fetal heart rate (FHR), amniotic water color, head configuration.

Fetal heart rate is registered by periodic auscultation with obstetric stethoscope, manual Doppler analyzer or fetal cardiotocography monitoring (see chapter 2).

Periodic auscultation is provided in obedience to the following rules:

- the woman is in lateral position;
- auscultation starts immediately after termination of the most intensive phase of fights;
- auscultation lasts for 60 seconds.

A normal pattern of fetal heart beat is within the limits of 110-170 beats per minute.

In case of abnormal fetal heart rate it is necessary to change woman's position of body (avoid dorsal position) and to conduct repeated auscultation, following the method mentioned above.

In case of constant auscultative abnormalities of fetal heart beats cardiotocographic examination is required (see chapter 2).

The color of amniotic waters is assessed during their escape and during every internal obstetric examination. Normally amniotic water is transparent. Appearance of fresh and thick meconium in amniotic waters testifies to worsening of fetus state, especially in combination with abnormality of heart beat rate.

Configuration of fetal head is the process of its adaptation to the birth canal. Due to the presence of sutures and fontannels bones of fetal skull have ability to be drawn together and overlap thus diminishing the volume of fetal head. There are three degrees of fetal head configuration:

- I degree - bones of skull are close, they contact each other
- II degree - bones moderately overlap each other
- III degree - bones considerably overlap each other

The third degree of head configuration in combination with absence of head

advancement down the birth canal and the presence of active uterine contractions is the sign of disparity between the sizes of fetal head and pelvis of mother (clinically narrow pelvis) and needs of delivery by a way of caesarian section.

Monitoring of woman's state is carried out by registration of the following parameters: pulse and blood pressure (every 2 hours), temperature (every 4 hours), urine volume (every urination, but no less than every 4 hours); presence of albumin or acetone in urine (according to indications).

Clinical management of physiological labor and delivery

The main purpose of assistance rendering during labor and delivery is to provide safety for a woman and her baby with minimal interference into physiological process by means of:

- careful monitoring of mother and fetus state as well as the labor progress;
- conditions creation for emergency rendering for parturient woman and newborn child;
- measures to prevent infectious and purulent-inflammatory complications;
- introduction and strict compliance with the principle of "thermal chain".

Clinical course and management during the first period of labor

The monitoring of the first period of labor progress, state of mother and fetus is carried out by partogram.

Partogram recording peculiarities.

In relation to hour-angle axis the following parameters are graphically represented on partogram:

1. Labor progress:
 - Rate of cervix dilation, assessed by the method of internal obstetric examination (every 4 hours)
 - Fetal head descending, assessed by abdominal palpation (every 4 hours)
 - Frequency (for 10 minutes) and duration (in seconds) of uterine

contractions (every 30 minutes)

2. State of fetus:

- Fetal heart beat rate, assessed by auscultation or Doppler analyzer (every 15 minutes)
- Degree of fetal head configuration (every 4 hours)
- State of amniotic sac and amniotic waters (every 4 hours)

3. State of a woman:

- Pulse and blood pressure (every 2 hours)
- Temperature (every 4 hours)
- Urine: volume (every urination, but not less than every 4 hours); presence of albumin or acetone (according to indications).

Partogram is represented on fig. 32.

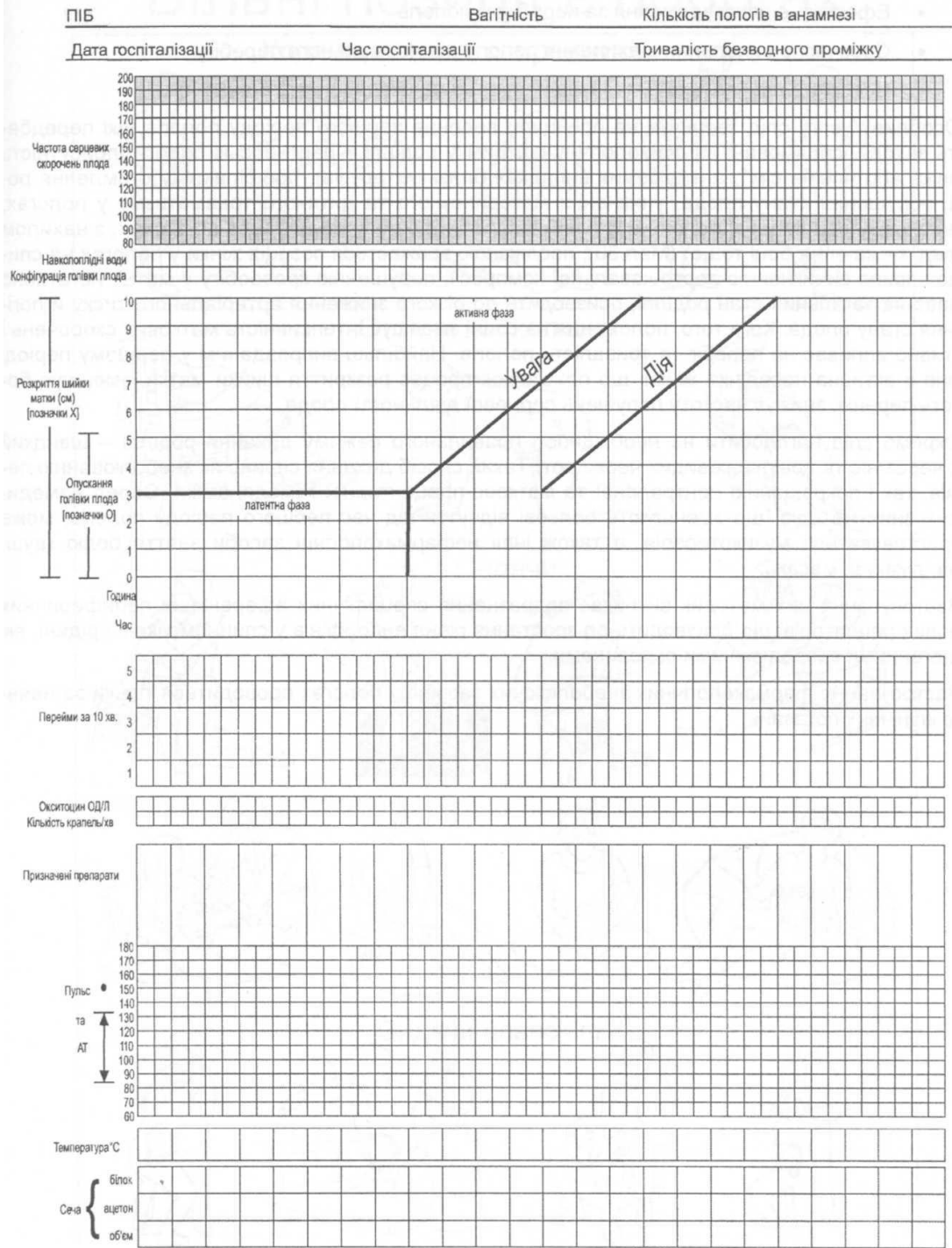
Advantages of partogram are:

- effective monitoring of labor progress
- timely prediction of deviation from normal progress of labor
- assistance in making decision concerning the necessity of interferences

Special attention should be paid to management principles during the first stage of labor: there are the measures, directed to psychological support of a woman - partners labor (presence of husband or family members, or intimate friends); prophylaxis of woman's fatigue, abnormality of fetal state, avoidance of maternal and child's traumatism in labor. The woman should be encouraged to choose the position which is more pleasing and comfortable for her during labor (sitting, upright, tilted forward, lateral positions, etc.).

Dorsal position considers to be undesirable because of aortic and vena cava compression development, blood circulation in uterus impairment, and adversely affect puerpera's general state, causes abrupt hypotonia and fetal state worsening. In addition, dorsal position diminishes intensity of uterine contractions and negatively influences progress and duration of labor. During the first stage of labor

Партограма (вкладиш до історії пологів № _____)



Діагноз:

Figure 32. Partogram

the active woman's conduct is most reasonable. It accelerates the process of cervix dilation, diminishes painfulness of contractions, reduces frequency of cardiac fetal activity abnormalities .

It's necessary to emphasize the necessity of the correct method of puerpera's breathing: the woman should breathe in deeply through her nose: this is followed by a slow, deep exhalation through her mouth. Such method of breathing contributes both fights anaesthetizing and improvement of central and uterine-placental hemodynamics. To reduce painful sensations another non-drug method as music therapy can be used, as well as shower, bathing, hot whirlpool, massage.

Application of these methods causes the irritation of specific peripheral nervous receptors, that results in growth of endorphines level in cerebral fluid, which are the endogenous anaesthetic matters.

Application of pharmacological anesthetics during labor is conducted only according to indications.

Clinical course and management during the second stage of labor requires:

- blood pressure, pulse measurements in woman every 10 minutes;
- control of fetal cardiac activity every 5 minutes during the early phase, and after every "bearing down" effort during the active phase;
- control of fetal head advancement down the birth canal by internal obstetric examination hourly.

Separately it should be noted that the protracted lodgment of fetal head in one plane of small pelvis without the dynamics of advancement can result in forming of recto- and urovaginal fistulae.

Due to the risk of birth canal ascending infectioning additional internal obstetrical examinations during the first period of labor and delivery are required only when there are indications for them:

- amniotomy performance in case of timely amniotic water escape absence;
- multiple pregnancy after the first fetus delivery;
- necessity of operative vaginal delivery (obstetrical forceps, vacuum

extraction or fetus extraction by pelvic end).

Birth of fetal head needs careful manual assistance to maintain of woman's perineum integrity as well as warning of intracranial, spinal and other traumas of fetus.

Defence of perineum consists of five maneuvers:

1. Prevention of the premature deflexion of fetal head: the palm of left hand abuts against symphysis pubis, by fingers restrain swift advancement of head, carefully pressing on it.
2. Diminishing of perineum tissue tension: palm's surface of right hand is disposed on a perineum, moving tissue of large vulvar lips toward perineum by fingers.
3. Disengagement out of fetal head from a vulvar cleft- after formation of fixing point, out of "bearing down" efforts, carefully taking off the lateral edges of vulvar ring from a head, enable it to be unbended.
4. Assistanse during the internal turn of shoulders and external turn of head: head, that was borned, is taken by both hands so that hands lay down on the area of ears; carefully draw down a head until front shoulder fits a pubic arch.
5. Shoulders disposal: take a head by the left hand and take to the symphysis pubis, by a right hand carefully taking off perineum tissue from the back shoulder.

After birth of shoulders the child's trunk is taken by both hands, the ends of fingers must be in arm-pits fossulas. Direct a trunk upwards and take the fetus out.

There is management during the second stage of labor without defence of perineum. Free position of woman during "bearing down" efforts promotes more dynamic passing of fetus through the birth canal. The most effective positions are sitting on a chair, upright position, pulling up on a ladder, lateral position .

It is important to underline that auxiliary dissection of perineum (perineo- and episiotomy) is carried out only when it is necessary during the second stage of labor.

Indications for perineum cutting:

- complicated vaginal labor (vacuum-extraction, obstetric forceps, breech presentation)
- cicatricial changes of perineum after its cutting in previous labor, especially after bad cicatrization
- distress of fetus during the second stage of labor.

It should be noted that the use of episiotomy by indication "threat of perineum rupture" is not always substantiated.

There are the following recommendations concerning perineum cutting performing in labor:

- episiotomies must be performed limitedly by indications;
- perineotomy is accompanied by greater frequency of deep ruptures of vagina with the defeat of rectum and anal sphincter in comparison with an episiotomy;
- routine episiotomy does not result in diminishing of deep ruptures of vagina frequency with the defeat of rectum and anal sphincter;
- in time of perineum cutting necessity it's recommended to give preference to episiotomy, not perineotomy.

Anyway decision about operation performing must be clinically based and well-proved to the woman, with giving her consent. The operation should be performed after previous local anaesthetizing.

Assessment for newborn babies

Immediately after birth a midwife lays out a child on the mother's abdomen, carries out drying of newborn's head and body by a warmed sterile diaper, dresses the child clean little cap and socks, covers by a dry clean diaper and blanket.

At the same time neonatologist, and at his absence obstetrician-gynecologist, carries out primary assessment of the new-born baby's state.

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 one minute and five minutes after birth for heart and respiratory rates,

muscle tone, reflexes, and color. Each area can have a score of zero, one, or two, with ten points as the maximum. A total score of ten means a baby is in the best possible condition.

The test is generally done at one and five minutes after birth, and may be repeated later if the score is and remains low. Scores 3 and below are generally regarded as critically low, 4 to 6 fairly low, and 7 to 10 generally normal. Upon termination of umbilical cord pulsation, but not later than 1 min. after birth of child midwife replacing sterile gloves, clamps and cuts an umbilical cord. If new-born baby's state is normal it is stayed on mother's breast.

If the newborn has search and sucking reflexes (the baby rises its head, opens the mouth, searches for mother's breasts) the midwife helps perform the first early applying to mother's breasts.

In 30 min. after child's birth the midwife measures new-born's temperature in an axillary area by electronic thermometer and writes down the results of thermometry in the card of new-born's development.

After mother and baby's contact "eye-to-eye" (but no later than during the first hour of baby's life) the midwife with sterile hands provide measures to prevent ophthalmia using 0.5% erythromycin or 1% tetracycline ointments according to recommendations to do it one-time.

Contact "skin to skin" lasts for no less than 2 hours in delivery room if mother and baby's state is normal.

After contact "skin-to-skin" termination the midwife puts the baby on the warmed diaper table, provides umbilical cord treatment and clamping, measures length, head and chest circumference, birthweight; dresses the baby clean romper suit, shirt, cap, socks, mittens.

The mother and her child are covered with a blanket and translocated to the rooming-in ward with the observance of "thermal chain" principles.

Thermal chain. Thermal chain is the complex of measures provided during labor and within the first days after child's birth with the purpose to diminish new-born's heat loss. Any of these measures neglect breaks off the thermal chain and

puts a new-born child under the threat of overcooling. The failure to observe of thermal chain advances the risk of glucopenia, metabolic acydosis, infection, respiratory disorders, disorders of central nervous system (hemorrhages, cramps) development in new-borns.

Ten steps of thermal chain:

1) Warm maternity room (operating-room).

The apartment must be clean and warm, without draughts from the opened windows, doors and conditioners (ventilators). The optimal (safe) temperature for a mother and child considers to be 25°C -28°C.

2) Immediate newborn's drying.

Immediately after birth (before the clamping of umbilical cord) a midwife must dry baby's body and head with sterile, dry, warmed diapers. She should put the newborn on the mother's abdomen and finish drying. Moist diapers need to be postponed, the baby should be dressed on clean little cap and socks and covered with clean dry warmed diaper. Needments for child's warming (diapers, little cap, socks, shirt, blanket) is needed to be prepared and warmed up in advance.

3) The contact "skin – to – skin".

The contact "skin – to – skin" prevents heat loss and promotes colonization of child's organism by the mother's flora. On mother's breast the child is covered with a clean preliminary warmed-up diaper and common with a mother blanket and stays there not less than 2 hours till rooming-in.

To control of observance of thermal chain measures the first measuring of newborn's temperature is carried out through 30 minutes after birth in axillary area by electronic thermometer. Normal body temperature of a new-born is 36,5°C-37,5°C.

4) Breast feeding.

Breast feeding should be started as soon as possible during the first hour after birth, when the baby shows signs of readiness before the feeding beginning and contacts mother "skin – to-skin". Don't make the baby start the first feeding if he/she doesn't show these signs.

5) Postpone weighing and bathing.

Bathing and weighing of new-born immediately after birth results in heat loss, that is why these procedures need to be postponed. The first bathing is expedient to carry out at home. Weighing and anthropometry of child must be conducted after contact "skin – to – skin" before rooming-in.

6) To dress and wrap up a newborn correctly.

A newborn must be dressed in clean warm romper suit, shirt, little cap, socks, mittens and covered with a warm blanket.

7) Round-the-clock mother and baby's rooming-in.

If there are no contraindications a new-born baby must be together with a mother in one room round-the-clock. Rooming-in provides feeding on call, prophylaxis of hypothermia and hospital-acquired infection.

8) Translocation in warm conditions.

If a baby needs to be translocated to other department (room) health care providers are under an obligation to provide support and control of baby's temperature to prevent hypothermia development. A new-born must be translocated together with a mother to the rooming-in ward. At delivery by caesarian section, the new-born is translocated in cuvesis or in a crib, covered with a warm blanket.

9) Reanimation in warm conditions.

A new-born baby with asphyxia can not make enough heat, and the risk of hypothermia development is high. That is why it is important to provide reanimation measures in warm conditions.

10) Training level and skills improvement.

All health care providers must have proper training and practical skills to follow the principles of "thermal chain".

Clinical course and management during the third stage of labor.

There are two approaches in management during the third stage of labor: active and expectant.

Active management during the third stage of labor

Due to a whole number of advantages the active management during the third stage of labor is worldwide used and recommended by the World Health Organization (WHO), the International Federation of Gynecology and Obstetrics (FIGO) and International Confederation of Midwives.

The method of active management during the third stage of labor allows to reduce frequency and amount of postpartum hemorrhage caused by uterine atony by 60% as well as hemotransfusion necessity.

The standard components of active management during the third stage of labor include:

- Administration of oxytocin or another uterotonic drug within the first minute after baby's birth;
- Controlled cord traction (traction on the umbilical cord, combined with counterpressure upwards on the uterine body by a hand placed immediately above the symphysis pubis).
- Uterine massage after delivery of the placenta. The fundus of the uterus (top portion) is vigorously massaged to keep it the consistency of a tightened thigh muscle.

Step 1. Intramuscular injection of oxytocin. The fundus is assessed immediately following delivery of the baby, thus excluding an undiagnosed twin and giving a baseline fundal height. If so, intramuscular injection of oxytocin (commonly, 10 IU) is given. (Fig.33, Step 1).

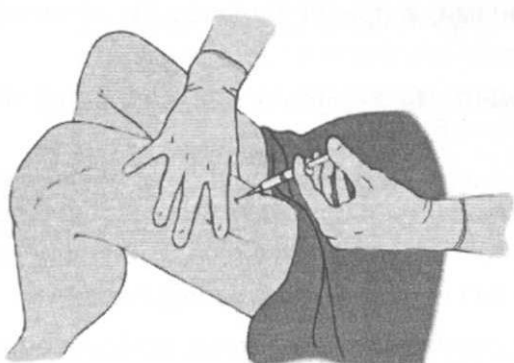


Figure 33. Step 1. Intramuscular injection of oxytocin

While uterotonic suggesting it's necessary to give preference to oxytocin as its effect is already shown in 2-3 minutes after injection and it can be given for all women.

If there is no oxytocin available intramuscular injection of ergometrine (0,2mg) can be given.

The woman must know all the possible side effects of these agents.

Ergometrine is contraindicated for women with preeclampsy, eclampsy and hypertension.

Step 2. Controlled cord traction procedure. Umbilical cord clamping and preparation for traction.

Clamp the cord close to the perineum (once pulsation stops, or after three minutes in a healthy newborn), hold it in one hand.

Place the other hand just above the woman's pubic bone and stabilize the uterus by applying counter-pressure during controlled cord traction.

Keep slight tension on the cord and await a strong uterine contraction (2-3 minutes) (Figure 34).

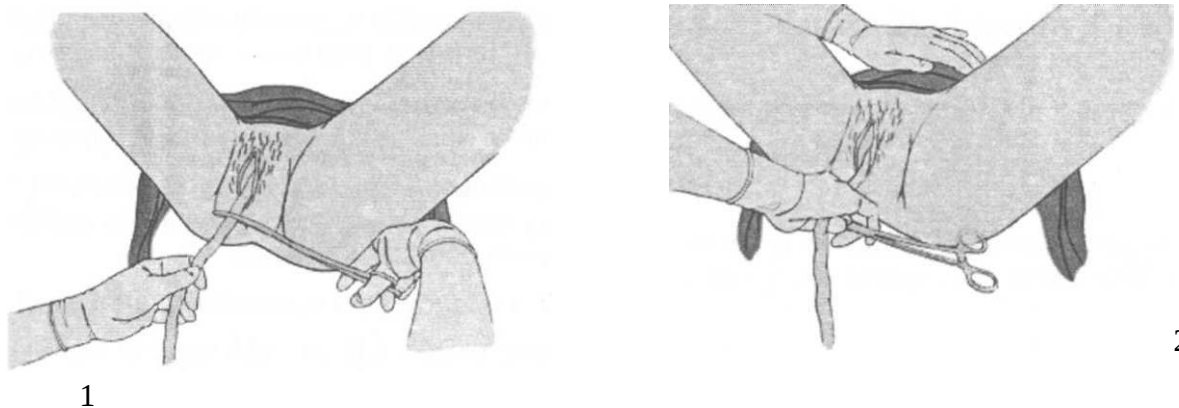


Figure 34. Step 2. Umbilical cord clamping (1) and preparation to controlled cord traction (2).

Step 3. Controlled cord traction with simultaneous uterine contractions.

With the strong uterine contraction, encourage the mother to push and very gently pull downward on the cord to deliver the placenta. Continue to apply counter-pressure to the uterus (Figure 35).

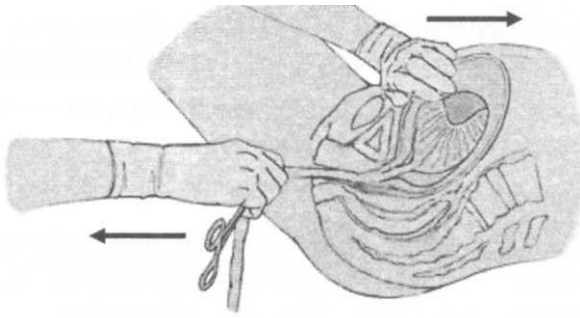


Figure 35. Step 3. Control traction by an umbilical cord with simultaneous contr-traction on an uterus

If the placenta does not descend during 30-40 seconds of CCT, do not continue to pull on the cord:

Gently hold the cord and wait until the uterus is well contracted again;

With the next contraction, repeat CCT with counter-pressure.

Note: Cord traction must never be applied in the absence of countertraction. It can cause inversion of uterus.

Step 4. Placenta delivery by “wringing”. After placenta delivering it is held by both hands and gently rotated, wringing the membranes. It is then slowly pulled down to finish delivery. (Figure 36)

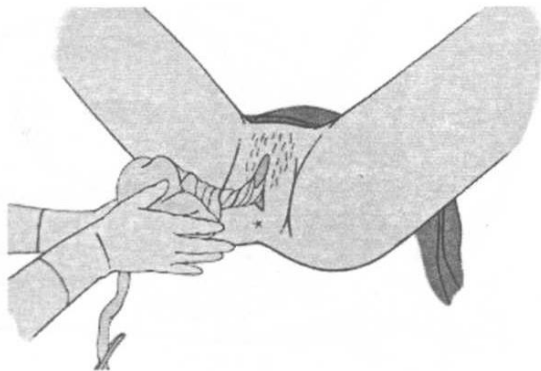


Figure 36. Step 4. Membranes delivery by «wringing»

In case of membranes rupture careful examination of groin and cervix of uterus by gloved hands is carried out. If there are membranes there fenestrated forceps is used for their remains removal.

Placenta is carefully examined for its integrity. If there is no area of maternal surface or there is the area of ragged vessels it can give occasion to suggest retained placenta areas and to start required measures.

Step 5. Uterine massage. The fundus of the uterus (top portion) is vigorously massaged to keep it the consistency of a tightened thigh muscle. (Figure 37)

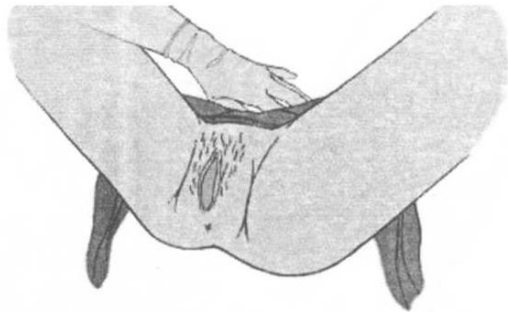


Figure 37. Step 5. Uterine massage after delivery of placenta

Further the uterus should be palpated every 15 minutes during the first two hours to insure its relaxation absence and keeping the consistency of a tightened thigh muscle. The repeated massage is used if necessary.

Ice-bags application on the lower abdomen is not used during early puerperium.

Every women must be offered to have active management during the third stage of labor as it reduces frequency of postpartum hemorrhage caused by uterine atony.

Puerpera must know information regarding active management during the third stage of labor and should give her voluntary written consent for its implementation.

Physiological (expectant) management during the third stage of labor

After cessation of umbilical cord pulsation but no longer than 1 minute after baby's birth, the umbilical cord is clamped and cut. Careful supervision after puerpera's general state, signs of placenta separation, amount of blood discharge is carried out.

If there are signs of placenta separation it is necessary to ask the woman to push that will result in placenta delivering.

The signs of placenta separation are as follows:

Schroder's Sign: Uterus rises up and is to the right of umbilicus when the separated placenta is descended into the inferior segment or into the vagina; the uterus is sandglass-shaped.

Chukalov- Kustner's sign: In case of placenta separation uterus rises up and umbilicus isn't pulled inside the vagina when pushing by palm edge down the pubic area. (Figure 38)

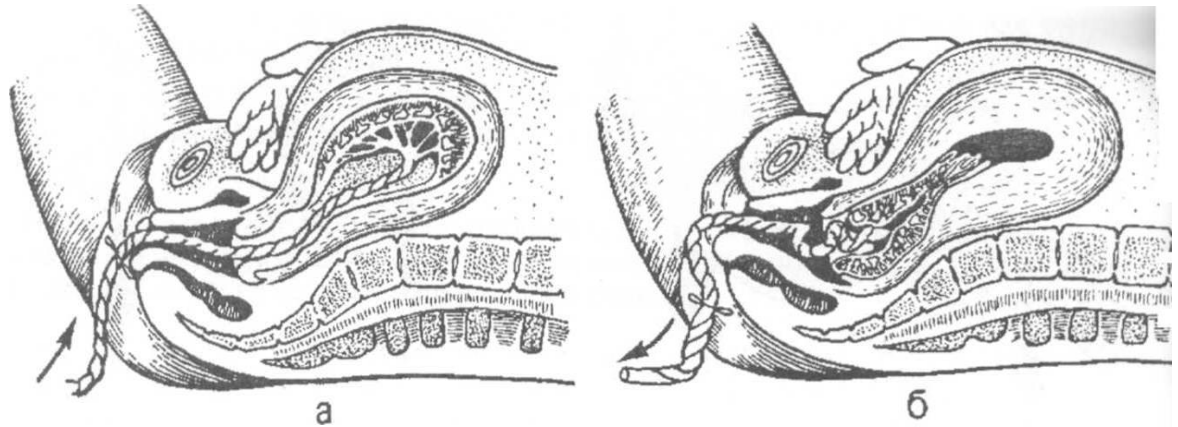


Figure 38. Sign of Chucalov-Kustner: a - placenta is not separated; b - placenta is separated.

Ahlfeld sign: Ligature on the umbilical cord near the vulvar cleft is 8-10 sm descended and is located at the inguinal ring when placenta is separated.

Dovzhenko sign: The woman is asked to breathe deeply: if the umbilical cord is not pulled inside the vagina when breathing out it can testify to placenta separation.

Klein sign: If the umbilical cord is not pulled inside the vagina when the puerperal is asked to push, placenta is separated.

Commonly, after about 30 minutes of waiting or if there is increased bleeding without evidence of placental separation, a manual removal of the placenta is undertaken.

Anesthesia (local or general) should be used for immediate manual removal of the placenta in case of hemorrhage development.

After placenta removal it is necessary to carry out its careful examination to be sure of its integrity .

Examination of birth canal after labor and delivery (with vaginal speculum) is carried out only if there are signs of bleeding, after operative vaginal delivery or

if the doctor is uncertain of birth canal integrity (accelerated labor, out-hospital delivery).

BIOMECHANISM OF LABOR IN THE OCCIPITO-ANTERIOR AND OCCIPITO-POSTERIOR PRESENTATIONS

Biomechanism of labor in the occipito-anterior and occipito-posterior presentations is an important subject in studying Obstetrics. As biomechanism of labor is the basic component of labor process in the occipito-anterior and occipito-posterior presentations it prognoses labor outcome for both mother and her fetus. Veritable knowledge of labor mechanism allows in good time to conduct preventive or medical measures that eventually contribute to reduction of maternal and perinatal mortality during labor and delivery.

Biomechanism of labor is a complex of sliding, rotatory, flexion and extension movements of fetus during its way downwards the birth canal.

Before biomechanism of labor studying it is necessary to determine the following peculiarities of fetal head position in occipital presentation:

- 1) before labor the fetal head is slightly flexed, that is occiput and small fontanelles are lower than the large fontanel;
- 2) a sagittal suture is lying oblique at the inlet as transverse orientation of inlet runs close to the sacrum and the muscles make posterior-lateral parts of pelvis somewhat narrower.

Biomechanism of labor also depends on the structure of bone-pelvic ring (its narrowing in posterior-lateral parts due to muscles) and ability of fetal head for configuration.

BIOMECHANISM OF LABOR IN THE OCCIPITO-ANTERIOR PRESENTATION.

Biomechanism of labor in anterior type occipital presentation (in fronto-

occipital presentation, in occipito-anterior presentation) consists of four moments.

The first moment is fetal head flexion and its descent downwards the inlet. It is axial fetal head rotation. Due to fetal head flexion, small fontanel is on the inferior pole of presenting part approaching to the axis of pelvis and becomes “the leading point”. As a result of this flexion the fetal head moves through the pelvis by the smallest circumference which runs through the small oblique plane and is 32 cm.

Fetal head flexion is explained by the law of double-crank arm. Sliding movements of fetal head last continuously up to the baby's birth. The head configuration takes place during this moment.

During the head flexion the axis of head and pelvis coincide and here the distance from pubis and promontory to sagittal suture is equal. Such engagement of head is called syncletic. If a sagittal suture is declined from the axis of pelvis (closer to promontory or pubis) there is asyncretic engagement which considers to be pathological one.

The second moment is internal rotation of the head. It occurs when the fetal head moves from the broad to the narrow part of the small pelvis. The head slowly rotates about its axis in such a way that the occiput is directed toward the symphysis and the face towards the sacrum. Thus the sagittal suture gradually changes its position, passing from the transversal to the oblique plane, and then from the oblique to the direct plane of anatomical outlet.

When the sagittal suture is in the first position it passes through the right oblique plane, when it is in the second position it passes through the left oblique plane of the pelvis.

Internal rotation of fetal head is the result of its smallest dimensions accommodation to the greatest pelvic dimensions as well as to the resistance of pelvic muscles to sliding movements of fetal head.

The third moment is fetal head extension in the outlet. The sagittal suture coincides with direct dimension of anatomical outlet. The point of fixation is formed between the middle of the lower edge of symphysis pubis and fossa

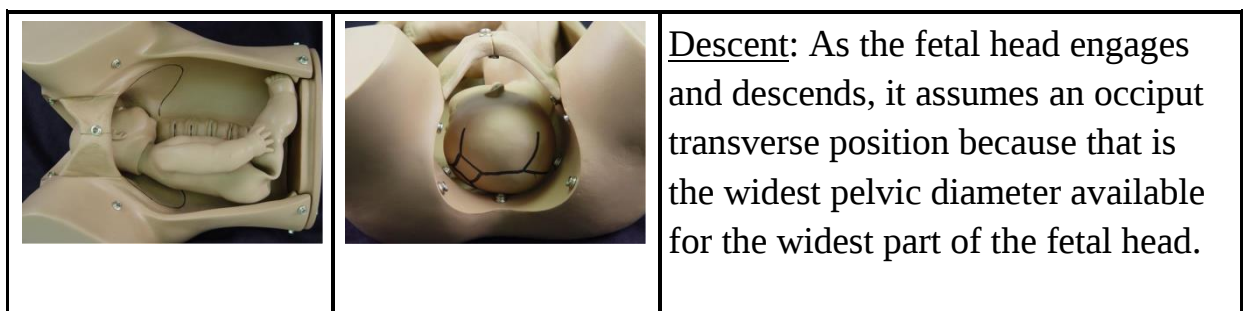
suboccipitalis. The head extension occurs around this point and clinically it is accompanied by the birth of forehead, face, chin.

The forth moment is internal rotation of the shoulders and external rotation of the head. During the fetal head engagement and extension the trunk moves downwards the small pelvis, thus the long axis of shoulders is now lying in one of the oblique planes of the inlet. In first position the shoulders are in the left oblique dimension of the inlet, in second position the shoulders are in the right oblique dimension of the inlet.

Internal rotation of the shoulders takes place in a similar way to internal rotation of the head. After rotation the shoulders are in their direct size in the direct plane of the anatomical outlet. This rotation of shoulders is transmitted to the delivered head that is the forth moment of labor biomechanism. The fetal head faces the mother's leg: in first position it faces the right leg, in second position it faces the left leg.

The anterior shoulder becomes the leading shoulder and reaches the pelvic floor first, causing it to be directed downwards and rotated forwards along the side of the pelvis, where it comes to lie beneath the lower border of the symphysis pubis. The point of fixation is the place of deltoid muscle attachment to the humerus. The fetal trunk flexion in the thoracic region occurs around the point of fixation and posterior shoulder is delivered first with the following posterior arm. After pectoral girdle delivery other parts of fetus are delivered; there is no special biomechanism of their delivery as their dimensions are rather smaller than those of fetal head and shoulders.

Figure 38 shows biomechanism of labor in occipito-anterior presentation.



		<u>Flexion</u>: While descending through the pelvis, the fetal head flexes so that the fetal chin is touching the fetal chest. This functionally creates a smaller structure to pass through the maternal pelvis. When flexion occurs, the occipital (posterior) fontanel slides into the center of the birth canal and the anterior fontanel becomes more remote and difficult to feel. The fetal position remains occiput transverse.
		<u>Internal Rotation</u>: With further descent, the occiput rotates anteriorly and the fetal head assumes an oblique orientation. In some cases, the head may rotate completely to the occiput anterior position.
		<u>Extension</u>: The curve of the hollow of the sacrum favors extension of the fetal head as further descent occurs. This means that the fetal chin is no longer touching the fetal chest.
		<u>External Rotation</u>: The shoulders rotate into an oblique or frankly anterior-posterior orientation with further descent. This encourages the fetal head to return to its transverse position. This is also known as restitution.

Figure 39. Biomechanism of labor in occipito-anterior presentation

BIOMECHANISM OF LABOR IN THE OCCIPITO-POSTERIOR PRESENTATION.

The first moment is fetal head flexion and its descent downwards the inlet (there are no differences between occipito-anterior and occipito-posterior presentations).

The second moment is internal rotation of the fetal head: the occiput is directed not toward the symphysis as in occipito-anterior presentation but to the sacrum, and the face is directed towards the symphysis. Along with the occiput the fetal back rotates backwards. Thus, small fontanel is directed towards the promontory, and large fontanel is directed towards the symphysis. The sagittal suture passes through the oblique to the direct orientation of the outlet.

The third moment is additional flexion of fetal head. It is fixed in the middle of the lower border of the symphysis by the area of the anterior border of large fontanel; the first fixation point is thereby formed, around which additional flexion is completed and lasts till the second fixation point formation.

The forth moment is extension of the head. Further disengagement of fetal head occurs due to the second fixation point formation between fossa suboccipitalis and coccygeal apex. Thus, the head is delivered with its face from under the symphysis, it is disengaged by middle oblique diameter which is slightly more than small oblique diameter.

The fifth moment doesn't differ from the forth moment of labor biomechanism in the occipito-anterior presentation (the internal turn of shoulders and trunk and external turn of head).

The head configuration in occipito-posterior presentation is dolichocephalic.

Etiological moments of occipito-posterior presentation formation include the changes of pelvic shape and dimension as well as fetal head. This variant is often observed in case of small, premature or dead fetus.

The peculiarities of clinical course of labor in occipito-posterior presentation are as follows: longer duration of delivery process as compared with occipito-anterior presentation; more expenditure of delivery strength for excess fetal head flexion; more frequent occurrence of perineum rupture, repetitive asthenia of labor progress, distress of fetus, etc.

Labor prognosis is generally satisfactory. The labor management is expectant, however it is necessary to be always ready to render obstetrical assistance or operation.

Control Questions

1. What is the biggest difference between the labor of nulliparous and multiparous women?
2. What defines the first stage of labor?
3. Describe the latent phase
4. Describe the active phase
5. What is the average duration of the active phase in nulliparous patients?
6. What is the second stage of labor?
7. What is the average duration of the second stage of labor?
8. What are perineum's defence maneuvers?
9. What are indications for perineum cutting?
10. Describe the assessment for newborn babies.
11. What is thermal chain?
12. Describe steps of thermal chain.
13. How is the third stage of labor defined?
14. What is the acceptable duration of the third stage of labor?
15. What methods of management of the third stage of labor do you know?
16. What is active management during the third stage of labor?
17. What is physiological management during the third stage of labor?
18. What signs of placenta separation do you know?
19. Describe the Chukalov- Kustner's sign.
20. Describe the Dovzhenko sign.
21. Describe the Ahlfeld sign.
22. What is biomechanism of labor ?

23. What are the cardinal movements of labor?
24. Why does a fetus flex and rotate during labor?
25. What position does the fetus present the smallest diameter of its head (suboccipito-bregmatic diameter) by engaging ?
26. How does the fetal head undergo internal rotation?
27. When does the fetal head undergo extension?
28. What is the Bishop score?
29. What are the five cervical components of the Bishop score?
30. What is defined as adequate uterine contractions (power)?
31. What techniques can be used to count the number of contractions?
32. What is the Apgar score ?
33. Tell about the contact "skin – to – skin".
34. What are indications for internal obstetrical examinations during labor?
35. What is partogram?

CHAPTER 4. PHYSIOLOGY OF PUERPERIUM PERIOD

Although puerperium is a physiological process, it demands doctor's knowledge of all its stages and features, namely: the involution processes in female organs and systems after labor and lactation. That allows to find out the initial signs of puerpera's possible diseases and complications in good time.

Puerperium begins directly after labor termination and lasts 6 weeks. During this time organs of female reproductive system recur to their state before pregnancy.

A puerperium is divided into early and late stages.

The early puerperium begins from the moment of expulsion of placenta and membranes and lasts for 2 hours. During this period puerpera is in a maternity room under doctor's surveillance. It is related to the risk of complications development, first of all bleeding. This period is very important and it needs to be considered as a term of female functional systems rapid adaptation after loading during pregnancy and especially in labor.

The late puerperium starts in 2 hours after labor termination and lasts for 8 weeks. During this period the reverse development (involution) of all organs and systems changed during pregnancy and labor takes place. It is necessary to underline that mammary glands are the only exception as their function is activated exactly during puerperium. It also should be noted that involution processes rate is maximal during the first 8-12 days and is the most expressive in reproductive organs, first of all, in uterus.

PHYSIOLOGICAL CHANGES OF FEMALE ORGANISM DURING PUERPERIUM

Uterus. Directly after secundines expulsion, uterus becomes round-shaped. The opened vessels of placental area are compressed. Immediately after

secundines expulsion the body of uterus is contracted and its fundus is on middle distance between pubis and umbilicus. The thickness of the anterior and posterior walls of uterus are 4-5 cm and adjoin each other; the cavity of uterus is lined with the decidua. During next two days the fundus of uterus is slightly below the umbilicus; 2 weeks after labor the uterus goes down below a symphysis. The uterus usually returns to its previous sizes in 6 weeks.

During 2-3 days after labor the decidua remains in the uterus and is divided into two layers. The superficial layer is necrotized and excreted with lochia (post-natal discharge). The basal layer, which is adjacent to endometrium and contains endometrial glands, remains intact and becomes the basis for a new endometrium regeneration.

Endometrium regeneration lasts for three weeks, except placental area. The complete regeneration of epithelium in the area of placenta attachment lasts for 6 weeks. In case of regeneration disturbance in the placental area there can be the post-natal bleeding and infecting.

Cervix of uterus. 10-12 hours after labor the cervical canal of uterus is infundibuliform, the internal os is 2-3 fingers opened, and one finger - on the 3d day. On the 8-10 day after labor the cervix of uterus is formed, the internal os is closed.

Vagina. During 3 weeks after labor the walls of vagina remain edematous. The edemas finally disappear to the end of puerperium. Minor lesions of vaginal mucous membrane regenerate 5-7 days. Genital cleft closes up, muscle tone of pelvic floor restores gradually.

Ovaries. Follicle maturation begins in a puerperium. Anovulatory cycle with the first menstruation on its background appears after labor. Further ovulatory cycles are. Due to the great amount of prolactin secretion in women during breast feeding, there are no menstruations for some months, or during the whole period of breast feeding.

Abdominal wall and pelvic floor. As a result of skin elastic fibres rupture and stretching by a pregnant uterus, anterior abdominal wall remains soft and

flabby for some time and regains a normal structure in some weeks. Except line-up the abdominal wall usually returns to its previous state, but in case of muscles atony can remain flabby and weak. Sometimes there is the diastasis of rectum abdominis muscle. The tone of pelvic floor muscles are also gradually, but the trauma presence during labor can lead musculature weakness and of development of genital prolapses.

Mammary glands. The function of mammary glands culminates after labor. Estrogenes and progesterone stimulate growth of mammary glands ducts and alveolar system during pregnancy. Due to prolactine action there is the increased blood flow to the mammary glands, their coarsing, especially on the day of puerperium.

The milk secretion occurs as a result of neural and hormonal actions. Milk formation is regulated by the nervous system and the hormone of adenohypophysis - prolactine. In addition, the optimum level of insulin, thyroid and renal hormones plays the role in lactation development. Suction stimulates the periodic secretion of prolactine as well as oxytocine; The latter stimulates milk secretion from alveoli into the mammary glands duct. It should be noted, that this process strengthens uterus contraction in post-natal period as well.

Within 3 days after labor mammary glands secrete a colostrum. A colostrum has a high concentration of albumins, mainly globulins, and minerals, and lower concentration sugar and fat. The proteins of colostrum according to by aminoacid composition occupy the transitional state between albuminous fractions of breast milk and blood serum. That obviously facilitates new-born's organism during the transitional period from a placental to breast feeding. A colostrum contains the high level of immunoproteins A, G, M, D, and T- and V-Lymphocytes as well. It is of great importance during the first days of new-born's life, when the functions of his/her organs and systems are yet immature, and immunity is in the stage of development.

A colostrum converts into mature milk within 5 days. The main components of milk are protein (albumines, globulins,), lactose, water, fat.

Respiratory system. Due to diaphragm lowering after labor the capacity of lungs is increased. Thus there is a decrease of respiratory movement up to 14-16 per minute.

Cardiovascular system and system of blood-formation. After births there are changes in hemodynamics, related to liquidation of uterine-placental blood circulation and some fluid excretion from mother's organism. The heart occupies its ordinary position due to diaphragm lowering. Directly after the labor the pulse lability with bradycardia is marked, here the blood pressure can be decreased for the first days after births, and then reaches its normal indexes. At the end of the first week after births the volume of circulatory blood goes down to ordinary. Blood indexes more often do not differ from normal ones, however, there is considerable leucocytosis takes place during the early post-natal period up to $30 \times 10^9/l$ - with granulocytosis prevalence. There is the increased level of fibrinogen in plasma, that should be taken into account during of prophylaxis lower extremities phlebitises development.

Urinary system. There is no renal dysfunction in healthy puerperal. Diuresis is normal, but can be slightly increased during the first days after births. The function of urinary bladder is often destroyed, that is related to excess excitement of sympathetic innervation of sphincter and of urinary bladder muscles tone with edema and minute hemorrhages development in the cervix of urinary bladder, as a result of its compression between the head of the fetus and the wall of pelvis during labor.

Organs of digestion and metabolic. The digestive system functions normally after births. Sometimes there is intestine atony with constipation development. The metabolism is usually increase during the first weeks after births and , but is normalized in 3-4 weeks .

Nervous system. After labor termination emotional tension of different degree take place but is usually normalized within 1-2 days . The woman needs psychological support from the medical personnel during this period .

MANAGEMENT OF NORMAL POSTPARTUM PERIOD

A physiological puerperium is characterized by the satisfactory state of puerpera, normal temperature and pulse rate, appropriate involution of uterus, presence of normal amount and quality of lochia, sufficient lactation.

First two hours after labor a woman is in the individual maternity hall under surveillance of midwife, doctor; thus a or someone from relatives at woman's desire can also be present .

This interval of time is very important. During it physiological processes of maternal organism adaptation to the new terms of existence occur, that is why it is necessary to create the most comfortable conditions contributing effective adaptation after labor. «Skin-to-skin» position of a mother and her baby and early newborn's breast placement in it. This in turn contributes to breastfeeding formation, thermal baby's infections prevention and emotional connection between a mother and her baby development. Optimal environmental temperature for a mother and her baby is 25-28 °C.

In future, in case of contra-indications absence, a new-born child must stay together round-the-clock with a mother in one room. The stay of mother and child provides the feeding on demand, hypothermia and hospital-acquired infections prophylaxis.

During puerpera's staying at the maternity hall must watch her pulse, blood pressure, control the state of uterus: he/she determines its consistency, size, fundal height, in attitude toward a symphysis and umbilicus (each 15 minutes during the first two hours), looks after the amount of blood discharge from maternity ways. It should be noted that an evaluation of blood loss in an early puerperium is obligatory. Measuring of blood loss is conducted by any measured glass. Middle blood loss in III period of labor and early post-natal period is 250-300 ml or 0,5% from mass of body of woman, but not more than 500 ml.

In an early puerperium execute the of external reproductive organs, pubic

coarticulation, perineum. Examination of uterus, cervix and vagina is conducted by indication. If an episiotomy was conducted or the trauma of maternity ways took a place, obligatory is proceeding in integrity of maternity ways with application of the local anaesthetizing.

In two hours after labor puerpera with her baby is transferred to the post-natal department, where a subsequent supervision is conducted. It is necessary to take body's temperature twice a day, in the morning and in the evening, to examine skin and mucous membranes, to determine pulse character and rate, to measure blood pressure. The special attention is paid to mammary glands and their form, nipples state, cracks presence, and possible gland swelling are determined.

At lactostasis decantation is performed. The woman is directed towards careful daily mammary glands check ups and indurations revealance; the talk about mastitis prophylaxis is given. The new-born is fed on his/her demand.

It is daily necessary to palpate puerpera's abdomen to determine the fundal height of the uterus, its consistency. The fundal height of the uterus is measured in cm in relation to pubic coarticulation. During the first day after labor the fundus of the uterus is 13-16 cm higher pubic coarticulation, during the second day - 10-12 cm, during the 3 day - 7-9 cm.

The reparative processes speed in the uterine cavity is also determined by post-natal discharge called lochia. Lochia microscopically consist of red corpuscles, decidua membranes fragments, epithelial cells, bacteria; they have a neutral or alkaline reaction. During the first days the presence of blood turns them red (lochia rubra), and during 3-4 day after labor they become lighter (lochia serosa), and during the 8-10 day lochia becomes yellowish white (lochia alba) due to leucocytes overwhelming presence.

If there are no pathologies of puerperium physiological course the puerpera with new-born is discharged on the 3 day under the supervision of obstetrician-gynecologist from the maternity clinic and district paediatrician.

The puerpera's discharge from the establishment is conducted under the

followings conditions:

- mother's satisfactory state:
 - absence of complaints
 - constant indexes of hemodynamics
 - absence of bleeding
 - absence of infection signs
- The mother has acquired skills concerning care and supervision;
- The mother has been consulted concerning new-born feeding, post-natal contraception, prophylaxis of child's death syndrome;
- The mother knows threatening symptoms in puerperium, and if she reveals any signs she'll immediately turn to the hospital;

Threatening symptoms in puerperium are:

- vaginal bleeding;
- increased body temperature;
- difficulty of breathing;
- pain in abdomen;
- pain in mammary glands and cracks of nipples;
- pain in peryneum;
- urinary incontinence, pain/difficulty during urination;
- purulent discharge with unpleasant smell from vagina.

Threatening states of child:

- a child sucks breasts badly;
- a child is languid or excitative;
- a child has cramps;
- abnormality of child's breathing;
- hypertermia or hypothermia in child;
- edema, hyperemia or pyogenesis of umbilical wound;
- child's diarrhea.

In 3-4 weeks after labor a woman must have a standard examination in maternity clinic, where the state of her health is comprehensively estimated, the questions of subsequent course of puerperium are discussed and recommendations concerning family planning are given.

Control Questions

1. What is puerperium?
2. When does puerperium begin?
3. How long does puerperium last?
4. What processes take place during puerperium in organism?
5. What is the early puerperium ?
6. What is the late puerperium ?
7. Describe the involution processes in Uterus.
8. What is lochia?
9. What does lochia microscopically consist of?
10. Describe the involution processes in Cervix of uterus.
11. Describe the involution processes in Vagina.
12. Describe the involution processes in Ovaries.
13. Describe the involution processes in Abdominal wall and pelvic floor.
14. Describe the involution processes in Mammary glands.
15. What is colostrum?
16. Describe the involution processes in Respiratory system.
17. Describe the involution processes in Cardiovascular system.
18. Describe the involution processes in system of blood-formation.
19. Describe the involution processes in Urinary system.
20. Describe the involution processes in Organs of digestion and metabolicm.
21. Describe the involution processes in Nervous system.
22. Tell about management of normal postpartum period.
23. What is optimal environmental temperature for a mother and her baby?

24. What is middle blood loss in labor and postpartum period?
25. Describe the mammary glands in postpartum period.
26. How do you measure fundal height of the uterus in postpartum period?
27. Describe the changes of lochia during postpartum period
28. Describe the mother's satisfactory state in postpartum period.
29. What are threatening symptoms in puerperium ?
30. What are threatening symptoms in states of child?

CHAPETR 5 NEWBORN CARE

IMMEDIATE ASSESSMENT AND RESUSCITATION

The transition from fetus to newborn infant is the most dramatic physiologic change that occurs in the human life span. The fetus that received all of its oxygen and nutritional needs via the placenta must now use two entirely different, essentially dormant organ systems to meet these needs. The circulation is rerouted and the pulmonary bypass paths (ductus arteriosus, foramen ovale, and umbilical circulation) are no longer used. The lungs and left side of the heart that once handled about 15% of the circulation must now deal with 100% of the circulation in series with the right heart and remainder of the body. The fluid-filled, unexpanded lungs must be inflated and cleared of fluid to allow gas exchange, as they are now the sole source of oxygen for the infant.

While every delivery should be attended by personnel trained in newborn resuscitation, the presence of personnel experienced in resuscitation is most desirable for deliveries where the need for resuscitation is more likely.

Meconium

Meconium passage prior to birth occurs in up to 20% of term deliveries and is a common reason for neonatal resuscitation. In the 1970s it was recognized that early suctioning by the obstetrician or pediatrician decreased the incidence of meconium aspiration syndrome (MAS). In the 1980s, routine suctioning of the oropharynx at the perineum or endotracheal suctioning were standard practice; however, it became clear that not all cases of MAS could be prevented and that aspiration in utero could occur. In the 1990s, many neonatologists were concerned that vigorous babies with thin meconium had a very low risk of MAS, and might actually do better if not intubated for tracheal suctioning. Unfortunately, the majority of studies pertinent to this issue have not been prospective, randomized, or controlled. The most recent Cochrane Library review concluded that until

further evidence is available, endotracheal suctioning for meconium should be reserved for those infants who are depressed or have respiratory difficulties.

The Apgar Score

In 1952, Dr. Virginia Apgar devised a 0 to 10 scale scoring system intended to focus attention on the newborn and allow the systematic assessment of its condition and immediate needs (see tab. 5). Since that time, Apgar scores have become a mainstay in immediate newborn assessment. The Apgar score is a useful tool to guide those charged with assessment and care of the newborn. It provides an overall picture of infant status, and has been used in clinical research to correlate later outcomes with initial appearance. It cannot be used to predict neurologic outcome without other tests or examinations, nor is it a validated tool for determining asphyxia. Moreover, it was never intended for use in premature infants. Scores are assigned at 1 minute of age, and every 5 minutes thereafter until the score is over 7, or until 20 minutes of age. Clearly, resuscitation should begin if necessary prior to the 1-minute score.

Table 5.

Apgar Score

Sign	0 points	1 point	2 points
A – Activity (muscle tone)	Absent	Arms and legs flexed	Active movement
P – Pulse	Absent	Below 100 beats per minute (bpm)	Above 100 beats per minute (bpm)
G – Grimace (reflex irritability)	No response	Grimace	Sneeze, cough, pulls away
A – Appearance (skin color)	Blue-gray, pale all over	Normal, except for extremities	Normal over entire body
R – Respiration	Absent	Slow, irregular	Good, crying

The test is generally done at one and five minutes after birth, and may be repeated later if the score is and remains low. Scores 3 and below are generally

regarded as critically low, 4 to 6 fairly low, and 7 to 10 generally normal.

Immediately after birth a midwife lays out a child on the mother's abdomen, carries out drying of newborn's head and body by a warmed sterile diaper, dresses the child clean little cap and socks, covers by a dry clean diaper and blanket.

At the same time neonatologist, and at his absence obstetrician-gynecologist, carries out primary assessment of the new-born baby's state.

Upon termination of umbilical cord pulsation, but not later than 1 min. after birth of child midwife replacing sterile gloves, clamps and cuts an umbilical cord. If new-born baby's state is normal it is stayed on mother's breast.

If the newborn has search and sucking reflexes (the baby rises its head, opens the mouth, searches for mother's breasts) the midwife helps perform the first early applying to mother's breasts.

In 30 min. after child's birth the midwife measures new-born's temperature in an axillary area by electronic thermometer and writes down the results of thermometry in the card of new-born's development.

After mother and baby's contact "eye-to-eye" (but no later than during the first hour of baby's life) the midwife with sterile hands provide measures to prevent ophthalmia using 0.5% erythromycin or 1% tetracycline ointments according to recommendations to do it one-time.

Contact "skin to skin" lasts for no less than 2 hours in delivery room if mother and baby's state is normal.

After contact "skin-to-skin" termination the midwife puts the baby on the warmed diaper table, provides umbilical cord treatment and clamping, measures length, head and chest circumference, birthweight; dresses the baby clean romper suit, shirt, cap, socks, mittens.

The mother and her child are covered with a blanket and translocated to the rooming-in ward with the observance of "thermal chain" principles.

Thermal chain. Thermal chain is the complex of measures provided during labor and within the first days after child's birth with the purpose to diminishing heat loss new-born's. Neglect of any these measures breaks off the thermal chain

and puts a new-born child under the threat of overcooling. The failure to observe of thermal chain advances the risk of glucopenia, metabolic acydosis, infection, respiratory disorders, disorders of central nervous system (hemorrhages, cramps), development in new-borns.

Ten steps of thermal chain:

1) Warm maternity room (operating-room).

The apartment must be clean and warm, without draughts from the opened windows, doors and conditioners (ventilators). The optimal (safe) temperature for a mother and child considers to be 25°C -28°C.

2) Immediate newborn's drying.

Immediately after birth (before the clamping of umbilical cord) a midwife must dry baby's body and head by sterile, dry, warmed diapers. She should put the newborn on the mother's abdomen and finish drying. Moist diapers need to be postponed, the baby should be dressed on clean little cap and socks and covered with clean dry warmed diaper. Needments for child's warming (diapers, little cap, socks, shirt, blanket) is needed to be prepared and warmed up in advance.

3) The contact "skin – to – skin".

The contact "skin – to – skin" prevents heat loss and promotes colonization of child's organism by the mother's flora. On mother's breast the child is covered with a clean preliminary warmed-up diaper and common with a mother blanket and stays there not less than 2 hours till rooming-in.

To control the observance of thermal chain measures the first measuring of newborn's temperature is carried out in 30 minutes after birth in axillary area by electronic thermometer. Normal body temperature of a new-born is 36,5°C-37,5°C.

4) Breast feeding.

Breast feeding should be started as soon as possible during the first hour after birth, when the baby shows signs of readiness before the feeding beginning and contacts mother "skin – to-skin". Don't make the baby start the first feeding if he/she doesn't show these signs.

5) Postpone weighing and bathing.

Bathing and weighing of new-born immediately after birth results in heat loss, that is why these procedures need to be postponed. The first bathing is expedient to carry out at home. Weighing and anthropometry of child must be conducted after contact "skin – to – skin" before rooming-in.

6) To dress and wrap up a newborn correctly.

A newborn must be dressed in clean warm romper suit, shirt, little cap, socks, mittens and covered with a warm blanket.

7) Round-the-clock mother and baby's rooming-in.

If there are no contraindications a new-born baby must be together with a mother in one room round-the-clock. Rooming-in provides feeding on call, prophylaxis of hypothermia and hospital-acquired infection.

8) Translocation in warm conditions.

If a baby needs to be translocated to an other department (room) health care providers are under an obligation to provide support and control of baby's temperature to prevent hypothermia development. A new-born must be translocated together with a mother to the rooming-in ward. At delivery by caesarian section, the new-born is translocated in cuvesis or in a crib, covered with a warm blanket.

9) Reanimation in warm conditions.

A new-born baby with asphyxia can not make enough heat, and the risk of hypothermia development is high. That is why it is important to provide reanimation measures in warm conditions.

10) Training level and skills improvement.

All health care providers must have proper training and practical skills to follow the principles of "thermal chain".

GENERAL EVALUATION AND TREATMENT

Every newborn infant should have a thorough physical examination. The newborn exam is focused on identification of congenital abnormalities, birth trauma, and signs of transitional difficulties .

Although infants of 35 or more weeks and over 2 kg will generally be able to maintain their temperature and feed successfully, all infants born prior to 37 weeks may require more frequent monitoring of temperature and blood glucose. Infants who are large or small for their delivery dates are at higher risk for hypoglycemia. If dates are uncertain, a Dubowitz or Ballard examination may be performed, ideally between 24 to 48 hours of age.

In addition to monitoring blood sugar prior to established feeding, routine laboratory work often includes blood type, Coombs test, and hematocrit. A positive Coombs test can be caused by Rh or ABO incompatibility.

Hematocrit levels between 40% to 65% are acceptable. Most states screen for phenylketonuria and congenital hypothyroidism.

Other tests used by some states include screens for congenital adrenal hyperplasia, cystic fibrosis, and other inborn errors of metabolism. These tests may be initiated prior to discharge according to state mandates.

Infants born in U.S. hospitals are given either dilute silver nitrate drops or erythromycin ophthalmic ointment to prevent *Neisseria gonorrhoeae* conjunctivitis, which was once the most common cause of congenital blindness. Vitamin K is administered intramuscularly to prevent vitamin K deficiency bleeding. Factors that can contribute to this deficiency include low vitamin K stores at birth, poor placental transfer of vitamin K, low levels of vitamin K in breast milk, and sterility of the gut. Because standard commercial infant formulas contain supplemental vitamin K, vitamin K deficiency bleeding is almost exclusively a problem of breast-fed infants. The most common sites of bleeding are

the umbilicus, mucous membranes, gastrointestinal tract, the penis after circumcision, and skin (from venipuncture). Intracranial bleeding can occur and is the main cause of mortality and long-term morbidity. All infants are actively immunized against hepatitis B, the initial dose of which is generally given on the day of birth. If the mother is positive for hepatitis B surface antigen or if her status cannot be determined within a few days, the infant should also receive passive immunization within 7 days in the form of hepatitis B immune globulin.

Early Onset Sepsis.

One of the most serious problems encountered in the immediate newborn period is early onset sepsis, defined as occurring in the first 5 days after birth. The current estimated rate in the United States is 1 to 2 per 1000 live births. Group B streptococci (GBS) remain the most common causal organisms, but with the routine use of intrapartum antibiotic prophylaxis for GBS, *Escherichia coli* now constitutes a larger proportion of causative organisms.

The symptoms of neonatal sepsis include respiratory distress, lethargy, poor feeding, hypotonia, seizures, and shock. The management of infants with symptoms of sepsis includes blood and, if indicated, cerebrospinal fluid cultures, followed by the administration of broad-spectrum intravenous antibiotics, generally a penicillin in combination with an aminoglycoside.

The management of asymptomatic infants of mothers with risk factors for neonatal sepsis is less clear and has become a topic of considerable debate since the routine use of intrapartum GBS chemoprophylaxis. Based on expert opinion and limited data the following general approach has been recommended.

Because of an increased risk for early-onset GBS septicemia and greater difficulty in assessing symptoms, asymptomatic infants born prior to 35 weeks gestation should be evaluated with a complete blood count and blood culture, and observed in the hospital without empirical antimicrobial therapy for at least 48 hours.

In infants born at and beyond 35 weeks, clinical assessment is more dependable. Routine laboratory evaluation is not recommended in these infants. They should, however, be observed in-hospital for at least 48 hours.

Hyperbilirubinemia and Discharge Planning

Timing of newborn discharge has been a topic of controversy for nearly 20 years. Prior to and during much of this time, the traditional stay was 3 days for a vaginally delivered baby and 5 days for those delivered by cesarean (due to the mother's extended stay). This minimum of 3 days allowed detection of the most common serious problems of the newborn, such as ductal-dependant congenital heart disease, early onset sepsis, hyperbilirubinemia, and failure to establish adequate breast-feeding.

Discharges at 24 hours (or less) became popular in the late 1980s, a practice driven largely by third-party payors. While numerous small studies were performed to assess the safety of early discharge, most suffered from insufficient numbers to rule out an increase in adverse outcomes that, individually, are relatively uncommon.

Bilirubin encephalopathy, a disorder rarely seen for the past 30 to 40 years, has recently been reported to be on the rise. Bilirubin peaks at 5 days in formula-fed infants but may peak as late as 7 to 10 days in breast-fed infants. Breast milk production is minimal in the first 48 hours after delivery and does not reach 80% of full volume until 4 days postpartum.

Because of this time frame, it is not easy to predict at 3 days of age which breast-fed infants with a negative Coombs test will be at risk of dangerously high bilirubin levels (>25 mg/dL), and it is nearly impossible to do so at less than 48 hours. In recognition of these issues, the pendulum appears to be swinging back to a 3-day stay for most breast-fed infants.

Infants readmitted after discharge prior to 48 hours are most likely breast-fed and jaundice is the most common reason for admission. In addition to insufficient breast milk intake, hyperbilirubinemia can result from relative polycythemia, bruising, cephalohematoma, or be idiopathic.

Threatening states of child:

- a child sucks breasts badly;
- a child is languid or excitative;
- a child has cramps;
- abnormality of child's breathing;
- hypertermia or hypothermia in child;
- edema, hyperemia or pyogenesis of umbilical wound;
- child's diarrhea.

Control Questions

1. What is newborn period?
2. How long does newborn period lasts ?
3. What processes take place during postnatal period in newborn's organism?
4. Describe the newborn period.
5. What is Meconium?
6. What is Apgar score ?
7. When is Apgar score assigned?
8. Tell about makes of Apgar score.
9. Tell about management of normal newborn period.
10. Tell about new-born's temperature measuring.
11. What do you know about contact "eye-to-eye"?
12. What prevents ophthalmia?
13. Describe the contact "skin to skin".
14. Describe the "thermal chain" principles
15. What is optimal environmental temperature for a mother and her baby?
16. What do you know about immediate newborn's drying?

17. Tell about Breast feeding.
18. What do you know about weighing and bathing postponing
19. What are threatening symptoms in states of child?
20. Tell about Translocation of new born babies.
21. What is physical examination of newborn infant?
22. Tell about actively immunization of newborn infant.
23. What are symptoms of neonatal sepsis?
24. What is Hyperbilirubinemia?
25. What are threatening symptoms in states of child?

CHAPETR 6 PRECONCEPTION CARE

PRECONCEPTION CARE AND COUNSELING

Preconception care and counseling are important because they may identify women who can benefit from early intervention, such as those with diabetes mellitus or hypertension, and may help to reduce birth defects. The risk of major birth defects (with or without chromosomal abnormalities) in the general population is approximately 3%. Because organogenesis begins 17 days after fertilization, it is important to provide the optimal environment for the developing conceptus. Preconception care and education can be incorporated into any visit with a woman of childbearing age. The following issues should be discussed with both prospective parents.

A. Reproductive history.

Diagnosis and treatment of conditions such as uterine malformations, maternal autoimmune disease, and genital infection may lessen the risk of recurrent pregnancy loss. Review of an obstetric history when the woman is not pregnant may allow prospective parents to explore their fears, concerns, and questions. Recording the menstrual history provides an opportunity to evaluate a woman's knowledge of menstrual physiology and offer counseling about how she might use such knowledge to plan a pregnancy.

B. Family history

Preconception assessment of family history for genetic risks offers a number of advantages.

1. ***Carrier screening*** based on family history or the ethnic background of the couple allows relevant counseling before the first potentially affected pregnancy. Preconception recognition of carrier status allows women and their partners to be informed of autosomal recessive risks outside the emotional context of pregnancy.

Knowledge of carrier status also allows both informed decision making about conception and planning for desired testing should pregnancy occur.

- a. *Tay-Sachs* disease mainly affects families of Ashkenazi Jewish and French-Canadian ancestry.
- b. *Canavan's disease* also affects families of Ashkenazi Jewish ancestry.
- c. *Beta-thalassemia* mainly affects families of Mediterranean, Southeast Asian, Indian, Pakistani, and African ancestry.
- d. *Alpha-thalassemia* mainly affects families of Southeast Asian and African ancestry.
- e. *Sickle cell anemia* mainly affects families of African, Mediterranean, Middle Eastern, Caribbean, Latin American, and Indian descent.
- f. *Cystic fibrosis* screening should be offered to patients with a family history of the disease. New recommendations suggest that all white and Jewish women be offered carrier screening.

2. Family history can reveal risks for other genetic diseases such as *muscular dystrophy*, *fragile X syndrome*, or *Down syndrome* for which genetic counseling should be offered. Information about appropriate diagnostic tests such as chorionic villus sampling or amniocentesis can be introduced. In some instances, genetic counseling may result in a decision to forgo pregnancy or to use assisted reproductive technologies that may obviate the risk.

C. Medical assessment.

Preconception care for women with significant medical problems should include an assessment of potential risks not only to the fetus but also to the woman, should she become pregnant. Appropriate care may require close collaboration with other specialists. Risk assessment includes the following.

1. Infectious disease screening

a. Rubella-nonimmune women can be identified by preconception screening, and *congenital rubella syndrome* can be prevented by vaccination. No case of congenital rubella syndrome has ever been reported after rubella immunization within 3 months before or after conception.

b. Universal screening of pregnant women for *hepatitis B virus* (HBV).

Women with social or occupational risks for exposure to HBV should be counseled and offered vaccination.

c. Patients at risk *for tuberculosis* should be tested.

d. *Cytomegalovirus (CMV)* screening.

e. *Parvovirus B19 IgG* .

f. *Toxoplasmosis* is of most concern to cat owners and people who eat or handle raw meat. Routine toxoplasmosis screening to determine antibody status before conception mainly provides reassurance to those who are already immune.

g. Screening for *varicella* antibody should be performed if a positive history cannot be obtained. The varicella zoster virus vaccine is now recommended for all nonimmune adults.

h. *Human immunodeficiency virus (HIV)* counseling and testing should be offered confidentially and voluntarily to all women.

i. Testing for *Neisseria gonorrhea*, *Chlamydia trachomatis*, and *Treponema pallidum* is often performed routinely in sexually active patients.

2. ***Evaluation of exposure to medications*** includes exposure to over-the-counter and prescribed drugs. Drug use should be ascertained and information provided on the safest choices. A genetic counselor may be helpful.

a. ***Isotretinoin (Accutane)***, an oral treatment approved by the U.S. Food and Drug Administration for severe cystic acne, should be avoided before conception. Isotretinoin is highly teratogenic, causing craniofacial defects (microtia, anotia).

b. *Warfarin sodium (Coumadin)*, an anticoagulant, and its derivatives have been associated with warfarin embryopathy. Because heparin sodium does not cross the placenta, women requiring anticoagulation should be encouraged to switch to heparin therapy before conception.

c. The offspring of women treated with *anticonvulsants* for epilepsy are at increased risk for congenital malformations. Debate continues as to whether the disease process, the medication, or a combination of both causes the malformations. The patient's neurologist may feel it is appropriate to attempt

withdrawal from anticonvulsants for women who have not had a seizure in at least 2 years. For women who are not candidates for anticonvulsant withdrawal, drug regimens that have the fewest teratogenic risks may be attempted.

d. No evidence exists of teratogenicity from *oral contraceptive or contraceptive implant* use.

e. *Vaginal spermicides* are not teratogenic to the offspring of women who conceive while using them or immediately after discontinuing their use.

D. Nutritional assessment

1. The *body mass index*, defined as [weight in kilograms/(height in meters)²], is the preferred indicator of nutritional status. Very overweight and very underweight women are at risk for poor pregnancy outcomes. Women with a history of anorexia or bulimia may benefit from both nutritional and psychological counseling before conception.

2. *Eating habits* such as fasting, pica, eating disorders, and the use of megavitamin supplementation should be discussed. Excess use of multivitamin supplements containing vitamin A should be avoided because the estimated dietary intake of vitamin.

Vitamin A is teratogenic in humans at dosages of more than 20,000–50,000 IU daily, producing fetal malformations like those seen with isotretinoin, a synthetic derivative of vitamin A.

3. Periconceptual intake of *folic acid* (0.4 mg of folic acid daily for all women capable of becoming pregnant) reduces the risk of neural tube defects.

E. Social assessment.

A social and lifestyle history should be obtained to identify potentially risky behaviors and exposures that may compromise a good reproductive outcome and to identify social, financial, and psychological issues that could affect pregnancy planning.

Maternal use of *alcohol, tobacco, and other mood-altering substances* may be hazardous to a fetus. Alcohol is a known teratogen, and a clear dose-response relationship exists between alcohol use and fetal effects. Increasing evidence

suggests that cocaine is a teratogen as well as a cause of prematurity, abruptio placentae, and other complications. Tobacco use has been identified as the leading preventable cause of low birth weight. Although many women understand the risks of substance exposures after confirmation of pregnancy, they may be unaware of the risks of exposure during the earliest weeks of pregnancy. If substance addiction is present, structured recovery programs are needed to effect behavioral change. All patients should be asked about use of alcohol, tobacco, and illicit drugs. The preconception interview enables timely education about drug use and pregnancy, informed decision making about the risks of using these substances at the time of conception, and the introduction of interventions for women who abuse substances.

RATIONALE FOR ROUTINE PRENATAL CARE

Prenatal care involves the following goals for pregnant women:

- to provide continuing, ongoing primary preventive health care
- to maintain or increase maternal health and the capability for self-care and to improve self-image before, during, and after pregnancy
- to reduce the risk of maternal mortality and morbidity, as well as unnecessary pregnancy intervention
- to reduce the risks to health before subsequent pregnancies and beyond the childbearing years
- to promote the development of parenting skills.

The goals of prenatal care for the fetus are as follows:

- to reduce the risk of preterm birth, retardation, and congenital anomalies
- to enhance fetal health and reduce the need for extended hospitalization after birth
- to promote healthy growth and development, immunization, and health supervision of the infant

- to reduce the risk of neurologic, developmental, and other morbidities
- to reduce the risk of child abuse and neglect, injuries, and preventable acute and chronic illness.

The goals of prenatal care for the family during pregnancy and the first year of an infant's life are the following:

- to promote family development and positive parent–infant interaction
- to reduce the number of unintended pregnancies
- to identify and treat behavioral disorders that can lead to child neglect and family violence.

Control Questions

1. What is Preconception care?
2. What are risk of major birth defects?
3. Tell about reproductive history recording.
4. What are genetic risks?
5. What is Infectious disease screening ?
6. What do you know about Evaluation of exposure to medications .
7. What is Nutritional assessment?
8. What is Social assessment?
9. Tell about periconceptual intake of folic acid
10. Tell about potentially risky of alcohol
11. Tell about potentially risky of tobacco, and other mood-altering substances
12. What goals does Prenatal care involve?
13. What are the goals of prenatal care for the family during pregnancy and the first year of an infant's life?

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