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## DEFINITION. CLASSIFICATION. PREPARATION FOR OBSTETRIC SURGERY

**Definition.** *Obstetric surgery* is actions of a physician aiming to eliminate the danger to the life and health of a parturient woman and/or fetus, which can be eliminated or reduced only by surgical intervention.

**Classification** of obstetric surgeries:

1. Surgeries aimed at pregnancy preservation in cervical incompetence (CI).
2. Surgeries for pregnancy termination (artificial abortion) at an early and late gestational age.
3. Surgeries correcting fetal position.
4. Maneuvers for breech extraction (extraction by foot, two feet, by groin traction).
5. Bringing down the foot in breech presentation.
6. Assisted delivery:
  - ▶ application of obstetrical forceps (outlet, mid-cavity);
  - ▶ vacuum extraction of fetus;
  - ▶ cesarean section.
7. Embryotomy.
8. Surgeries in placental and early postpartum period.
9. Surgical methods of managing obstetrical hemorrhage.
10. Minor obstetric surgeries in delivery.

**Preparation for obstetric surgery.** The presence of indications for surgery does not mean that in all cases it a good outcome is warranted. First of all, it is necessary to determine the prerequisites that ensure the maximal potential safety of the surgery and be aware of contraindications to it. For this, one should be guided by maternal and fetal interests. However, in cases when maternal life and health are in greater danger than that of the fetus, the issue is decided in favor of the mother. In doing so, the outcomes of surgery are determined both based on immediate outcomes and on long-term consequences. The strategy of modern obstetrics is often organ-preserving surgery. The obstetrician should be sure that surgery at this time is not more dangerous than further conservative follow-up and expectation. Before obstetric surgeries which are most often accompanied by blood loss, it is necessary to obtain data on complete blood count, urinalysis, ECG, coagulogram, information about allergic reactions and intolerance to some drugs. Any obstetric hospital should be absolutely prepared to manage a potential bleeding.

Sometimes various types of surgeries are chosen for the same indications. The choice depends on the clinical and obstetric situation. In some cases, only one type of surgery is possible, for example, in *complete placenta previa* when there is a risk of maternal life-threatening profuse bleeding (regardless of the fetal state) or in *absolute cephalopelvic disproportion* (vaginal delivery is impossible). In these cases, only a cesarean section is indicated (absolute indications for surgery).

Distinctive features of obstetric surgeries include their urgent nature, the need for rapid and accurate diagnostics of obstetric situation taking into account the woman's somatic health, pregnancy complications, and the state of the fetus. Thus, a fetus that is in a state of chronic hypoxia with intrauterine growth retardation, as well as a deeply immature and premature fetus, may not tolerate a prolonged labor, labor stimulation, artificial extraction from the maternal birth canal using obstetric forceps and/or obstetric maneuvers.

Most obstetric surgeries are carried out not only under visual guidance but also with tactile sensations of the hands. No wonder they say that "the obstetrician's eyes are at the tips of his fingers".

When deciding on obstetric surgery, the physician bears double responsibility for mother and child (often for two or even three children).

**Preparation for obstetric surgery.** The beginning of obstetric surgery includes preparation of:

- ▶ instruments;
- ▶ operative table;
- ▶ operating team;
- ▶ the patient and surgical site.

The instruments, surgical drape, operating material, hands of the surgeon, assistant, midwife (receiving the newborn) should be sterile. A catheter (sometimes two) is placed into the woman's vein to perform infusion therapy. The urinary bladder is catheterized to monitor hourly diuresis. Monitoring of vital organs is performed. At risk of profuse hemorrhage, reinfusion of autologous blood is used (Cell Saver apparatus). *Anesthesia* is administered by an anesthesiologist and a nurse anesthetist. Most often, spinal and epidural anesthesia, less often endotracheal anesthesia is used.

When the preparation for surgical delivery is completed, it is necessary to auscultate fetal heartbeat once again and to perform an external examination to determine the presenting part. In some cases vaginal examination is repeated. The obstetric situation can change rapidly.

# Chapter 1

## **SURGERIES AIMING TO PRESERVE PREGNANCY IN CERVICAL INSUFFICIENCY**

### **1.1. BASIC CONCEPTS OF CERVICAL INSUFFICIENCY**

**Definition.** *Cervical insufficiency* (CI) is failure of obturative function of the uterine isthmus and cervix, resulting in violated integrity of fetal membranes, leakage of amniotic fluid or rupture of membranes, premature termination of pregnancy. Typical signs of CI include: sudden rupture of membranes, prolapse of the amniotic sac into the vagina, rapid and almost painless expulsion of the fetus from the uterus.

Main causes of CI:

1. *Anatomical incompetence* of the internal os (as a result of artificial dilation, cervical tears after an abortion or delivery; connective tissue dysplasia, malformations, post-traumatic injuries, and other causes).
2. *Functional incompetence* of the internal os due to existing hormonal disorders (hyperandrogenism, genital infantilism, neuroendocrine disease).

**Pathogenesis.** The mechanisms of premature termination of pregnancy in CI consist in cervical shortening, softening, dilation of the internal os and cervical canal. The gestational sac loses physiological support in the lower pole of uterus. Fetal membranes prolapse into the dilated cervical canal. An increase of intrauterine, intra-abdominal pressure (physical stress), infection of the birth canal disrupt the membrane integrity, membranes rupture, and rapid expulsion of fetus occurs.

In this case, termination of pregnancy can be rapid without prior significant clinical symptoms.

**Clinical presentations.** Dilation of the cervix and prolapse of amniotic sac occur without increased excitability or hypertone, increased uterine contractile activity. The first symptoms felt by the patient are the sensation of pressure in the vagina, which is exerted by a prolapsing amniotic sac, or rupture of

membranes in the second trimester. In this case, as a rule, there is no blood discharge. Preterm labor with CI is rapid and almost painless.

History of repeated miscarriages in the second trimester at the same gestational age allows suspecting cervical insufficiency — CI.

## 1.2. DIAGNOSIS AND TREATMENT OF CERVICAL INSUFFICIENCY

**Diagnosis.** Diagnostic criteria for CI in pregnancy include:

1. *History* of spontaneous abortion in the second trimester, especially repeated late miscarriages, preterm and traumatic deliveries, cervical tears.
2. *Physical examination findings*: cervical shortening, soft consistency and dilation. Stember's scale is used to assess the degree of CI risk (see table 1.1). The score of 5 or more on this scale indicates the need for surgical correction.
3. *Transvaginal ultrasound*: measurement of length and width of cervical canal, determination of the shape and degree of dilation of internal os (V- or U-shaped os).
4. *Hysterosalpingography*. It is possible to diagnose CI before pregnancy, using hysterosalpingography (on the 18–20th day of the menstrual cycle), when the incompetence of internal os is more distinct. Its dilation by more than 5 mm is an unfavorable prognostic sign.
5. *Monitoring* of cervical condition during pregnancy. Monitoring of the cervical condition should be performed from 12 weeks gestation in women with suspected post-traumatic CI, and from 16 weeks, if functional CI is suspected. For this purpose, the cervix is carefully examined and palpated evaluating the length, consistency, position in relation to pelvic axis, and the state of the external os. Dilation of the internal os is determined only by ultrasound. However, it is important to know that the cervical state is different before 20 weeks pregnancy, hence it is difficult to reliably assess the risk of CI.

**Table 1.1.** Assessment score of cervical insufficiency degree on Stember's scale

Clinical sign	Score		
	0	1	2
Length of vaginal part of uterine cervix	Normal	Shortened	Less than 1.5 cm
State of cervical canal	Closed	Partially passable	Accommodates a finger
Location of cervix	Posteriorly	Centrally	Anteriorly

End of the table 1.1

Clinical sign	Score		
	0	1	2
Cervical consistency	Firm	Softened	Soft
Location of the fetal presenting part	Above the pelvic inlet	Closely pressed to pelvic inlet	In the pelvic inlet

At 24–28 weeks the mean cervical length is usually 3.5–4.0 cm; after this period its length decreases to 3.0 cm (32 weeks) and 2.5 cm (34–37 weeks). Cervical shortening by 1 cm compared to the initial values and its softening are signs of threatening premature termination of pregnancy.

**Treatment.** The need for surgical correction of CI depends on the indications and contraindications to it.

**Indications (during pregnancy):**

- ▶ CI signs (clinical, ultrasound, assessment score);
- ▶ history of spontaneous abortions, preterm deliveries, habitual (recurrent) abortions in combination with clinical signs of CI (shortening, dilatation and soft consistency of cervix).

**Contraindications:**

- ▶ bleeding from cervical canal;
- ▶ infections of the lower genital tract;
- ▶ uterine fibroids in the area of cervix and isthmus, which do not allow internal os edges to close;
- ▶ vaginal pathogenic flora.

*CI treatment during pregnancy* — placement of stitches in the uterine cervix.

**Prerequisites:**

- ▶ gestational age of 14–25 weeks (optimal term is up to 20 weeks);
- ▶ intact membranes;
- ▶ absence of cervical effacement;
- ▶ absence of prolapse of amniotic sac into the vagina;
- ▶ no signs of chorioamnionitis or vulvovaginitis.

**Preparation for surgery:**

- ▶ microbiology testing of vaginal and cervical discharge. Treatment of vulvovaginal and cervical infection;
- ▶ tocolytic therapy if indicated.

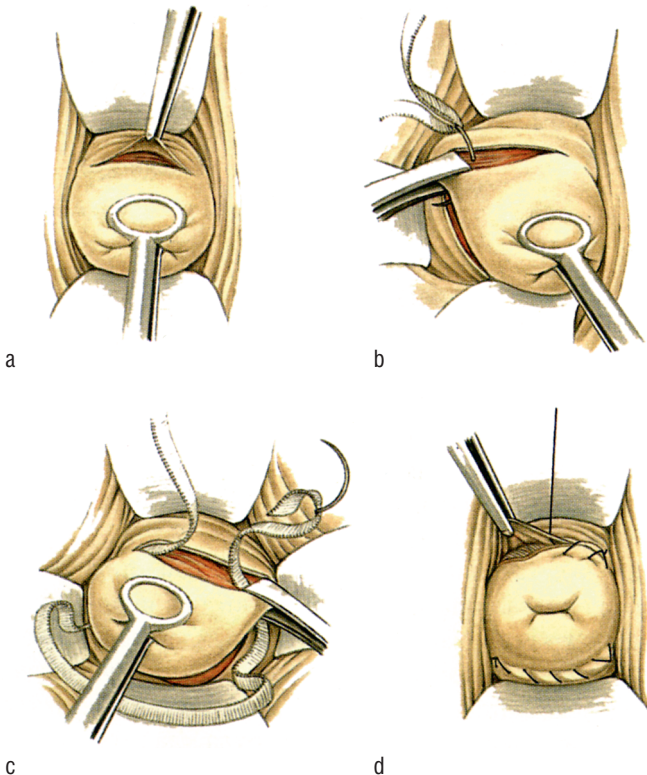
**Analgesia:**

- ▶ premedication: atropine sulfate 0.3–0.6 mg and dormicum (midazolam) 2.5 mg IM;
- ▶ ketamine 1–3 mg/kg body weight IM or 4–8 mg/kg body weight IM;
- ▶ propofol 40 mg every 40 s IV until clinical signs of anesthesia appear. The average dose is 1.5–2.5 mg/kg body weight.

### 1.2.1. Methods of surgical correction of cervical insufficiency using suture placement

A surgical procedure for CI during pregnancy was first proposed in 1955 by Shirodkar. Subsequently, this technique was repeatedly modified.

The surgery consists of placing a circular suture with mercilene ligature to the cervix in the region of the internal os (fig. 1.1) after dissecting the mucous membrane of the anterior vaginal fornix and displacing the bladder upward. After surgery, a dense scar forms in the area of the uterine isthmus. Currently,



**Fig. 1.1.** Applying a circular suture to the cervix in the area of the internal os using a mercilene thread (modification of the Shirodkar method): a — dissection of the mucosa; b — placement of a circular suture in the anterior vaginal fornix; c — tying a knot to secure a suture in the anterior vaginal fornix; d — suturing the incision of the mucosa

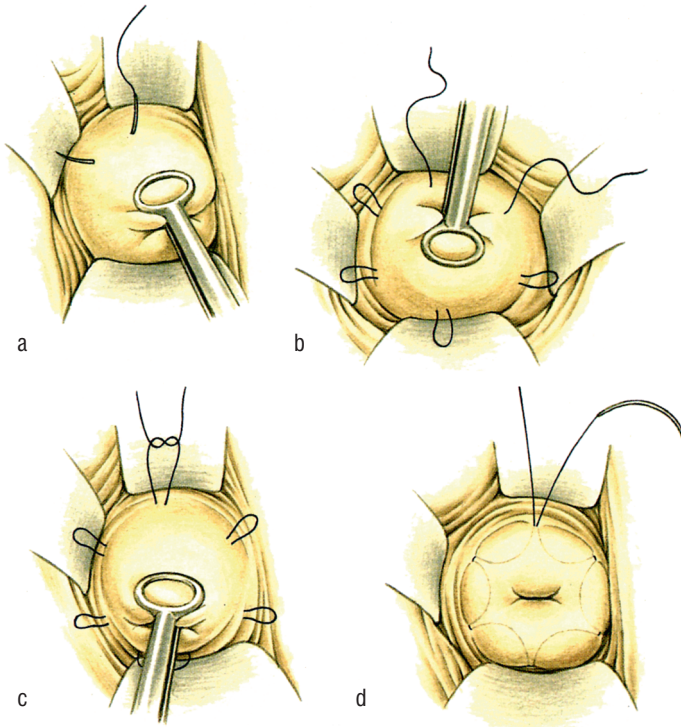


several modifications are proposed, among which the methods developed by McDonald and A.I. Lyubimova are the most common.

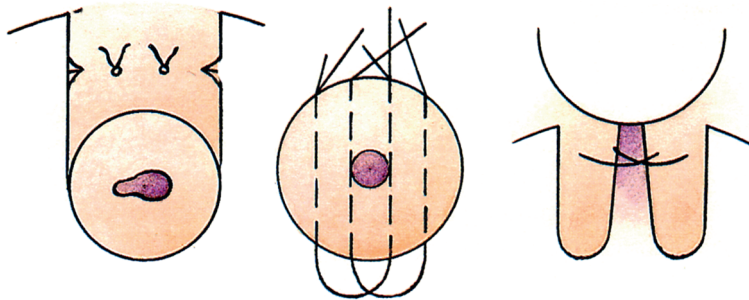
- ▶ The **method** of placing a circular purse string suture on the cervix by **MacDonald method** (1957) (fig. 1.2).

Surgery technique. A purse-string suture (using lavsan, silk, chromic catgut, mersilene tape) is applied to the cervix at the border of the mucosa of the anterior vaginal fornix. The needle is drawn deep through cervical tissue. The ends of the threads are knotted in the anterior vaginal fornix. The long ends of the ligature are left so that they are easier to detect before delivery and can be easily removed.

- ▶ U-shaped double cervical stitches in CI by **A.I. Lyubimova method** (fig. 1.3).



**Fig. 1.2.** Placement of a circular purse string suture on the cervix in the area of the internal os by the MacDonal method: a — placing the first seam; b — placing similar seams in a circle; c — completion of suturing; d — pulling the thread and narrowing the diameter of the cervical canal to 5 mm. Tying a knot



**Fig. 1.3.** Double U-shaped suture on the cervix by the method of A.I. Lyubimova

Surgery technique. Insert a needle with lavsan thread into the cervix at the border of the transition to the mucous membrane of the anterior vaginal fornix, 0.5 cm away to the right from the midline, and pass it through its entire thickness. The needle exits in the posterior vaginal fornix. The end of the thread is transferred to the left lateral part of the vaginal fornix. A needle is then again inserted into the mucous membrane at 0.5 cm to the left of the midline, capturing a part of the cervical tissues. The end of the second lavsan thread is transferred to the right lateral part of the vaginal fornix. Then insert the needle into the mucous membrane, capturing a part of the cervical tissues, exiting in the anterior vaginal fornix. For 2–3 hours, leave a swab in the vagina.

**Complications** of surgical correction of CI:

- ▶ spontaneous termination of pregnancy;
- ▶ hemorrhage;
- ▶ rupture of membranes;
- ▶ tearing of the tissue due to sutures;
- ▶ chorioamnionitis, sepsis.

**Management of pregnant women** in the postoperative period:

1. Patient can get up and ambulate 2 hours after the surgery.
2. Treat the cervix and vagina with a 3% solution of hydrogen peroxide, chlorhexidine (in the first 3–5 days), miramistin daily.
3. For the therapeutic and prophylactic purpose the following are prescribed:
  - $\beta$ -adrenergic agonists (hexoprenaline 2.5 mg or 1.25 mg 4 times daily for 10–12 days + verapamil 0.04 mg 3–4 times);
  - antibiotic therapy (if indicated).
4. Discharge from the hospital on the 5–7th day.

5. Women should be examined every 2–3 weeks in outpatient setting.
6. Sutures should be removed at 37–38 weeks gestation.

In case of suture related tearing of the tissue or infection, sutures are removed immediately.

### 1.2.2. Use of vaginal pessary in cervical insufficiency

The surgical method — cervical cerclage, was considered the main method among the treatment choices for the prevention of preterm labor resulting from CI. In recent years, vaginal pessaries have become an alternative method. The effectiveness of this method is at least 85%.

Arabin pessary (Germany) consists of flexible silicone and has the shape of a bowl with an inner diameter of 65 or 70 mm; the height of the curvature is 32 or 35 mm. The required height is determined individually by bimanual and echographic examination of the length of the cervix, the diameter of the upper vaginal third. The perforated model provides the best drainage of fluid (vaginal secretion). The obstetric pessary can be used for CI from 15–16 weeks, up to 37 weeks gestation.

The mechanism of action of the pessary consists in strengthening the cervix with the walls of the central opening of the pessary, reducing the pressure applied to it by the fetus, amniotic fluid, and partial transfer of intrauterine pressure to the anterior wall of the uterus.

*Indications for placement of vaginal pessary* are:

- ▶ CI of functional and organic origin;
- ▶ threatened late miscarriage and preterm delivery;
- ▶ cicatricial deformity of the cervix;
- ▶ multiple pregnancy;
- ▶ post-traumatic pelvic floor dysfunction.

An obstetric pessary is placed in outpatient and inpatient settings after testing for the presence of urogenital infection of the lower genital tract.

The pessary is electively removed at 37 weeks gestation.

*Indications for early* removal of the pessary are the need for emergency delivery, rupture of membranes, development of regular labor, signs of infection (chorioamnionitis).