Maternal injury

**Injury of the perineum and the vaginal walls:**

*Causes:*

* perineal tissue stiffness, the most pronounced in nulliparous age, scarring of the vaginal wall, high crotch;previa head and the eruption of its large size;
* flexion of the presenting part
* operative delivery (forceps, vacuum extraction);
* large fetus;
* anatomically narrow pelvis;
* fast childbirth;
* premature extension and the eruption of the head,

*Diagnostics:*

* Perineal symptoms precede threat crotch rupture:
* bulging of the perineum,
* cyanosis,
* edema,
* blanching,
* perineal skin becomes shiny,
* cracks,

***then there is a perineal rupture!***

*The degree of perineal rupture:*

1st degree - compromised the integrity of the posterior commissure;

2nd degree - laceration of the perineum, the vaginal wall and the pelvic floor muscles, except for the external sphincter of the rectum;

3rd degree - the rupture external sphincter of the rectum and sometimes the anterior wall of the rectum.

Bleeding with deep vaginal ruptures stopped when suturing. Hematoma vagina sewn (with or without an opening) and tightly backfill for 24 hours. The growth of the hematoma is accompanied by a feeling of tension, pain, urge to act of defecation, increase of anemia. In this case it is necessary to identify the bleeding vessel, flash, assign activities to prevent infection.

Perineal ruptures are not usually accompanied by significant bleeding detected during inspection and sutured to the nature and extent of the damage.

*Prevention:*

careful management of childbirth, vaginal sanitation, prevention of the birth of the largest fetus.

**Cervical Ruptures**

*Causes:*

* scar neck strain;
* cervicitis;
* rigid neck at age primapara;
* large fetus;
* extensor previa;
* quick, rapid, prolonged labor;
* operational benefits delivery (forceps, vacuum extraction, extraction of the stem, destroying the fetus operations, manual removal of placenta and isolation, and others.);
* unsustainable second stage of labor.

*Diagnostics*

The main symptom of cervical fracture is bleeding after the birth of the fetus, and the uterus is well reduced. Bleeding can be from mild to heavy, the amount of bleeding depends on the caliber of the damaged vessel.

Usually after the baby is born and the placenta begins bleeding from the birth canal bright scarlet stream (blood), leading to the rapid hemodynamic disturbances. Inspection of the cervix in the mirror confirms that cervical rupture. With ruptures 3rd degree necessary to avoid damage to the lower uterine segment.

After delivery, childbirth necessarily  produce all  inspection of the cervix in the mirrors. For this cervix fenestrated foceps grip the front lip, and intercepting them sequentially for the cervix distance every 2 cm, inspect gradually entire cervix clockwise.

Degrees of cervical fracture:

1st degree - the value of the rupture is not more than 2 cm;

2nd degree - the rupture is greater than 2 cm, but does not reach the

vaginal vault;

3rd degree - the rupture reaches the vaginal vault.

*Treatment*

  The basic principle of treatment consists in suturing the cervix break immediately after his diagnosis. Closure of the rupture immediately after birth produced through all layers of the cervix from the vagina catgut single-row suture. Suturing produce rupture from the upper edge toward the outer fauces, first provisionally applied ligature above fracture edges 0.5-1 cm. The distance between the individual sutures 0.7-1 cm.

**uterine rupture**

uterine rupture is one of the most severe obstetric pathologies. Mortality in uterine rupture reaches 12,8-18,6%.

*Causes:*

* hyperextension of the lower segment due
* narrow pelvis,
* hydrocephalus fetus
* large fetus,
* incorrect position of the fetus
* incorrect insertion of the fetal head;
* tumors of the uterus and birth canal;
* anomalies of labor activity;
* scars on the uterus after prior surgery (perforation of the uterus, a cesarean section, conservative myomectomy).

*Classification of uterine rupture*

  The clinical course:

1. Threatened uterine rupture.

2. The beginning of uterine rupture.

3. Take a uterine rupture.

By the nature of damage:

1. Incomplete rupture of the uterus (not penetrating into the abdominal cavity).

2. Complete uterine rupture (penetrating into the abdominal cavity).

Clinic

Threatened uterine rupture:

* Painful contractions,
* The appearance of a woman's desire to push with high standing fetal presenting part (Vastens positive symptom)
* Excessive stretching of the lower uterine segment,
* Stress and pain of the lower uterine segment,
* High standing of the contraction of the ring,
* Cervical edema
* Difficulty in urination,
* Signs of fetal suffering.

Uterine rupture, which began:

* bout sharply painful and take a convulsive character,
* from the birth canal appear spotting
* swelling of the vagina increases,
* blood in urine is detected,
* broken heart activity of the fetus,
* appear active fetal movement,
* passage of meconium (with cephalic presentation)
* may occur sudden death of the fetus.

Take a uterine rupture:

* at break new mothers often feel a strong cutting pain,
* contractions cease,
* objectively - there:
  + apathy,
  + appears pale skin,
  + tachycardia,
  + there is a cold sweat,
  + nausea,
  + vomiting,
  + hiccups.
  + palpation and percussion are determined -
  + abdominal pain, especially its lower half,
  + positive symptom Shchetkina-Blumberg,
  + blunting in the side sections - free liquid.
  + quickly appears and grows as a result of bloating intestinal atony,
  + It observed bleeding from the vagina, which increases when moving away up the presenting part,
  + the fetus dies,
  + when stepping into the abdominal cavity of the fetus stomach becomes irregular in shape, and through the anterior abdominal wall is easily palpated small part of the fruit.

**Obstetric Management of uterine rupture**

threatening uterine rupture

* you must immediately stop generic activities and complete birth surgically.
* when the dead fetus and the fetal head, located in the pelvic cavity - destroying the fetus operations.

started and accomplished uterine rupture

always shown laparotomy, the purpose of which is to eliminate the source of bleeding, restoring the anatomy of the pelvic organs, preventing the spread of infection.

The volume of transactions - suturing rupture supravaginal hysterectomy, hysterectomy, and drainage of the abdominal cavity and retroperitoneal fat.

**Obstetric fistula**

For severe birth injury include urinary and intestinal-vaginal fistulas. Their presence leads to disability, infringement sexual, menstrual, generative and other functions usually occur emotional disorders.

*Fistulas are the following:*

* vesico-intestinal,
* cervicovaginal / between the bladder and cervical channel /
* uretrovaginal,
* ureterovaginal,
* entero-vaginal,
* vesico-vaginal (the most occurring fistulas).

*Causes*

Long standing head in one plane of the pelvis:

* with a narrow pelvis,
* anomalies of insertion and praevia,
* large / giant / fetus

Slipping tools when presenting part of  destroying the fetus operations

*Clinic*

* Incontinence and passage of it through the vagina with the urogenital fistulas,
* Stepping through the vagina gases and feces in intestinal-vaginal fistulas.

*Diagnostics*

- Inspection in the mirror

- cystoscopy

- Sigmoidoscopy.

*Treatment* - surgical.

**Stretching and rupture of the joints of the pelvis**

*Etiology and pathogenesis*. Excessive softening of the joints of the pelvic bones, especially the pubic symphysis ( "simphysiophaty") predisposes them to rupture and excessive stretching during childbirth by mechanical abuse or surgical interventions.

Breaks symphysis pubis often observed in the operational delivery, as well as the presence of a narrow pelvis and a vibrant labor. In 85% of cases at the symphysis pubis rupture occurred intervention to delivery. At the same time 55% of the cases used forceps and 8% - for the extraction of fetal pelvic end.

In areas stretching or tearing are formed hemorrhage, in which the infection postpartum inflammation appear appropriate pelvic joints. In rare cases, the symphysis pubis rupture accompanied by damage to the urethra, bladder, and the clitoris.

*Clinic*

* complaints of pain in the pelvic area of the associated joints, most often appear 2-3 days after birth,
* increased pain when moving down.
* Puerperas bedridden, some hip rotated outwards and at the same time deployed with slightly bent knees (to "frog") - a symptom NM Volkovich.
* "Duck" gait.

First degree - a discrepancy in the pubic rami 5-9 mm

second degree - 10-20 mm

third degree - more than 20 mm.

*Treatment*

* bed rest,
* antibiotic therapy,
* vitamin.
* tight bandaging of the circular basin
* trauma counseling

Fetus injuries

The term "birth trauma" unites Break (and hence function disorder) tissues and organs of the child arising during childbirth. Perinatal hypoxia and birth asphyxia are often accompanied by a birth trauma, but may be one of the pathogenetic links of their occurrence.

The forces of labor and delivery occasionally cause physical injury to the infant. The incidence of neonatal injury from difficult or traumatic deliveries is decreasing due to increasing use of cesarean delivery in place of difficult versions, vacuum extractions, or mid- or high-forceps deliveries.

A traumatic delivery is more likely when the mother has small pelvic measurements, when the infant seems large for gestational age (often the case with diabetic mothers), or when there is a breech or other abnormal presentation, especially in a primipara. In such situations, labor and the fetal condition should be monitored closely. If fetal distress is detected, the mother should be positioned on her side and given O2. If fetal distress persists, an immediate cesarean delivery should be done.

**Extracranial Head Injuries**

Head injury is the most common birth-related injury and is usually minor, but serious injuries sometimes occur.

**Head molding**

Head molding is common in vaginal delivery due to the high pressure exerted by uterine contractions on the infant’s malleable cranium as it passes through the birth canal. This molding rarely causes problems or requires treatment.

**Scalp abrasions**

Scalp abrasions and lesions, which are usually superficial and minor, can occur during deliveries that require the use of instruments (in up to 10% of infants who had vacuum extraction).

**Caput succedaneum**

Caput succedaneum is an extraperiosteal subcutaneous collection of serosanguinous fluid on the presenting portion of the scalp resulting from pressure during labor as the head delivers.

**Subgaleal hemorrhage**

Subgaleal hemorrhage occurs between the galea aponeurosis and periosteum. It results from greater trauma and is characterized by a fluctuant mass over the entire scalp, including the temporal regions, and manifests in the first few hours after birth. This potential space under the scalp is large, and there can be significant blood loss and hemorrhagic shock. Treatment is mostly supportive.

**Cephalhematoma**

Cephalhematoma is hemorrhage beneath the periosteum. It can be differentiated from subgaleal hemorrhage because it is sharply limited to the area overlying a single bone, the periosteum being adherent at the sutures. Cephalhematomas are commonly unilateral and parietal. In a small percentage of neonates, there is a linear fracture of the underlying bone. The hematoma usually presents in the first few days of life and resolves over weeks. Treatment is not required, but anemia or hyperbilirubinemia may result. Occasionally, the hematoma calcifies into a bony mass.

**Depressed skull fractures**

Depressed skull fractures are uncommon. Most result from an assisted delivery using forceps or from the head resting on a bony prominence in uterus. Infants with depressed skull fractures or other head trauma may also have subdural bleeding, subarachnoid hemorrhage, or contusion or laceration of the brain itself . Depressed skull fractures cause a palpable (and sometimes visible) step-off deformity, which must be differentiated from the palpable elevated periosteal rim occurring with cephalhematomas. CT is done to confirm the diagnosis and rule out complications. Neurosurgical elevation may be needed.

**Facial Nerve Injury**

The facial nerve is injured most often. Although forceps pressure is a common cause, some injuries probably result from pressure on the nerve in utero, which may be due to fetal positioning (eg, from the head lying against the shoulder, the sacral promontory, or a uterine fibroid).

Facial nerve injury usually occurs at or distal to its exit from the stylomastoid foramen and results in facial asymmetry, especially during crying. Identifying which side of the face is affected can be confusing, but the facial muscles on the side of the nerve injury cannot move. Injury can also occur to individual branches of the nerve, most often the mandibular.

Another cause of facial asymmetry is mandibular asymmetry resulting from intrauterine pressure; in this case, muscle innervation is intact and both sides of the face can move. In mandibular asymmetry, the maxillary and the mandibular occlusal surfaces are not parallel, which differentiates it from a facial nerve injury. A congenital anomaly that can cause an asymmetric smile is unilateral absence of the depressor anguli oris muscle; this anomaly is clinically insignificant but must be differentiated from facial nerve injury.

Testing or treatment is not needed for peripheral facial nerve injuries or mandibular asymmetry. They usually resolve by age 2 to 3 mo.

**Brachial Plexus Injuries**

Brachial plexus injuries frequently follow lateral stretching of the neck during delivery caused by shoulder dystocia, breech extraction, or hyperabduction of the neck in cephalic presentations. Injuries can be due to simple stretching of the nerve, hemorrhage within a nerve, tearing of the nerve or root, or avulsion of the roots with accompanying cervical cord injury. Associated injuries (eg, fractures of the clavicle or humerus or subluxations of the shoulder or cervical spine) may occur. Intrauterine compression may also cause some cases.

Injuries may involve the

* Upper brachial plexus (C5 to C7): Affects muscles around the shoulder and elbow
* Lower plexus (C8 to T1): Primarily affects muscles of the forearm and hand
* Entire brachial plexus: Affects entire upper extremity and often sympathetic fibers of T1

The site and type of nerve root injury determine the prognosis.

**Erb palsy** is the most common brachial plexus injury. It is an upper brachial plexus (C5 to C7) injury causing adduction and internal rotation of the shoulder with pronation of the forearm. Sometimes the biceps reflex is absent and the Moro reflex is asymmetric. Ipsilateral paralysis of the diaphragm due to phrenic nerve injury also is common. Treatment is usually supportive with physical therapy and protective positioning, which includes protecting the shoulder from excessive motion by immobilizing the arm across the upper abdomen and preventing contractures by gently doing passive range-of-motion exercises to involved joints every day starting at 1 wk of age.

**Klumpke palsy** is rare and is a lower plexus injury that causes weakness or paralysis of the hand and wrist. The grasp reflex is usually absent, but the biceps reflex is present. Often, the sympathetic fibers of T1 are involved causing an ipsilateral Horner syndrome (miosis, ptosis, facial anhidrosis). Passive range-of-motion exercises are usually the only treatment needed.

Neither Erb palsy nor Klumpke palsy commonly causes demonstrable sensory loss, which suggests a tear or avulsion. These conditions usually improve rapidly, but deficits can persist. If a significant deficit persists > 3 mo, MRI is done to determine the extent of injury to the plexus, roots, and cervical cord. Surgical exploration and microsurgical repair of brachial plexus with nerve grafts have sometimes been helpful.

**Involvement of the entire plexus** is less common and results in a flaccid upper extremity with little or no movement, absent reflexes, and usually sensory loss. Ipsilateral Horner syndrome is present in the most severe cases. Ipsilateral pyramidal signs (eg, decreased movement, Babinski sign) indicate spinal cord trauma; an MRI should be done. The involved extremity’s subsequent growth may be impaired. The prognosis for recovery is poor. Management may include neurosurgical exploration. Passive range-of-motion exercises can prevent contractures.

**Phrenic Nerve Injuries**

Most phrenic nerve injuries (about 75%) are associated with brachial plexus injury. Injury is usually unilateral and caused by a traction injury of the head and neck.

Infants have respiratory distress and decreased breath sounds on the affected side. Treatment is supportive and typically requires continuous positive airway pressure or mechanical ventilation. About one third of infants recover spontaneously within the first month. Infants who do not recover may require surgical diaphragmatic plication.

**Other Peripheral Nerve Injuries**

Injuries to other peripheral nerves (eg, the radial, sciatic, obturator) are rare in neonates and are usually not related to labor and delivery. They are usually secondary to a local traumatic event (eg, an injection in or near the sciatic nerve). Treatment includes placing the muscles antagonistic to those paralyzed at rest until recovery. Neurosurgical exploration of the nerve is seldom indicated. In most peripheral nerve injuries, recovery is complete.

**Spinal Cord Injury**

Spinal cord injury  is rare and involves variable degrees of cord disruption, often with hemorrhage. Complete disruption of the cord is very rare. Trauma usually occurs in breech deliveries after excess longitudinal traction to the spine. It can also be caused by cord compression due to epidural hemorrhage or hyperextension of the fetal neck in utero (the “flying fetus”). Injury usually affects the lower cervical region (C5 to C7). When the injury is higher, lesions are usually fatal because respiration is completely compromised. Sometimes a click or snap is heard at delivery.

Spinal shock with flaccidity below the level of injury occurs initially. Usually, there is patchy retention of sensation or movement below the lesion. Spasticity develops within days or weeks. Breathing is diaphragmatic because the phrenic nerve remains intact because its origin is higher (at C3 to C5) than the typical cord lesion. When the spinal cord lesion is complete, the intercostal and abdominal muscles become paralyzed and rectal and bladder sphincters cannot develop voluntary control. Sensation and sweating are lost below the involved level, which can cause fluctuations of body temperature with environmental changes.

An MRI of the cervical cord may show the lesion and excludes surgically treatable lesions, such as congenital tumors or hematomas pressing on the cord. The CSF is usually bloody.

With appropriate care, most infants survive for many years. The usual causes of death are recurring pneumonia and progressive loss of renal function. Treatment includes nursing care to prevent skin ulcerations, prompt treatment of urinary and respiratory infections, and regular evaluations to identify obstructive uropathy early.

**Intracranial Hemorrhage**

Hemorrhage in or around the brain can occur in any neonate but is particularly common among those born prematurely; about 15 to 25% of premature infants < 1500 g have intracranial hemorrhage. Hypoxia-ischemia, variations in BP, hypoperfusion with reperfusion, and pressures exerted on the head during labor are major causes. The presence of the germinal matrix (a mass of embryonic cells lying over the caudate nucleus on the lateral wall of the lateral ventricles that is vulnerable to hemorrhage) makes hemorrhage more likely. Risk also is increased by hematologic disorders (eg, vitamin K deficiency, hemophilia, disseminated intravascular coagulation).

Hemorrhage can occur in several CNS spaces. Small hemorrhages in the subarachnoid space, falx, and tentorium are frequent incidental findings at autopsy of neonates that have died from non-CNS causes. Larger hemorrhages in the subarachnoid or subdural space, brain parenchyma, or ventricles are less common but more serious.

Intracranial hemorrhage is suspected in neonates with apnea, seizures, lethargy, or an abnormal neurologic examination. Such infants should have a cranial imaging study as part of the initial evaluation. Cranial ultrasonography is risk free, requires no sedation, and can readily identify blood within the ventricles or brain substance. CT is more sensitive than ultrasonography for thin layers of blood in the subarachnoid or subdural spaces and for bony injury. MRI is more sensitive and specific than CT or ultrasonography for intracranial blood and for brain injury. CT is done to rapidly identify intracranial hemorrhage.

Treatment depends on the location and severity of the hemorrhage but usually is only supportive, including giving vitamin K if not previously given and managing any underlying coagulation abnormality. In cases of significant hemorrhage (eg, subdural hemorrhage), neurosurgical consultation should be obtained to help identify infants requiring intervention.

**Epidural hematoma**

Epidural hematoma is a collection of blood between the skull and the dura mater. It is rare in neonates but can occur in association with a skull fracture or cephalhematoma. Infants may present with apnea, seizures, or focal neurologic abnormalities. The fontanelles may be bulging if intracranial pressure is increased. Most epidural hematomas are self-limiting and do not require treatment. If an intervention is required, surgical and nonsurgical options exist. Nonsurgical options are percutaneous epidural tapping or ultrasound-guided needle aspiration. Surgical options include craniotomy, which is reserved for cases that are rapidly progressing or not responsive to other interventions. If identified and treated promptly, neurologic outcomes are good.

**Intraventricular and/or intraparenchymal hemorrhage**

Intraventricular and/or intraparenchymal hemorrhage usually occurs during the first 3 days of life and is the most serious type of intracranial bleeding. Hemorrhages occur most often in premature infants, are often bilateral, and usually arise in the germinal matrix. Cases in term infants are rare. Most bleeding episodes are subependymal or intraventricular and involve a small amount of blood. In severe hemorrhage, there may be bleeding into the parenchyma or a cast of the ventricular system with large amounts of blood in the cisterna magna and basal cisterns. Hypoxia-ischemia often precedes intraventricular and subarachnoid bleeding. Hypoxia-ischemia damages the capillary endothelium, impairs cerebral vascular autoregulation, and can increase cerebral blood flow and venous pressure, all of which make hemorrhage more likely. Most intraventricular hemorrhages are asymptomatic, but larger hemorrhages may cause apnea, cyanosis, or sudden collapse.

Prognosis for infants with small intraventricular hemorrhages is good. However, infants with large intraventricular hemorrhages have a poor prognosis, especially if the hemorrhage extends into the parenchyma. Many infants who survive have residual neurologic deficits. Preterm infants with a history of severe intraventricular hemorrhage are at risk of developing posthemorrhagic hydrocephalus and must be monitored closely with serial cranial ultrasound examinations and frequent head circumference measurements.

Treatment for most hemorrhages is only supportive. However, infants with progressive hydrocephalus require CSF drainage by placement of a subcutaneous ventricular reservoir or one of the various types of ventricular shunts (eg, ventriculoperitoneal). Because many infants will have neurologic deficits, careful follow-up and referral for early intervention services are important.

**Subarachnoid hemorrhage**

Subarachnoid hemorrhage probably is the most common type of intracranial hemorrhage. It involves bleeding between the arachnoid membrane and the pia mater. Neonates typically present in the 2nd or 3rd day of life with apnea, seizures, lethargy, or an abnormal neurologic examination.

The prognosis is usually good, with no significant long-term sequelae. However, with large hemorrhages, the associated meningeal inflammation may lead to a communicating hydrocephalus as the infant grows.

Treatment is supportive.

**Subdural hemorrhage**

Subdural hemorrhage involves bleeding between the dura and the pia mater. It results from tears in the falx, tentorium, or bridging veins. Such tears tend to occur in neonates of primiparas, in large neonates, or after difficult deliveries—conditions that can produce unusual pressures on intracranial vessels. Some subdural hemorrhages are nontraumatic. Infants may present with apnea, seizures, a rapidly enlarging head, an abnormal neurologic examination with hypotonia, a poor Moro reflex, or extensive retinal hemorrhages.

The prognosis for subdural hemorrhage is guarded, but some infants do well.

Treatment is supportive, but neurosurgical drainage of the hematoma is usually needed for rapidly progressing bleeding with compression of vital intracranial structures and worsening clinical signs.

**Fractures**

**Midclavicular fracture,** the most common fracture during birth, occurs with shoulder dystocia and with normal, nontraumatic deliveries. Initially, the neonate is sometimes irritable and may not move the arm on the involved side either spontaneously or when the Moro reflex is elicited. Most clavicular fractures are greenstick and heal rapidly and uneventfully. A large callus forms at the fracture site within a week, and remodeling is completed within a month. Treatment consists of immobilizing the arm for 14 days by pinning the shirt sleeve of the involved side to the opposite side of the infant’s shirt.

The **humerus and femur** may be fractured in difficult deliveries. Most of these are greenstick, mid-shaft fractures, and excellent remodeling of the bone usually follows, even if moderate angulation occurs initially. A long bone may be fractured through its epiphysis, but prognosis is excellent.

**Soft-Tissue Injuries**

All soft tissues are susceptible to injury during birth if they have been the presenting part or the fulcrum for the forces of uterine contraction. Edema and ecchymosis often follow injury, particularly of the periorbital and facial tissues in face presentations and of the scrotum or labia during breech deliveries. Breakdown of blood within the tissues and conversion of heme to bilirubin result whenever a hematoma develops. This added burden of bilirubin may cause sufficient neonatal hyperbilirubinemia to require phototherapy, and rarely, exchange transfusion . No other treatment is needed.