

Perinatal pathology of the fetus and newborn (III)

Group of diseases that arise in newborns due to trauma, hypoxia, toxic-metabolic and infectious injury of organs and tissues, as a result of adverse pregnancy or childbirth

CAUSES OF MECHANICAL DAMAGE (NON-CONFORMITY OF PARTURIENT CANAL/GENERATIVE PASSAGE TO FETUS SIZE)

Mother

- Age
- Anomalies of the pelvis (narrow, flat rachitic)
- Exostosis ,trauma fractures pelvis

Fetus

- Giant fetus
- Diabetic Fetopathy
- Multiple pregnancies
- Abnormal location and presentation
- Defects development of(hydrocephalus)
- Prolonged pregnancy

MECHANICAL DAMAGE

- SOFT TISSUE, MUSCLE, BONE
- Nervous System:
 - Peripheral nerves
 - Central nervous system (damage to the brain and spinal cord)

Mechanical damage of (soft tissues, muscles, bones)

- Labor tumor
- Cephalohematoma
- Sternocleidomastoid muscle hemorrhage
- Fractures of clavicle, epiphysis

Labor Tumor

- Swelling of soft tissue where the presenting part (often the head) due to venous stagnation in children as they pass through the mother parturient canal.
- Often with punctulated hemorrhages on the skin.
- More frequently it is encountered in the children of the first-born mothers due to prolong disengagement of fetus head because of the giant size of fetus.
- Swelling disappears within 1-2 days. Treatment is not required

Cephalohematoma

- Effusion of blood beneath the pericranium(0,3-0,5% of newborns)
- Increases during the first 2-3 days of life.
- One or both parietal bones, rarely in the occipital and frontal, still less on the temporal bones.
- Capacity from 5 to 150 ml of blood (long duration - liquid)
- The boundaries do not extend beyond the bone that involved.
- The surface of the skin over the tumor was not changed.
- Under CT sometimes observed- broken bones,
Perhaps the message with epidural hematoma

Cephalohematoma

- From 7-10 days - reduced in size
- Usually disappear in 3-8 weeks.
- With significant hemorrhages of compacted periosteum, hematoma ossified, which leads to distortion or asymmetry of the skull.
- Diff.diagnoz-labor tumor; hemorrhage beneath the aponeurosis; cerebral hernia.
- Complications: anemia, due to considerable blood loss; jaundice , due to progress of hemorrhage resolution, suppuration.

Treatment of Cephalohematoma

- Feed the child with expressed breast milk in the course of 3-4 days.
- After that calcium gluconate and Vit. 3 days (0,001 g 3 times)
- Puncture cephalohematoma ,suck out the blood and apply compressive bandage.
- With infection and suppuration CT-surgical treatment, antibiotics.

Hemorrhage in sternocleidomastoid muscle

- Always arise during breech presentation at birth, or by using forceps or manual extraction of the fetus.
- Small, moderately dense or rather small consistency of tumor with the size of a walnut and plum, which often appears only at the end of the first - the start of the 2nd week of life.
- Further develops torticollis - head tilted to the patient's side, and chin in the opposite direction.
- Diff.diagnoz: congenital torticollis, developed in the uterus as a result of prolonged pressure of the mother's pelvic bones on the muscle owing to insufficiency of amniotic fluid

Hemorrhage in sternocleidomastoid muscle

- Treatment: Immediately after birth, hemostasis therapy, turning heads in a proper way especially during sleep, after a while overlay thermal compress and massage. It is recommended to injects prednisolone and hyaluronidase into hematoma.

Prognosis is usually favorable. When inefficient conservative treatment, between the ages of 4 and 6 months after birth indicate surgical treatment (tendotomy)

Fracture of clavicle

- Observed in 0,03-0,1% of newborns
- Possible with spontaneous delivery without aid from obstetric . Fracture form in the giant fetus, when pelvic present with fall back arm.
- Violent or weak uterine contraction, delayed exit of fetus shoulder, narrow pelvis of parturient women promote fractures. Always lead to right clavicle fracture.
- Subperiosteum fracture in the middle third of the clavicle without dislocation.
- Diagnosis: movement of the hand on the side of fracture is limited, there is a local swelling, the Moro reflex on the side of lesion is absent, crepitation during palpation

Fracture of clavicle

- Favorable prognosis, formation of bone marrow advanced rapidly on- 3-4-day, subsequently the function of limbs are not affected.
- Diff.diagnoz: avulsion fracture the head of shoulder bone , palsy Brachial Plexus and central paralysis. When suspect fracture carry out X-ray examination.
- Treatment: short-term slightly immobilised limb on the side of the clavicle fracture and the child laid on the unaffected side.

MECHANICAL DAMAGE OF NERVOUS SYSTEM

- **Damage to the spinal cord** (neck region
Caesarian section)
- **Damage to peripheral nerves (paralysis):**
 - facial nerve
 - Brachial plexus (top, bottom, total)
- **Intracranial birth injury (bleeding):**
 - Epidural
 - Subdural (supra, subtentorialnoe)
 - Intraventricular
 - Parenchymatous
 - Subarachnoid

Damage to peripheral nerves

■ Paralysis of the facial nerve

- Assimmetrical face with eye slits gape, hanging-down of cheeks, displacement of the mouth angle toward the unaffected side .
- All of these symptoms intensified when the child cry.

■ Upper brachial plexus paralysis Erba - Dyushena

- Damage at the level of C5 - C6
- Hand and the fingers moving, sometimes-clicking in the shoulder joint.

■ Lower brachial plexus paralysis Dezherin - Klyumpke

- Damage at the level of C7 - Th1
- Hand passively hanging in the form of seals feet or has the form of "sharp-clawed paws."

Total brachial plexus palsy

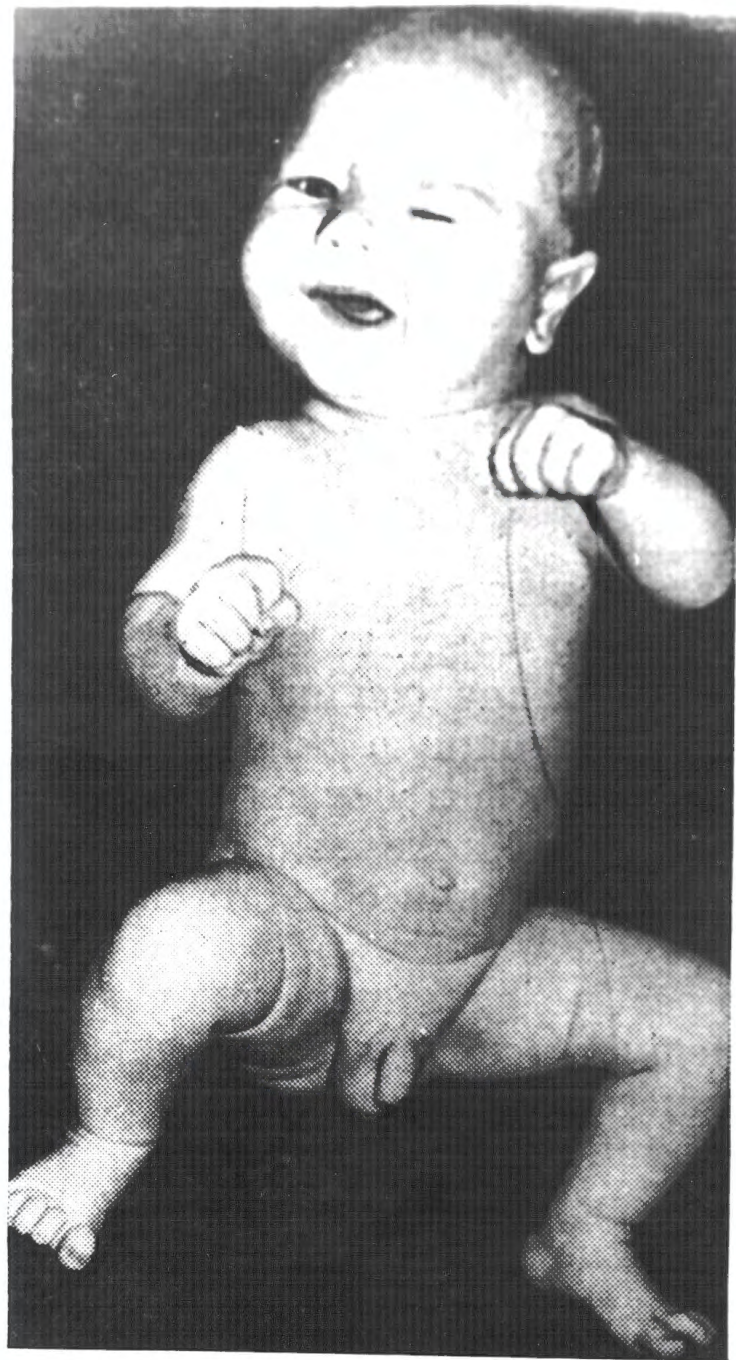
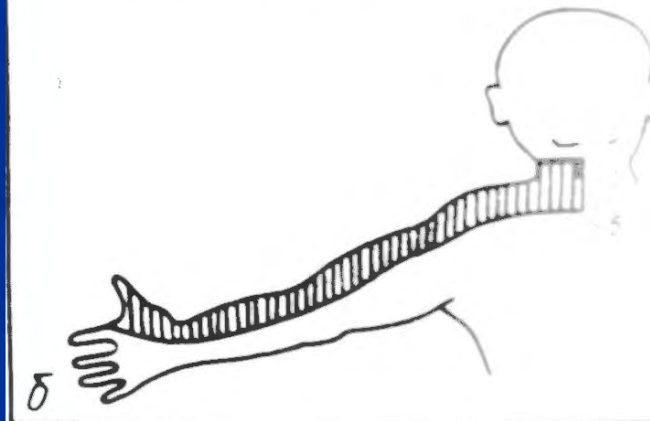
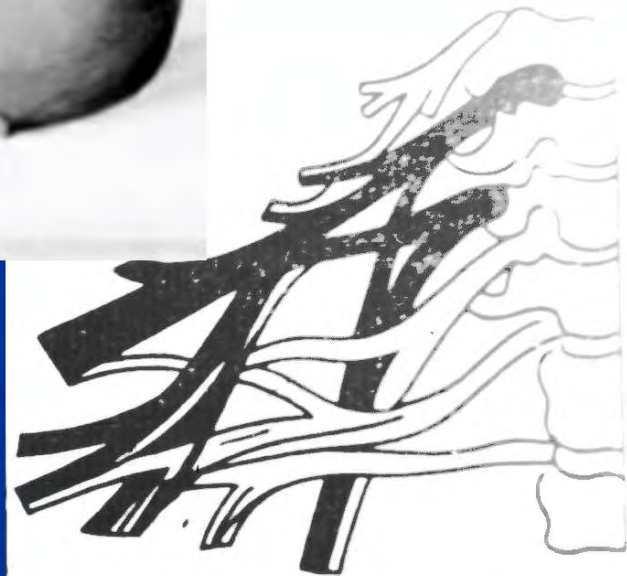


Рис. 18. Парез мышц лица при пе-

Upper brachial plexus paralysis Erba - Dyushena

- Damage at the level of C5-C6
- The damaged extremity hangs along the body, its upper part is turned inward and is forced against the body.
- Forearm is slightly [pronirovano] and is bent in the elbow
- Palm is turned back and towards the outside. Hand is isolated from the body by the deep and wide slot (symptom of puppet hand).
- Hand and fingers move, sometimes flick in the humeral joint
- Frequently it is combined with paralysis of diaphragms & nerve



Lower paralysis Дежерин - Клюмпке

- Damage at the level of C7 – Th1
- Encountered considerably frequent – paralysis of muscles of the forearm and hand.
- Brush passively overhangs in the form “seal paw “or takes the form “clawed-shaped paw
- Decreased movements in the humeral and elbow joint.
- Pallor of the skin (symptom of the ischemic glove).

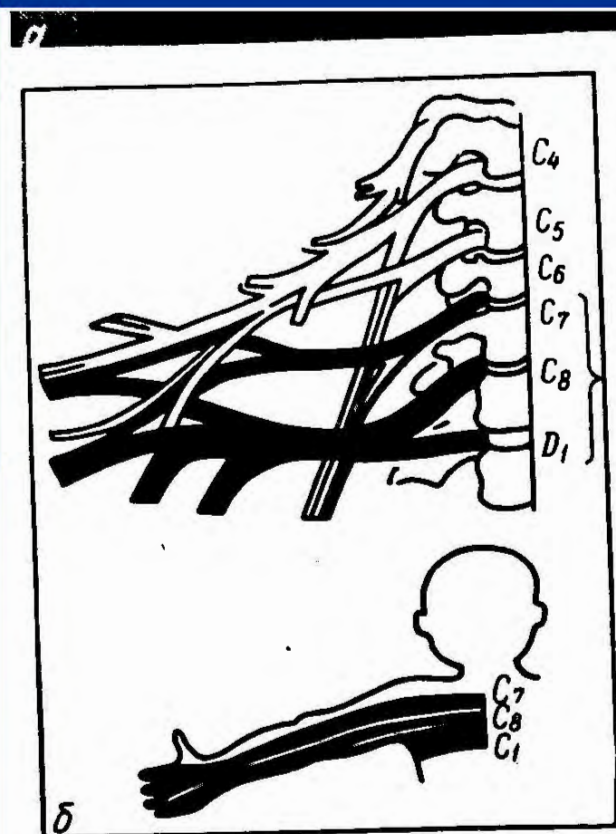


Рис. 68. Нижний дистальный тип акушерского пареза



Рис. 67. Симптом «кукольной руки»

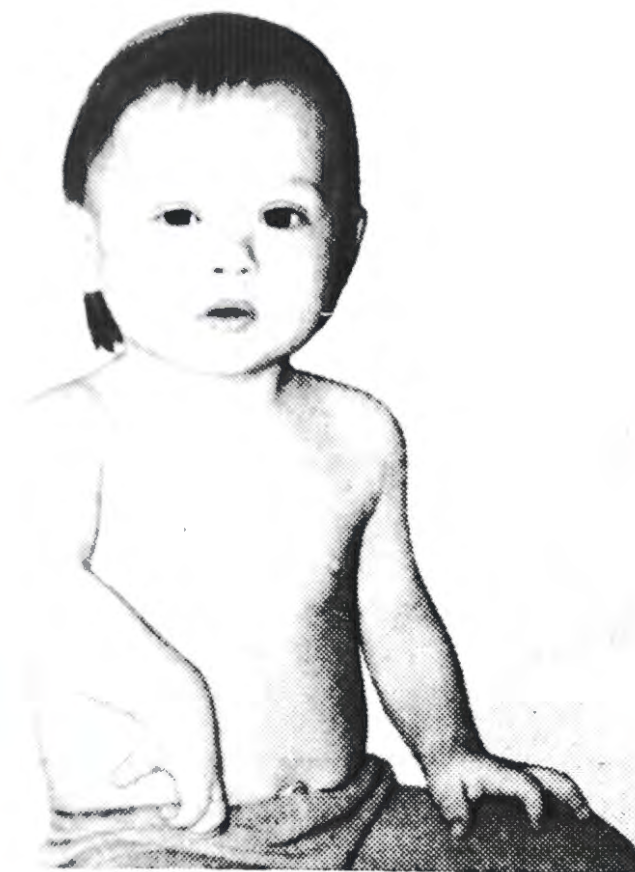
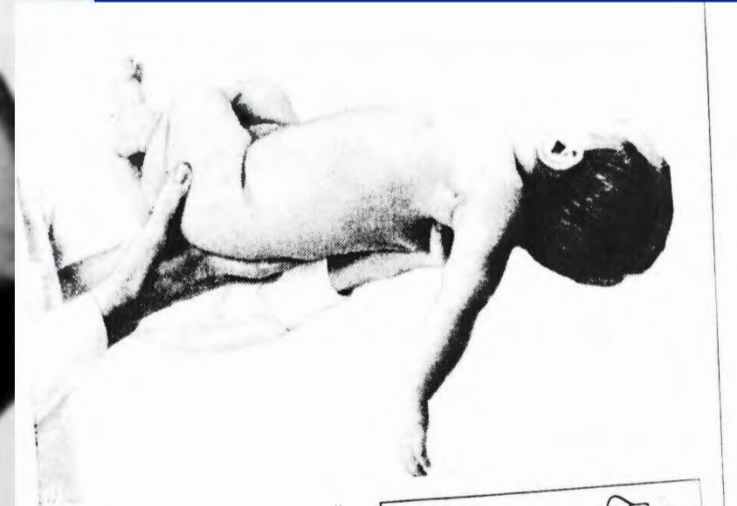


Рис. 72. Положение паретичной руки в виде «охотничьего рожка»

Тотальный парез плеча



течении в патологический
иных симпатических во-
тороне пареза руки отме-
ром (Клода Бериара-Гор-
миса, энтофтальм). В пе-
учаиях имеется нарушение
и радужки, сохраняющее-
е длительного времени.
ишем типе пареза прокси-
малы конечности также
и или страдают незначи-
титель «кукольной руки»
не развивается внутри
контрактура плеча. При
пареза встречается реже,
и



Рис. 69. Тотальный тип акушерского пареза

Therapeutic measures during nerve paralysis

- **Acute phase**: preparations improving cerebral blood circulation, diuretics, the complex of the vitamins of group [v], papaverine, folic, lipoic acids, nicotinamide
- **Early regression period and further**: together with the drug therapy - massage, gymnastics, floating, hydro-massage with physiotherapy (thermal procedures, electrophoresis with the nicotinic acid), acupuncture

Epidural Bleeding

- Fast-increasing HF hypertension in the first hours of life ВЧ:
 - hyper-excitability
 - spasms
 - On the side of hematoma frequently dilation of the pupil
 - Сочетается с кефалогематомой
- CT – band-shaped very dense formation between the solid cerebral membrane and by the bones of the skull
- HCT – poorly informative

Subdural Bleeding

- Asymptomatic
- Neurology- disturbance in the first 72 hours of the life: the asymmetry of muscular tone, spasm in the section the groups of muscles, the deflection of eyes in side of hematoma, dilation of pupil on the side of hematoma
- General cerebral symptoms (increase in the intracranial pressure, hyper-excitability)
- CT- “crescent-shaped” zone of increased density, that is adjacent to the arch of the skull
- HCT- poorly informative

Subdural Bleeding (субтенториальное)

- Catastrophic –from the first minute of life - signs of the compression of the brain stem: coma, opisthotonus, the disturbance of pupil reactions, , фиксир. взор, прогрессир.нарастание серд.-сосуд. и дыхат. наруш.
- Deferred – после периода относит. благополу-чия (неск. часов или дней)- признаки ВЧГ и компрессии ствола мозга. Наиболее частый исход-летальный.
- Disturbances of metabolism, decreased BP, bradyarrhythmia & anemia
- HCT- deformation of the 4th ventricle., thromb in the large cistern
- KT - extensive hematomas of the rear fossas

Intraventricular Bleeding(trauma)

- Rarely encountered predominantly reported & manifested during 1-2 days of life (sometimes on 2-4 weeks)
- Hyper-excitability, by oppression, focus spasms, secondary apneas
- Progressive BЧГ vomit, unjoined fontanel(s)
- Hydrocephaly
- HЧГ – Ventriculomegaly. Deformation of outlines and an increase in the sizes vessels. Thromb in the openings of ventricles

PARENCHYMATOUS HEMORRHAGES

- Rarely encountered, frequently in newborns >4000
- **Полушарные кр.** —asymptomatic flow or the increasing oppression of cerebral activity, by hemisyndrom, очаговые клонич, spasm, ВЧГ (perifocal edema of the brain)
- **Внутримозжечковые кр.-** asymptomatic(кр. в краевые отделы полушар. мозжечка) or increasing ВЧГ, the compression of the brain stem with massive bleeding in the hemispheres of the cerebellum

Subarachnoid Bleeding

- First 12 hrs of life- the oppression of cerebral activity till coma
- At times— the widely open eyes, “cerebral cry”, the pose of decortication (inflexion of hands, the extension of feet)
- Hyperesthesia
- Hyper-excitability, the generalized spasms
- Rapidly increasing external hydrocephalus
- HCT, increase in the density and expansion of the subarachnoid spaces

Нурохіс РТ

- Asphyxia (suffocation) - **острое прекращение поступления кислорода (5-7% н/р).**
- Asphyxia - fetal (center.) and post-natal (СДР)
- **Нурохіа** - the prolonged repeated limitations of constant O₂ supply leads to excess accumulation in the organism of CO₂ and other incompletely oxidized products (80% of all damages to CNS).
- Hypoxia -chronic intrauterine

CAUSES FOR HYPOXIC DAMAGES

Maternal

- State and disease of the mother leads to the depletion of fetal-placental-central blood flow (toxycosis)
- Excessively rapid or protracted labor

Child

- Delay of the intrauterine development of the fetus
- Premature birth
- Congenital defect
- Pathology of the placenta and the umbilical cord

HYPOXIC DEFECTS OF CNS

- Cerebral Ischemia (1-3 stage)
- Intracranial the hemorrhage of the hypoxic genesis (they are characteristic for the premature children)
- Combination of ischemic and hemorrhagic defeats CNS of the nontraumatic nature

Cerebral Ischemia

(hypoxic-ischemic encephalopathy)-1

■ Cerebral Ischemia - 1 (light)

- Light asphyxia upon birth. Excitation CNS in the mature babies, oppression in premature babies, the duration not more than 5-7 days

■ Cerebral Ischemia - 2 (medial severity)

- ~~■ B/y hypoxia, intranatal asphyxia~~
- Oppression of the CNS, смена фаз церебр. активн. More than 7 days, spasm (тонич. или атипичн.- апноэ, трепет. век у недонош, клонические у донош.)
- Транзиторная ВЧГ (у донош.)
- Vegetative-visceral defect

Cerebral Ischemia

(Hypoxic-Ischemic-Encephalopathy)-2

■ Cerebral Ischemia - 3 (chronic)

- B/y fetal hypoxia, chronic perinatal asphyxia, extracerebral cause for steadfast hypoxia of the brain (ВПС, СДР, hypovolemic shock)
- Progressive loss of cerebral activity more than 10 days (first 12 hours-coma, 12-24 hours – increase level of awakesness, 24-72 hours -coma)
- Repetitive spasm, эписпатус
- Dysfunctional brain stem (respiratory defect.)
- The pose of decortication (decerebration) - depends on the volume of the defect.
- Vegetative-visceral defect
- Progressive ВЧГ

Intracranial Hemorrhage of Hypoxic Genesis

■ Intraventricular hemorrhage -1

(субэпиндимальное)

- Predominantly in premature and immature newborns
- Ante and intranatal hypoxia, повторн. Apnea attacks, jet-like introduction of hyperosmolar solution.
- Asymptomatic course
- Transitory mechanical disturbances.

Intracranial hemorrhage of hypoxic genesis (2)

■ Intraventricular hemorrhage -

2

(субэпиндим.+
интравентрик.)

- B/y hypoxia, intranatal asphyxia., defect upon first reanimation., АГ, СДР. ИВЛ, fast introduction of large volumes or hyperosmolar solution, coagulopathy
- Catastrophic course short period. Mobile excitement. passes into the coma, deep apnea, cyanosis and marbling of the skin, тонич. spasm, oculomotor disorders, bradyarrhythmia, the disturbance of the thermostatic control – intraventricular hypertension.
- Волнообразн. течение - смена фаз cerebr. активности, приступы апноэ, muscular hypotonia, atypical spasm.
- Decrease in arterial pressure, hematocrite, HB, hypoxemia, acidosis, fluctuating glycemia.

Внутричерепные кровоизлияние гипоксического генеза (3)

■ **Intraventricular
hemorrhage -3**
(субэпиндим.
+
интравентрик.
+
перивентрик.)

- 12-17% ВЖК, immature with экстрем. Low body weight
- Typical catastrophic course. Rapid developmetn of coma, progressive defect of vital functions(bradycardia, arrythmia, apное, dysпноe)
- Tonic spasms, oculomotor defect caused by displacement of the brain stam. High letality on the first day of life.
- Труднокорректируемые hypoxemia, acidosis, electrolytic solution, ДВС-syndrome.
- Proggressive drop in arterial pressure, arrythmia, critical drop in hematocrite и HB.



Ultrasonic picture of the brain of newborn with the intra-ventricular hemorrhage: moderated of ventriculomegalia, the unevenness of the outlines of vascular interlacement, dust devil in the occipital horn of the lateral ventricle

ПЕРВИЧНОЕ СУБАРАХНОИДАЛЬНОЕ КРОВОИЗЛИЯНИЕ

- frequency ~20%, from that 3/4- premature and immature newborns
- Intranatal hypoxia or asphyxia, prematurity, immaturity, coagulopathy
- Course: - **asymptomatic**
 - the syndrome of excitation with hyperesthesia,
acute ВЧГ (stress and the protrusion of large fontanel, the divergence of seams, transitory Greffe Syndrome)
- Sudden spasm on the 2-3 days of life (очаговые клонические for mature babies, atypical for premature)



Ultrasonic picture of the brain of child with the plural cysts on the spot of the centers of the hemorrhages.

Combinaion of ischemic and hemorrhagic defects of the CNS of the nontraumatic nature

- They are encountered considerably more frequently than all enumerated isolated forms of damages to CNS, predominantly in premature babies .
- В/у гипоксия, asphyxia during labor, for premature with low body weight (1000-1500g), defets of first animation, АГ or fluctuatuion system of arterial pressure, coagulopathy, ДВС-syndrome
- These damages are the most chronic.
- Clinical picture depends on the leading defect types of CNS (ischemia, hemorrhage), of severity , localization,
- **Regulative defect of metabolism**

Prenatal Classification of Brain Pathology

0 – 14 days of life:

Asphyxia, hypoxia



- Syndrome of the excitation
- Syndrome of the oppression

More than 2 weeks:

Perinatal encephalopathy

Period:

- acute (1 month),
- stopping
(early-till 4-5 mo,
late- up to 1 yr.),
- residual phenomena

Perinatal Hypoxic defect of the brain

- Syndrome of the increased nervous reflex excitability
- Hypertensional-hydrocephalic syndrome
- Vegetative-visceral defect syndrome
- Muscular dystonia syndrome
- Spasmic syndrome
- Depression(depressive) syndrome

Syndrome of the increased nervous reflex excitability

- **Increase in spontaneous motor activity**
- **Restlessness, unmotivated(of unknown cause) weeping**
- **Animation of the innate and tendinous reflexes**
- **Frequent tremor of limbs and chin**
- **Convulsive readiness**

Hypertensive-hydrocephalic syndrome

- Lobular or brachycephaly
- Fast increase in head circumference (more than 1cm in a week)
- Expansion and protusion of the fontanelle
- Opening of seams (arrow-shaped $> 0,5$ cm)
- Graefe's symptom, нистагм, косоглазие
- Muscular dystonia, spontaneous reflex of Moro, срыгивания, tachyarrythmia, tachypное

Vegetative-visceral defect syndrome

- **Combination with one of the behavioral syndromes**
- **Dyskinesia of the GIT (diarrhoea, meteorism, gastro-esophageal reflux-упорные срыгивания)**
- **Rare – defects in heart and respiratory rhythms**
- **Restlessness or weakness**

Syndrome of the oppression

- It is characteristic for premature kids
- Apathy, hypodynamia, general muscular hypotonia
- Hypo-reflection (в т.ч. sucking and swallowing reflexes) - feeding through the probe
- There can be bulbar and pseudo-bulbar disturbances, during excitation

Treatment of hypoxic damages to the CNS(1)

Primary resuscitation:

- the warming of child (radiant heat-, the incubator),
- (A) the release of the upper respiratory tract + is NOT EARLIER than 5 min. after [birth.
Haltage of stomach contraction
- (B) – O₂ therapy (вплоть до ИВЛ 100% O₂ 15-30”),
- (C) - completion ОЦК (физ.р-р, 5% aalbumin, 4% NaHCO₃).

Treatment of hypoxic damages to the CNS(2)

Intensive therapy during the acute stage:

- the optimum regime of the therapy
- **O₂ therapy (mask, ИВЛ),**
- **completion ОЦК (maintenance AD stabilization МЦР),**
- the correction of disturbances **КОС**
- **Hemostatic therapy(викасол),**
- **antioxidants (ГОМК),**
- edema of the brain (diuretics, glucocorticoids, Ca²⁺ channel blockers

Treatment of hypoxic damages to the CNS(3)

Treatment in the early period :

- with edema of the brain (under the control of neurosonography)
- Diuretics according to scheme, Ca channel blockers**
- Sedative therapy(фенobarбитал),**
- the maintenance of the hemodynamics of the brain (ноотропил, glycine, энцефабол, глутаминовая кислота, аминокислот. комплексы),
- maintenance of the hemodynamics of the brain (трентал, кавинтон, циннаризин, оксибрал),
- therapeutic exercise, massage

Outcomes of hypoxic- traumatic damages of CNS

- 4 - 5% - ДЦП, oligophrenia
- 20 - 40% - other:
 - Delay in the rates of physical, mental and vocal development,
 - цереброастенический syndrome with neurosis-like state,
 - scattered очаговые microsymptoms,
 - Moderate intracranial hypertension,
 - Compensated or progressive hydrocephalus,
 - epilepsy

Possible for complete recovery.