

Children with Birth Trauma of the Cervical Spinal Cord and Spine (Obstetric Plexitis) According to the Age Periods

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Abstract

This research reveals information about children with birth trauma of the cervical spinal cord and spine (obstetric plexitis) according to the age. Also, the article discusses the classification of prenatal injuries of the cervical spine is supplemented in the morphological picture. The aim of this study was to improve diagnosis of natal neck injury and its consequences in children of various age groups. The pictures of the cervical spine during execution functional tests made it possible to determine the pathological mobility

between the vertebrae or a whole functional block.

Keywords: children, infants, birth trauma, cervical spinal cord and spine, medicine, diagnosis, treatment, prenatal injuries, age period.

INTRODUCTION

The issues of timely diagnosis and treatment of birth injuries of the central nervous system attract close attention of doctors of various specialties: pediatricians, obstetricians, neurophysiologists, radiation diagnosticians, pathomorphologists, pediatric neurologists and ophthalmologists. Natal injuries of the cervical spine and spinal cord are one of the most serious and poorly studied problems of pediatric neurology. Natal brain and spinal cord injuries are one of the most common causes of infant mortality, minimal damage to the brainstem, vertebral arteries, and cervical spinal respiratory and diaphragmatic centers. The cause of the sudden syndrome children mortalities may be acute circulatory disorders in the spinal cord at the level of the C1-C2 segment. The most significant reported clinical symptoms in sudden infant death syndrome are apnea, choking, convulsions, hypotension and a history of obstructed labor or asphyxiation in the prenatal period.

Children who have undergone natal spinal trauma and have not received adequate therapy are at risk for the development of delayed complications, which include the early development of chondrosis and osteochondrosis, the formation of post-traumatic and degenerative instability of the cervical spine, scoliosis, acute and transient disorders of the spinal cerebral and cerebral circulation.

Taking into account changes, the classification of prenatal injuries of the cervical spine is supplemented in the morphological picture. The characteristics of the main clinical symptoms and syndromes of natal trauma, the signs of birth injuries of the neck, descriptions of symptoms and methods of examination of the neck in children with prenatal CNS are described in the scientific work.

LITERATURE REVIEW

Based on the results of an experimental study, the number of authors have identified and described four mechanisms of perinatal lesions of the spine: rotary, traction-compression, distraction, mixed [1,13,15]. M.K. Mikhailov [8,12] developed a classification of birth injuries of the cervical spine, spinal cord, vertebral arteries and disco-ligamentous structures, taking into account morphological changes. The risk of perinatal neck injury is possible with natural childbirth. The damaging factor, in this case, is the mechanical effect on the fetus when passing through the birth canal [13]. When this creates pressure on the spinal cord and its vessels in vaginal delivery, perinatal neck injury can occur when the fetus's head is over-extended. In addition, additional compression occurs in the anterior head, frontal or facial presentation (A.Yu. Ratner, Malokonova, M.K. Mikhailov [9,12]).

P.V. Rozental restated with significant pressure on the cervical spine, posterior displacement of the occipital bone and wedging of the posterior arch of the atlas into the lumen of the foramen magnum is possible, which can lead to compression of the medulla oblongata and its vessels [14]. R.E. Burns, M. Schneier established correlations between the atlanto-occipital instability (as a result of subluxation) and sudden infant death syndrome [7]. These authors described the phenomenon of "Atlantean inversion", when the posterior arch of the C1 vertebra enters the foramen magnum. For traction-compression injury on the compression side, firstly, the venous plexus and blood vessels and then the bone structures are damaged. In childbirth, such effects are manifested with asynclitic insertion of the fetal head by tilting the neck in the opposite direction and stretching over the head [2,6].

The traction mechanism of perinatal neck injury occurs when using obstetric forceps, vacuum extractor. V.A. Tabolin, P.A. Temin, E.A. Ulezka describe ruptures of the ligaments of the atlantooccipital joint with this mechanism of injury [1,2,3].

The mechanism of vascular damage in perinatal spinal trauma is described in detail. Damaged fragments of osteo-ligamentous structures and soft tissues have a mechanical effect on the adjacent vascular wall,

resulting in deformation of the vessel - depression of one or two walls, followed by narrowing of the lumen or complete overlap. It is possible to develop a circular narrowing of the damaged vessel - segmental or throughout and even stenosis, as a result of thrombosis or compression by a hematoma, a prolapsed cartilaginous disc, bone-cartilaginous fragments of the damaged vertebra. Traumatic dislocations of the vertebrae displace the artery and, regardless of the degree of displacement, deform it. Wherein most often, various combinations of deformities and displacements of the vertebral arteries with their branches are observed. Combinations of displacements and deformities of the vertebral arteries and their branches largely depend on the location of the injury and the nature of the displacement of traumatic elements. So, traumatic dislocations of the cervical vertebrae contribute to the displacement of the vertebral arteries with the formation of an acute angle or push them back with moderate circular narrowing of the lumen throughout, with the development or absence of collaterals [4,5].

M.K. Mikhailov emphasized that the mobility of the vessels in the transverse processes of the lower cervical vertebrae is rather insignificant in comparison with the atlanto-occipital and atlanto-axial intervals, and even a slight dislocation of the lower cervical vertebrae leads to compression of nearby vessels [8,9,10]. According to various authors, the pathology of pregnancy and childbirth is a risk factor for natal spinal injury [5,7,9,11]. For example, during rapid childbirth, the fetus experiences a more significant damaging effect on the part of the uterus and the birth canal of the mother; when discoordination of labor occurs, the need to use obstetric benefits [6,7,8].

RESEARCH METHODOLOGY AND METHODS

The work is based on the analysis of the results of a comprehensive clinical examination of children with clinical signs of prenatal neck injury and its consequences (during the analysis there were 100 patients - 50 basic patients, 50 comparator patient and 30 control patients). According to the data of case histories and outpatient records, all children underwent an analysis of the condition of children. In newborns and children, in the first months of life, the following was assessed: the condition of the skin, the rhythm of respiratory movements, the shape of the chest, the activity of the cardiovascular system, gastrointestinal tract, the posture of the newborn, the presence or absence of convulsive twitching. When assessing neurological status in newborns and children of the first months of life were studied: motor activity, muscle tone, neonatal reflexes, pathological neurological symptoms, a complex of cervical symptoms, cranial innervation. An audiological test was performed, an examination fundus. Changes in the bulbar group of nerves were noted.

Children from 1 year old underwent a general examination, while assessing the condition of the skin, the shape of the chest, the activity of the respiratory, cardiovascular systems and the gastrointestinal tract, an ophthalmological examination was carried out, paying attention to the presence or absence of signs of minimal cerebral dysfunction (headaches, speech disorders, tics, impaired coordination of fine movements, hyperexcitability syndrome), clinical signs of vertebro-basilar insufficiency. In children who have undergone natal spinal trauma, attention was paid to the symmetry of the shoulder girdle, symmetry of the pectoral muscles and upper limbs, soreness of the paravertebral points and spinous processes of the cervical vertebrae, tension of the cervico-occipital muscles, symptom "Pterygoid scapula", "clicking" symptoms in the shoulder joint.

Children who have the conditions of cervical lordosis, muscle tone of arms and legs, proprioceptive reflexes from the hands were studied if there was a history of obstetric paresis. All newborns underwent a lateral X-ray examination of the cervical spine; if it is necessary, transoral images were taken using a standard technique. In addition, the newborns underwent neck ultrasound by the proposed methodology. Children over three years of age underwent a functional X-ray of the neck. If it is indicated, the children were taken pictures of the skull, bones and joints, chest and abdominal organs, cavity. Children over one year of age, if it is indicated, underwent X-ray computed tomography to identify and determine the

severity of prenatal damage to the bone skeleton of the cervical spine of the spinal cord, muscles and other soft tissues, as well as the detection of signs of spinal hypertension, the newborns underwent complex ultrasound diagnostics with functional tests according to our proposed methodology. All newborns underwent neurosonography exclude organic pathology of the brain. Also, for newborn children, the ultrasound examination of the abdomen was performed. X-ray and ultrasound examinations of the neck, ultrasound examinations of the brain, ultrasound examinations of the abdomen, radiographs of the skull, X-ray examination of the brain, radiological examinations of the chest cavity organs were performed.

DIRECTIONS OF METHODS.

1. For the presence of clinical and neurological signs of prenatal CNS injury in newborns after neurosonography, it is necessary to conduct a comprehensive ultrasound examination of the neck according to our method, including an assessment of the sternocleidomastoid muscles and other soft tissues of the neck, cervical spinal cord and spine.
2. For children aged two to six years who have undergone a prenatal neck injury, it is necessary to perform functional ultrasound of the neck in combination with an assessment of the state of soft tissues.
3. For young children who have undergone a prenatal neck injury, ultrasound examination of the neck should be performed during the periods of the formation of the most important motor skills: in the first or second months (keeping the head in an upright position), in the sixth or seventh months (the skill of independent sitting and getting up) and in the eleventh or thirteenth months (beginning of walking).
4. Radiography of the neck in frontal and lateral projections has priority in diagnosing the consequences of prenatal spinal trauma in children over six years of age.

The risk of getting a birth injury increases with complicated labor. But in the course of our research, we found that obstetric benefits were used in only 11 (2.9%) cases in newborns. Our studies have shown that a significant predominance of operative delivery over obstetric benefits did not reduce spinal trauma during childbirth.

Thus, according to our studies, it is predominated among newborns with prenatal neck injury. The babies were born naturally or by Caesarean section and in most cases had a body weight within the physiological norm. 34.5% of cases had complications during childbirth, and the signs of neurotoxic infection were detected in 73.4% of cases.

1. The clinic method.

The analysis of the somatic and neurological status of children suffering from perinatal neck injury was carried out according to case histories and outpatient medical records. When assessing the neurological status in newborns and children of the first months of life (during the analysis there were 100 patients - 50 basic patients, 50 comparator patient and 30 control patients), the following aspects were assessed:

- 1) Locomotor activity, volume and symmetry of movements limbs.
- 2) The state of muscle tone.
- 3) The presence and strength of unconditioned physiological reflexes.
- 4) Pathological neurological symptoms and syndromes as cerebral (hyperexcitability syndrome, depression syndrome), and focal (Gref's symptom, "setting sun", horizontal and vertical nystagmus, anisocoria, paresis, paralysis).

In newborns and children of the first months of life paid attention to general clinical signs that may indicate perinatal trauma:

1. the condition of the skin;
2. the rhythm of respiratory movements;
3. the shape of the chest;
4. the activity of the cardiovascular system;
5. the gastrointestinal tract;

6. the pose of the newborn;
7. the presence or absence of convulsive twitching.

The complex of cervical symptoms was assessed, such as a symptom of “short neck”, an abundance of transverse folds on the neck, tension of the cervicoccipital muscles, symptom of Novik’s “doll hand”, symptom of “doll head”, symptom of “falling head”, symptom of “severe head”, symmetrical or asymmetrical head installation. With clinical signs of CNS trauma, the cranial innervation was studied:

- a) the fundus of the eye was examined;
- b) an audiological test was carried out;
- c) the function of the oculomotor nerves (presence or absence of strabismus, the symptom of the “setting sun”);
- d) the symmetry of the face (Moebius syndrome). Changes in the bulbar group of nerves were noted.

2. Ray method.

Radiographs were performed according to the standard technique, for newborns in lateral and if it is necessary, for patients of the neuropsychiatric department - in two mutually perpendicular projections in the transoral projection with functional tests. X-rays met certain requirements:

- a) the symmetry of the image of the spine on images in direct projection, the location of the spinous processes is strictly along the midline;
- b) the image of the roots of the arches is symmetrical with respect to the midline of spine in the pictures in the lateral projection, the back surface of the bodies;
- c) vertebrae - single-circuit, vertebral bodies and intervertebral discs are displayed separately without overlapping each other. To fulfill these conditions, the direction of the central X-ray beam, which coincided with the radius of curvature of the cervical spine. The central bundle was guided cranially at an angle.
- d) Pictures of the cervical spine during execution of functional tests made it possible to determine the pathological mobility between the vertebrae or a whole functional block. Four images were taken: a conventional image of the cervical spine in lateral projection, an image in a direct projection, an image in conditions of maximum flexion and maximum extension of the neck. The patient was placed in a standing position.
- e) Images of the cervical spine, taken under the conditions of performing functional tests, made it possible to identify the displacement of the overlying vertebrae in relation to the underlying vertebrae both anteriorly and posteriorly and to establish the nature and degree of deformation of the anterior wall of spinal canal.

Radiography of the cervical spine assessed the integrity of bone structures, the presence or absence of dislocations, the severity of cervical lordosis, the volume of functional tests performed, the distance between the lateral masses of the Atlantean, the ratio in the atlantoaxial joint.

An ultrasound examination of the abdominal organs was performed for all newborns upon admission to the hospital and after treatment. Liver scanning was performed with the patient lying on his back from under the right costal arch with transducers of various configurations and frequencies. An intercostal approach was used from the front, from the side along the axillary lines, from the back through the right kidney. The contours, structure, echogenicity of the parenchyma, oblique size of the right lobe of the liver were assessed. The study of the gallbladder consisted in assessing the shape and size (provided that the gallbladder did not have time to contract).

The structure, echogenicity of the parenchyma, size were evaluated. The spleen was scanned along the intercostal space between the anterior and middle axillary lines and through the anterior abdominal wall in the left hypochondrium. The contours, structure, echogenicity of the parenchyma, and sizes were assessed. We examined the kidneys through the anterior abdominal wall and from the side. The displacement of the

kidneys, contours, structure, echogenicity of the parenchyma, and the state of the calyx-pelvic system were assessed. We determined the right adrenal gland along the anterior axillary line when scanning through the liver scan projection, the height and width were measured. The thickness of the gland was measured with the transverse position of the probe in the epigastrium. The left adrenal gland was examined when the sensor is positioned between the anterior and middle axillary lines along the intercostal space. The contours, structure, echogenicity of the parenchyma, and sizes were assessed.

ANALYSIS AND RESULT

The goal is to identify coping mechanisms, ways to overcome difficulties in various areas of mental activity, coping strategies.

The procedure for conducting. The subject is offered 50 statements regarding behavior in the difficult life situation. The test subject should evaluate how often these behaviors appear:

- never - 0 points;
- rarely - 1 point;
- sometimes - 2 points;
- often - 3 points

Processing results:

1. the sum of points for each subscale;
2. calculation by the formula: $X = \text{sum of points} / \text{max score} * 100$
3. or:

0-6 - low level of tension, speaks of adaptive coping;

7-12 - average, adaptive personality potential in the borderline state;

13-18 - high intensity of coping, indicates a pronounced maladjustment.

According to the effectiveness of treatment, associate with this test, which assesses the psychological status of the mother. With a positive mood, treatment measures are more effective than with depression, anxiety, etc.

ANSWER OF COPING TEST OF R. LAZURUSA

	In a difficult situation, I ...	Never	Seldom	Sometimes	Often
1	... focused on what I needed to do next - the next step	0	1	2	3
2	... started doing something, knowing that it wouldn't work anyway, the main thing is to do at least something	0	1	2	3
3	... tried to persuade superiors to change their minds	0	1	2	3
4	... talk with others to learn more about the situation	0	1	2	3
5	... criticized and reproached myself	0	1	2	3
6	... tried not to burn bridges behind him, leaving everything as it is	0	1	2	3
7	... hoped for a miracle	0	1	2	3
8	.. resigned myself to fate: it happens that I have not luck	0	1	2	3

9	... acted like nothing happened	0	1	2	3
10	... tried not to show my feelings	0	1	2	3
11	... tried to see something positive in the situation	0	1	2	3
12	... slept more than usual	0	1	2	3
13	... to vent my frustration on those who brought me problems	0	1	2	3
14	... looked for sympathy and understanding from someone	0	1	2	3
15	... I felt the need to express myself creatively	0	1	2	3
16	... tried to forget it all	0	1	2	3
17	... turned to specialists for help	0	1	2	3
18	... changed or grew as a person in a positive direction	0	1	2	3
19	... apologized or tried to make amends	0	1	2	3
20	... made a plan of action	0	1	2	3
21	... tried to give some outlet to my feelings	0	1	2	3
22	... realized that she herself caused this problem	0	1	2	3
23	... gaining experience in this situation	0	1	2	3
24	... spoke to anyone who could specifically help with this situation	0	1	2	3
25	... tried to improve their well-being by eating, drinking, smoking or medication	0	1	2	3
26	.. risked recklessly	0	1	2	3
27	... tried to act not too hasty, trusting the first impulse	0	1	2	3
28	...found new faith in something	0	1	2	3
29	... rediscovering something important	0	1	2	3
30	... changed something so that everything was settled	0	1	2	3
31	... generally avoided communication with people	0	1	2	3
32	... did not allow this to happen, trying not to think about it especially	0	1	2	3
33	... asked for advice from a relative or friend whom he respected	0	1	2	3
34	... старался, чтобы другие не узнали, как плохо обстоят дела	0	1	2	3
35	.. refused to take it too seriously	0	1	2	3
36	... talked about how I feel	0	1	2	3
37	... stood his ground and fought for what he wanted	0	1	2	3
38	... took it out on other people	0	1	2	3
39	... used past experience - I had to get into such situations before	0	1	2	3

40	... knew what to do and redoubled his efforts to get things right	0	1	2	3
41	... refused to believe it really happened	0	1	2	3
42	... I made a promise that next time everything will be different	0	1	2	3
43	... found a couple of other ways to solve the problem	0	1	2	3
44	... tried that my emotions did not interfere too much with me in other matters	0	1	2	3
45	... changed something in myself	0	1	2	3
46	... I wanted it all to be somehow formed or ended	0	1	2	3
47	... imagined, fantasized how it could all turn out	0	1	2	3
48	... prayed	0	1	2	3
49	.. was running through my mind what to say or do	0	1	2	3
50	... thought about how the person I admire would act in this situation and tried to imitate him	0	1	2	3

CONCLUSION

1. The symptoms of the consequences of prenatal neck injury are limitation of the mobility of the cervical spine and dislocation of the cervical vertebrae, and in children older than a year - instability of the cervical segments, the absence of cervical lordosis - as signs of emerging chondrosis.

2. Statistically reliable clinical signs of a previous prenatal neck injury in full-term infants are: muscle hypertonia, decreased motor activity, suppression of the sucking reflex; in premature babies - muscular hypotonia, suppression of reflexes, decreased motor activity, and in young children - residual damage to the central nervous system, delayed speech and psychomotor development.

3. Algorithm of newborns and young children with prenatal lesions of the central nervous system should include, in addition to neurosonography, ultrasound examination of the neck with an assessment of the state of soft tissues, cervical spinal cord and spine, and the head and neck should be performed only if a bone fracture is suspected.

PRACTICAL RECOMMENDATIONS

1. Absolute indications of the neck should include: the presence of pathological neurological symptoms (general cerebral and focal), symptoms of cranial nerve damage, decreased motor activity, asymmetry of limb movements, changes in muscle tone, decreased or suppressed reflexes of the neonatal period. Relative indications: low and extremely low body weight at birth, pathology during childbirth

(large fetus, umbilical cord entanglement around the neck, difficult removal of the shoulders, rapid labor, leg, breech or breech presentation, transverse position of the fetus), pathology of pregnancy (intrauterine infections, the threat of termination of pregnancy, chronic placental insufficiency).

2. In order to identify natal spinal trauma and assess the dynamics of treatment of prenatal neck lesions in newborns and children under 12 months of age, it is advisable to conduct ultrasound examination of the neck organs, from 13 months to three years - functional ultrasound. Children over three years old - X-ray ultrasound examination of the neck.

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