

Osteopathic treatment of hypertensive-hydrocephalic syndrome
in children of the first three months of life

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SUMMARY

A comprehensive examination (NSG, ultrasound of the cervical and lumbosacral spine, blood flow through the main vessels of the head, neurological status) and treatment of 120 children in the first three months of life with hypertensive-hydrocephalic syndrome. Comparison of the main clinical, neurosonographic and osteopathic changes in the main group, who received only osteopathic treatment, with similar indicators of the comparison group receiving allopathic treatment.

We have taken a complex examination (neurosonography, US-signs of jugular and lumbar-sacral of "vertebral column, blood circulation of the vessels of the brain, neurological status) and have treated of 120 first three months babes with hypertensivehydrocephalic syndrome. The comparison of the main clinical, US-signs and osteopathic changes in the main group which had got osteopathic treatment only with the same characteristics of the control group having got allopathic treatment.

In modern literature, much attention is paid to craniosacral therapy in the treatment of various pathologies in adults and children, but many problems of neonatology have not yet been properly studied and elucidated [1; 2; 3]. Determination of disorders at the level of the craniosacral system that occur during labor is a prerequisite for identifying the causes of various pathologies in children, including those in hypertensive hydrocephalic syndrome (HHS), as well as for substantiating the methods of etiopathogenetic treatment.

The purpose of this study is to study the effectiveness of osteopathic methods of early diagnosis and treatment of HGS in children during the first three months of life. The objectives of the study included: analysis of the main factors contributing to the emergence of HGS; assessment of the dynamics of osteopathic manifestations in HGS; comparison of the effectiveness of treatment with osteopathic and allopathic methods.

MATERIALS AND METHODS

Two groups (60 children each) at the age of the first three months of life, full-term, with hypertensive-hydrocephalic syndrome were under observation. The first group - the main one - included children with HGS who received only osteopathic treatment, the second - the comparison group - consisted of children with HGS who were treated according to generally accepted drug regimens. The clinical neurosonographic examination excluded children with structural changes in the brain (developmental anomalies, hemorrhages, ischemia, infections, tumors).

To achieve this goal, the obstetric history of pregnancy and childbirth was analyzed; the peculiarity of the clinic and the development of HGS in a child; identified and evaluated the main clinical, ultrasound and osteopathic changes before and after treatment. To objectify the assessment of the effectiveness of osteopathic treatment, the main clinical, ultrasound and osteopathic changes in the main group were compared with similar indicators in the comparison group.

All children underwent a clinical examination, including the study of neonatological and neurological status with an assessment of the level of psychomotor development according to L.T. Zhurba and E.M. Mastyukova [4].

Osteopathic examination - assessment of the craniosacral mechanism of children was carried out according to generally recognized osteopathic techniques through examination and palpation of the anatomical structures of the craniosacral system, in particular the skull, cervical spine and sacrum [3, 5, 6, 7, 8].

Ultrasound examination of patients with HGS included neurosonography (NSG), trans- and intracranial Doppler ultrasound with duplex scanning of the great vessels of the head; Ultrasound of the cervical and lumbosacral spine. The studies were carried out according to standard methods [9-15]. Neurosonographic examination was carried out for all children during the observation period at least four times: before treatment, after it, at 6 months and at 1 year of age. If indicated, monthly. Ultrasound of the cervical and lumbosacral spine was performed according to the indications: ultrasound of the cervical spine was performed in 35 children of the main group and 36 in the comparison group; Ultrasound of the lumbosacral region - 20 and 17 children, respectively. Assessment of the state of hemodynamics at the subcranial and transcranial levels was carried out selectively.

At 6 months and 1 year of life, follow-up examination of children and comparison of treatment results were carried out.

The biomedical data obtained during the study were processed on an IBM-PC computer using the STATISTICA for Windows software system (version 5.11) [16, 17].

The children of the comparison group received standard conservative treatment, which included dehydration, stimulating, vascular and physiotherapeutic treatment, massage, exercise therapy. The selection of drugs and their doses was carried out individually, depending on the condition of the child, but according to generally accepted methods. Treatment was prescribed and monitored by a neurologist once a month on an outpatient basis.

Children of the main group received only osteopathic treatment, which was carried out differentially, taking into account the pathophysiology of the HGS and the pathobiomechanical disorders we found. Based on global osteopathic concepts [3; 5; 6; 7; 8], the following techniques were used: correction of disorders at the level of the sacrum, correction of the craniovertebral junction and cervical

of the spine, correction of displacements at the level of the occipital bone (Fig. 1), decompression of the SBS, drainage of venous sinuses, membranous occipital-sacral equilibration.



Fig. 1. Correction of displacements at the level of the occipital bone

Osteopathic treatment of children of the main group was carried out no more than once a week. The selection of techniques used at each session depended on the clinical manifestations of the disease and osteopathic disorders. The number of sessions performed was determined by the dynamics of neurological and osteopathic status and varied from five to eight sessions (in severe cases). The treatment terms averaged from one and a half to two months.

RESULTS AND DISCUSSION Comparative analysis of pre- and perinatal risk factors (complications of pregnancy and childbirth) showed that the most frequent (48.33%) cause of this disease in children was pathology of childbirth (fetal traction, extrusion, breech presentation). In many cases, medication-assisted labor stimulation was used and a prolonged period of labor was noted. A third of the children had a large (more than 4000 g) birth weight.

During neurological examination of the main group and the comparison group, the majority of children showed an increase in the rate of head growth in comparison with the age norm and an increase in the vascular pattern on the scalp in 63.33 and 65% of cases, respectively. At the same time, about half of the examined patients showed a non-sharp divergence of the cranial sutures. Attention was drawn to the high frequency of detecting eye symptoms in children in two groups; changes in neuro-reflex excitability and muscle tone were noted (in most cases, in the direction of its increase).

When assessing the psychomotor development of children on the Zhurba-Mastyukova scale, most children showed a significant delay in statomotor functions (22-20 points), and 13 children in the main group and 11 in the comparison group were assigned to the risk group for delayed psychomotor development (24-23 points).

Osteopathic examination in children in the main group and the comparison group revealed a dysfunction of the craniosacral

system, manifested in the slowing down of the rhythm and amplitude of mobility of the SBS and the sacrum. These disorders manifested themselves in the form of SBS compression, which was detected in all children. Two thirds of children: 70 of the main group and 71.67% of the comparison group - had displacements at the level of parts of the occipital bone. Moreover, more often ($P < 0.01$ according to Fisher's criteria and χ^2) there was an anteroposterior displacement of the scales relative to the condylar parts along the transverse axis during compression of the skull in the birth canal (Fig. 2). There was also a rotation of the scales along the anteroposterior axis, which was accompanied by compression of the condylar masses, and rotation along the vertical axis. More than half of the children (58.33 and 60%, respectively) had cervical dislocations with or without rotation. Approximately one third of children (33.33 and 28.33%, respectively) in both groups showed compression at the level of the lumbosacral spine (L5-S1), which was manifested by a violation of the kinetics of the sacrum. The same children were found to have displacements of the sacral vertebrae S1 relative to S2, S2 relative to S3, etc.

During neurosonographic examination of children of the main group and the comparison group, an increase in the width of the lateral ventricles and an increase in the body index of the lateral ventricle were found in all patients. An increase in the third ventricle was observed in 51.67 and 53.33% of children, respectively. The majority of children showed an increase in bone-brain diastasis (63.33 and 61.67%, respectively) and an expansion of the interhemispheric fissure (66.67 and 68.33%).

When conducting ultrasound of the cervical spine in 58.33 children of the main group and 60% of children in the comparison group, displacements of the cervical vertebrae were revealed. In some cases, this led to a decrease in the width of the spinal canal. More often, the displacement of the vertebrae was found at the C3-C4 level (Fig. 3). Ultrasound of the lumbosacral spine revealed in one third of children in both groups (33.33 and 28.33%, respectively) displacement of the sacral vertebrae S1 relative to S2, S2 relative to S3, S3 relative to S4, S4 relative to S5 by 2 mm or more. More often these displacements were detected at the S1-S2-S3 level (Fig. 4).

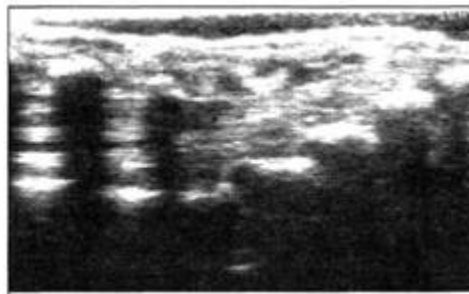
The data of duplex scanning of the main arteries and veins of the head at the extra- and intracranial level show that the greatest changes in children in two groups concerned venous outflow. In 69.57% of children of the main and 72.22% of the comparison group, venous dysgemia in the jugular vein was pronounced. In 47.83% of patients in the main and 44.44% of the comparison group, severe dysgemia in the vertebral veins was also noted. At the level of the cavernous sinus, pronounced changes were noted in 56.52 and 61.11% of children, respectively. Arterial blood flow disturbances were mainly associated with the vertebrobasilar basin. This was manifested in most of the subjects by the asymmetry of the linear blood flow velocity (LFV) in the vertebral arteries (73.91 and 72.22%, respectively) and the asymmetry of their diameter (60.87 and 61.11%, respectively). In the carotid basin, the disturbances were insignificant. Vascular hypoplasia was excluded in all children.



Fig. 2. X-ray of the skull of a 1 month old baby with anteroposterior displacement scales of the occipital bone along the transverse axis, arising from compression of the skull in birth canal



Rice. 3. Ultrasound of the cervical spine of a child 1 month of life. Constriction the spinal canal at the C3 level, caused by the displacement of this vertebra



Rice. 4. Ultrasound of the lumbosacral spine of a child 1 month of age.
Displacements S2, S3, S4 of the sacral vertebrae

The groups of patients (main and comparison group) included in the study by the main indicators (gender, age, anamnesis of pregnancy and childbirth, complaints, results of neurological and osteopathic examinations, ultrasound results) were randomized.

When assessing the dynamics of manifestations of HGS against the background of osteopathic treatment, we used the following concepts: normalization (no complaints; absence of clinical symptoms of HGS; normalization of the size of liquor-containing spaces, confirmed by NSG data; normalization of hemodynamic parameters, confirmed by duplex scanning and USDG data; absence of displacements at the level of the cervical and sacral vertebrae; absence of osteopathic disorders), improvement (decrease in complaints; decrease in size

liquor-containing spaces; improvement indicators hemodynamics; reduction of displacements at the level of the cervical and sacral vertebrae; decrease in the severity of osteopathic disorders), stabilization (lack of dynamics in clinical manifestations, complaints and objective research methods), deterioration (increased clinical manifestations with negative dynamics on the part of instrumental research methods).

In the process of treating children from the main group, in all age groups, there was a decrease in complaints after the first procedure, after the third - a stable improvement in the condition was achieved.

According to the data of the radiological study, the normalization of indicators was noted in the majority of patients (63.33%), in one third of children - a decrease in the severity of US-signs. Only in 10% of patients, US-signs did not change. The increase in these signs was not found in any of the children. The dynamics of the US-signs, shown in Fig. 5, related to the data of the NSG, which was carried out for all children. Ultrasound of the cervical and lumbosacral spine, carried out according to indications, revealed the absence of disorders after osteopathic treatment in all children. According to the results of a duplex study, the normalization of hemodynamic parameters was noted in 73.9% of children, and in the rest - an improvement in these indicators (26.1%). There was no stabilization or deterioration.

On neurological examination, hyperexcitability was noted after the first procedure; normalization occurred after the third. The rate of increase in head circumference decreased after two procedures and returned to normal after four. The spitting up and pulsation of the fontanel decreased after the first procedure and disappeared after the third. The level of psychomotor development according to the Zhurba-Mastyukova scale clearly accelerated after the third procedure and returned to normal after the fifth. In the majority of children, by the end of treatment, the rates of psychomotor development outstripped the age norms. After treatment, the majority of children (70.0%) showed the absence of neurological manifestations of HGS. In 30.0% of patients, there was a decrease in the severity of neurological signs.

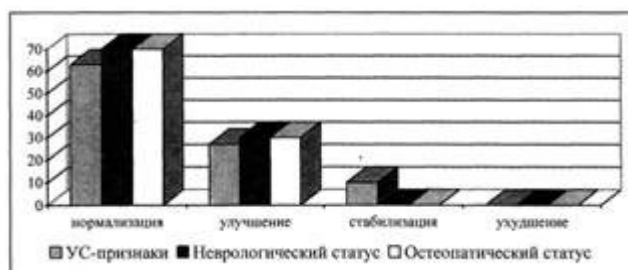


Рис. 5. The effectiveness of treatment in the main group in terms of dynamics

Evaluating the dynamics of HGS manifestations against the background of osteopathic treatment, the data processing revealed a statistically significant dependence of the treatment results on the age of the patients (at $P < 0.001$ according to Fisher's criteria and -2). Our research has shown that the earlier the treatment was started, the better the results were.

The first comparative analysis of the dynamics of HGS in children of the two groups was carried out at 6 months of age. The assessment was related to the presence or absence of complaints, data of the NSH, neurological and osteopathic statuses. It should be emphasized that by the time of the follow-up examination, children from the main group had not received treatment for four months - 15 children, three months - 27 children, two months - 13 children and one month - 5 children. The children of the comparison group continued therapy. During the follow-up examination of children at 6 months of age, according to the NSG data, the results shown in Fig. 6. Neurological and osteopathic examination of children revealed the dynamics shown in Fig. 7. When statistically processing the results of the follow-up examination of children at the age of 6 months, we obtained statistically significant differences ($P < 0$,



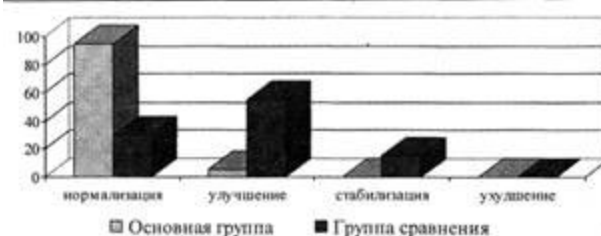
Fig. 6. The effectiveness of treatment according to the dynamics of the US-signs of HGS (follow-up examination at 6 months)



Fig. 7. The effectiveness of treatment in terms of the dynamics of neurological and osteopathic statuses (follow-up examination at 6 months)



Fig. 8. The effectiveness of treatment according to the dynamics of the US-signs of HGS (follow-up examination in 1 year)



Rice. 9. The effectiveness of treatment according to the dynamics of neurological status (follow-up examination in 1 year)

The second stage of dynamic monitoring of HGS in children of two groups was carried out at the age of 1 year of life. The assessment concerned the same indicators as at 6 months, as well as the dynamics of duplex scanning data after treatment. In the period from 6 months of life to 1 year, children of the main group no treatment was received. In the majority of patients in the comparison group, therapy was continued. According to the NSG data, we obtained the results shown in Fig. eight.

Neurological and osteopathic examination of children revealed the dynamics shown in Fig. 9 and 10.

When statistically processing the results of the follow-up examination of children at the age of 1 year, we obtained statistically significant differences ($P < 0.001$ according to Fisher's criteria and -2).

When comparing the results of duplex scanning of the great vessels of the head after treatment, we obtained the following data: the normalization of hemodynamics concerned both venous and arterial components and was 73.9% in the main group and 22.2% in the comparison group. Improvement of hemodynamic parameters in the main group (26.1%) occurred primarily due to the normalization of venous outflow through the jugular and vertebral veins.



Fig. 10. The effectiveness of treatment according to the dynamics of osteopathic status (follow-up examination in 1 year)

Arterial blood flow in the vertebrobasilar basin was well restored. It took a longer time to normalize venous blood flow along the sinus cavernosus and arterial blood flow along the carotid basin. In the comparison group, the improvement (55.6%) concerned more arterial blood flow in the carotid and vertebrobasilar regions. The venous dysgemia of the jugular and vertebral veins regressed more slowly. In the comparison group, hemodynamic disturbances remained the same in 22.2% of children. At

Statistical processing of the results of duplex scanning of the great vessels of the head after treatment in two groups, we obtained statistically significant differences ($P < 0.01$ according to Fisher's criteria and -2).

CONCLUSIONS

During the analysis of the pathophysiological causes of HGS, the predominance of impaired outflow and resorption of cerebrospinal fluid was noted. According to the duplex study, in all children, as a rule, there was a violation of venous outflow both in the jugular veins and in the vertebral veins, which led to difficulty in the circulation and resorption of cerebrospinal fluid. The osteopathic examination revealed the factors leading to the occurrence of these disorders. These are, first of all, displacements at the level of the occipital bone, cervical and sacral vertebrae.

The data obtained allowed us to conclude that the use of the osteopathic method in the treatment of children in the first three months of life with HGS is effective. In 86.67% of cases, the children of the main group recovered completely, in 13.33% there was an improvement in their condition. There was not a single child with negative HGS dynamics. At the same time, the duration of treatment was on average one and a half to two months. In children of the comparison group who received conventional treatment regimens, recovery was noted in 30.0% of cases, improvement - 55.0%, and 15.0% of children stabilized their condition by 1 year. Treatment times averaged five to eight months. The high efficiency of osteopathic treatment was directly related to the possibility of osteopathic techniques to influence the pathophysiology of the process of HGS occurrence.

In the treatment of children of the comparison group, the low percentage of recovery and the long duration of treatment were due to the persistence of the found displacements, which continued to create obstacles for normal blood flow, and therefore for the outflow and resorption of cerebrospinal fluid. This was confirmed by duplex scanning. The preservation of extravasal influences on hemodynamics along the vertebral arteries did not allow normalizing blood flow in these children. In half of the cases, the drugs had to be changed due to reactions to them (agitation, dyspepsia, skin rashes). After the first year of life, two-thirds of the children in the comparison group continued treatment and observation by a neurologist.

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Egorova, I.A. Osteopathic treatment of hypertensive-hydrocephalic syndrome in children of the first three months of life / I.A. Egorova // Traditional medicine. - 2004. - No. 1 (2). - S.41-46.

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