Diagnostics, treatment and prediction of the course of various clinical neurophysiological variants of myofascial pain in children with the consequences of labor cervical spine injury

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SUMMARY

On the basis of a clinical and neurophysiological study of 126 patients with the consequences of a birth injury of the cervical spine in the form of myofascial pain syndrome, variants of spino-bulbospinal activity were identified, which adequately characterize the peculiarities of adaptation of the central nervous system to the influence of the severity of the course of myofascial pain syndrome. The differentiated treatment is described and its prognosis is given depending on the variant of the spino-bulbospinal activity.

THE SUMMARY

On the basis clinic-neurophysiological of research 126 patients with consequences of a patrimonial trauma cervical of a department of a backbone as myofascial pain syndrome are allocated variants spino-bulbo-spinal of activity, which adequately characterize features of adaptation of the central nervous system to influence of weight of current myofascial pain syndrome. Is described differentiated treatment and its forecast is given depending on variant spino-bulbo-spinal of activity.

INTRODUCTION

One fromunderstudied children's problems vertebroneurology are myofascial manifestations of birth injuries of the cervical spine [6; 7; eight]. Despite the exceptional importance of the problem, only the first step has been taken in its study. There have been no special clinical and neurophysiological studies to study the state of segmental and suprasegmental structures of the central nervous system in children with consequences of birth trauma of the cervical spine in the form of myofascial pain syndrome (MBS). The role of the level of nociceptive afferentation from the affected spinal motion segments and affected muscles in the development of various variants of the supraspinal activity of the nervous system. Known hyperreflex, normoreflex and hyporeflex variants of spino-bulbospinal (SBS) activity [2; eleven], which adequately characterize the peculiarities of adaptation of the central nervous system to the influence of nociceptive impulses [16]. Identification of clinical and neurophysiological variants of the functioning of the central nervous system in the aftermath of birth trauma of the cervical spine will justify the differentiated treatment of this contingent of patients and give its prognosis.

PURPOSE OF THE STUDY

The aim of the study was to increase the efficiency of neurophysiological diagnosis and treatment of MBS in children with consequences of birth trauma of the cervical spine.

MATERIAL AND RESEARCH METHODS

The study included 126 patients of the first and second childhood, in whom the known hyperreflex (n = 49),

normoreflex (n = 59) and hyporeflex (n = 18) variants of SBS activity. There were no differences in age and severity of myofascial pain syndrome (VMS) in the compared ones (p> 0.05).

Electrophysiological examination was carried out on the "Neuro-MEP-Micro" electroneuromyograph. The spinobulbospinal reflex (SBR) was caused by irritation of the ipsilateral nerve in the ulnar groove with simultaneous recording of a response from the trapezius muscle [13]. Registration of responses was carried out using cutaneous electrodes. The ground electrode was located proximal to the elbow joint. The active abduction electrode was applied to the most convex part of the trapezius muscle during its active contraction. The reference electrode was placed 2-3 cm distal to the active discharge electrode. The duration of the stimulus was 0.5 ms at a stimulation frequency of 0.1-0.2 Hz. From 5 to 10 reflex responses were analyzed at an analysis epoch of up to 500 ms. The latency (ms), amplitude (mV), area (mV x ms), duration (ms) of the early response of the SBSR were evaluated.

A three-point scale was used to assess the severity of the pathology and the nervous system. The index of muscle syndrome [14] in children was used to determine VMBS. The total score was assessed for the muscles of the cervical spine and shoulder girdle on the side of inducing SBSD.

The research results were statistically processed using the Statistica 6.0 for Windows software packages [1; 15]. The mean (M), standard deviation (Sx) were evaluated. The relationship between VMBD and the parameters of polysynaptic reflexes was assessed using the Spearman's rank coefficient R. The significance of differences in two independent samples was compared using nonparametric statistics using the Mann-Whitney test. The relationship between the scores and the variants of SBS activity was identified using Pearson's chi-square, gamma statistics. To assess the long-term results of treatment, we used an analysis of the life-time data, identifying the duration of remission with the life-span, and the breakdown of remission with its completion (death).

RESULTS AND DISCUSSION

As you can see from the table. 1, electrical irritation of the ulnar nerve caused three variants of SBS activity: I - hyperreflex, II - normoreflex, III - hyporeflex.

Table 1

Indicators of the early component of SBS in patients with different variants of SBS activity

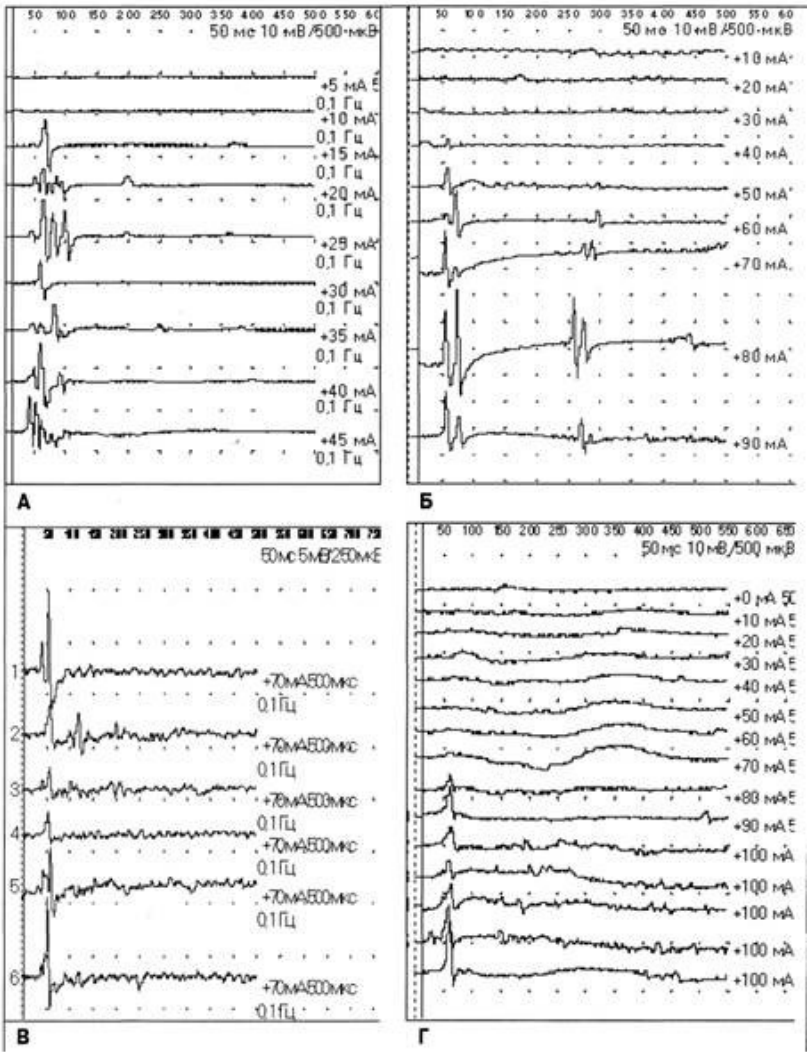
SBSR indicators	SBS activity option			Indicator p		
	I (n = 49)	II (n = 59)	III (n = 18)	1-2	1-3	2-3
Latency, ms	37.0 ± 11.4	42.0 ± 13.6	50.8 ± 11.5	0.041	0.038	0.382
Amplitude, mV	1.4 + 1.4	0.5 ± 0.2	0.2 ± 0.2	0.000	0.000	0.217
Area, mV x ms	12.2 ± 13.2	3.6 ± 1.92	3.9 ± 1.8	0.000	0.000	0.586
Duration, ms	86.1 ± 17.5	55.0 ± 15.9	46.4 ± 10.8	0.000	0.000	0.027

The first - hyperreflex - variant of SBS activity was expressed in the appearance of one, two, and even three powerful high-amplitude responses with a tendency to merge with increasing stimulus intensity (Fig. 1A and 1B). The latency of the early component of the SBSR decreased, the duration, amplitude, and area increased. In children, strong and moderate, direct, significant, correlations between the VIBS and the area, amplitude were established.

SBSR (respectively, r_{xy}= 0.71, p = 0.000; r_{hu}= 0.69, p = 0.000). Apparently, the change in the amplitude-temporal characteristics of the SBSR is associated with the implementation of the reflex, when the activation of interneurons responsible for its implementation occurs. Possible mechanisms for increasing the power and duration of SBSR are an increase in the number of excited interneurons with their multiple repeated excitation during the implementation of the polysynaptic reflex. The reasons for this increase in excitability may be the weakening of inhibitory influences from the reticular nucleus of the thalamus [10].

There is a strong (Pearson chi-square is 71.83, p = 0.000), a weakly expressed relationship (gamma statistics is 0.62) and a moderate direct significant correlation (r_{hu}= 0.38, p = 0.000). A more severe course of MBS is detected in patients with a hyperreflex variant compared with other variants of SBS activity (p <0.05),

In patients with a hyperreflex variant of SBS activity, indicators of the pathology of the nervous system and brainstem symptoms are more pronounced (p <0.05)[5] than in children with other variants, which indicates the role of minimal cerebral dysfunction in the formation of the level of supraspinal reflex excitability. An increase in the level of reflex excitability in them occurs against the background of more pronounced manifestations of minimal cerebral dysfunction, which leads to a more severe course of MBS. Under conditions of weak inhibitory processes, the neurons of the brain stem participating in the implementation of SBS activity take on the properties of generators of increased excitation [4; 12; 13].



Rice. 1. SBSR of the trapezius muscle reflex
A. Hyperreflex variant - one powerful high-amplitude complex arisingat a low threshold of irritation with reduced latency, increased duration.
B. Hyperreflex variant - there are two high-amplitude responses.
B. Normoreflex option.
D. Hyporeflex variant - the appearance of the SBS component in supramaximal stimulation, increased latency and decreased duration.

The third variant of SBS activity, hyporeflex, was characterized by the absence of a late reflex response under standard stimulation conditions (Fig.1D). Only with supramaximal stimuli, a weak response was noted, the latent period of which was longer and the duration was shorter than in the group with the normoreflex type. The emergence of these temporal characteristics is due to a decrease in the reflex excitability of interneurons involved in the implementation of SBSR. Possible mechanisms are a decrease in the number of interneurons involved in the implementation of the polysynaptic response, and their rhythmic activity. Probably, the decrease in polysynaptic reflex activity reflects the reaction of the nervous system, which is characterized by increased inhibition on the part of the descending systems of the reticular formation on the SBSR.

The second - norm-reflex - variant of SBS activity was characterized by intermediate values of latency, amplitude, area and duration (Fig. 1B).

It should be noted that there were no differences in the severity of MPS in the compared groups and the relationship between MPS and variants of SBS activity ($p > 0.05$). These facts deny the dependence of the formation of a variant of SBS activity on the intensity of nociceptive afferentation.

The data obtained on the variants of SBS reflex activity indicate a violation of the state of the brain stem structures in children with the consequences of birth trauma of the cervical spine, regardless of the BMJ.

The division into three clinical and neurophysiological option dictated and differentiated treatment of patients in the groups of comparisons, Correction pathobiomechanical changes was carried out mainly post-isometric muscle relaxation, traction mobilization techniques on the spine [6; nine]. In connection with a more severe course of MBS, more pronounced manifestations of minimal brain dysfunction in children with a hyperreflex variant, homeopathic preparations diskus-compositum, traumeel-S, cerebrum-compositum were used. In the hyporeflex variant, bioresonance therapy (BRT) was used. In patients with hyperreflex variants of SBS, BRT activity was combined with acupuncture to normalize the functional state of the supraspinal structures of the central nervous system using common action points.

The baseline BRT was the same for all patients with hyperreflex and hyporeflex variants of SBS activity. The operating mode of the device for basic therapy: interval (pulse, impact - 3 seconds, pause - 1 second), inversion, low-frequency filter, gain 40, for 3-5 minutes; then a high-pass filter, gain 10, for 1-2 minutes, with hand or foot electrodes. From the 2-3rd procedure, we used a mode of operation without a filter, with an increase from 10 to 20, a therapy time of up to 10 minutes. More often than not, the input electrode corresponded to the highest quadrant measurement, and the output electrode corresponded to the smallest. The shoulder girdle therapy was performed with a small roller

electrode. In the projection of myofascial trigger points and acupuncture points, a point electrode was used with the operation of a device with a high-frequency filter, with an exposure time of up to 60 seconds per point. A feature of BRT in patients with a hyperreflex variant was the effect mainly on general acupuncture points, and with a hyporeflex one - on segmental, local points, the projection of myofascial trigger points.

The analysis of the treatment results was carried out after 14 days. The BMD, vertebral status, and the final indicator of the pathology severity scale were assessed (Table 2). As a result of the treatment, positive dynamics was noted in all groups (p <0.05).

table 2

Results of treatment of patients in the compared groups

Indicators	Result	I (n = 49) group	II (n = 59) group	III (n = 1 8) group
VMBS	BEFORE	24.1 ± 16.5	24.8 + 16.3	19.4 ± 19.4
	After	12.3 ± 9.0 ***	10.9 ± 8.9 ***	8.6 ± 6.4 *
Vertebral manifestations	Before	1.5 ± 0.4	1.5 ± 0.5	1.7 ± 0.6
	After	1.0 ± 0.8 ***	1.1 ± 0.9 **	1.1 + 0.6 **
final grade	Before	2.4 ± 0.6	1.9 ± 0.7	1.3 ± 0.5
	After	1.7 ± 0.4 ***	1.2 ± 0.5 **	0.8 ± 0.5 ***

Note:

in comparison in the group before and after treatment * - p <0.05, ** - p <0.01, *** - p <0.001.

Long-term results were followed in 58 children (n_I= 23, n_{II}= 25, n_{III}= 10), who applied again after treatment within 12 months for exacerbation of MBS.

To identify the effect of SBS variants on reflex activity, the duration of remission in these groups was compared. The significance of the null hypothesis about the correspondence of the functions of the state of remission in groups with different variants of SBS to reflex activity was assessed using Pearson's chi-square (23.37) and the WW-Gehan-Wilcoxon rank test (p = 0.000). A significant difference in the functions of maintaining the state of remission in the compared groups was revealed. There was a significant difference in the functions of maintaining the state of remission between hyper- and norm-reflex variants of the SBS reflex activity according to the WW-Gehan-Wilcoxon rank criterion (WW = -289.0, p = 0.000) and between the hyper- and hyporeflex variants (WW = -69.00 , p = 0.038). The difference between normo- and hyporeflex variants is insignificant (WW = 21,000, p = 0.562). These data confirm the effect of SBS variants of reflex activity on the duration of remission. The state of remission 75% of patients with hyper-, normo- and hyporeflex variants of SBS maintain reflex activity for 160, 250 and 190 days, respectively, while 50% of patients with a hyperreflex variant retain this state for 175 days, with normoreflex - 300 days. with hyporeflex - 200 days, the duration of remission in patients with normoreflex variant is 0.8-1.7 times longer than in patients and other variants of SBS reflex activity.

CONCLUSIONS

1. In children with consequences of birth trauma of the cervical spine in the form of MBS it is advisable to distinguish hyperreflex, norm-reflex and hyporeflex variants of SBS activity, which adequately characterize the peculiarities of adaptation of the central nervous system to the influence of the severity of the course of MBS. Data generation

variants of SBS activity does not depend on the level of nociceptive impulses from myofascial trigger points. An increase in the level of reflex excitability occurs against the background of more pronounced manifestations of minimal cerebral dysfunction, which leads to a more severe course of MBS.

2. A feature of the treatment of patients with a hyperreflex variant of SBS activity is the use of homeopathic medicines, acupuncture and bioresonance therapy with an effect on common points, and in patients with a hyporeflex variant - bioresonance therapy with an effect on myofascial trigger points, segmental and local points.

3. The preservation of the state of remission is influenced by the SBS variant of reflex activity, therefore, patients with a hyperreflex variant of SBS activity should be prescribed a second course of treatment after an average of 6 months, with a hyporeflex one - after 7-8 months, with a normoreflex one - after 9-12 months.

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