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Efficacy Of Combined Decontamination and Neuroprotection in the Treatment of Sepsis in Infants During the First Year of Life

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ABSTRACT

The article presents the results of a study on the effectiveness of sepsis treatment using combined decontamination and enterosuction in young children.

Keywords:

sepsis, treatment, young children

Relevance. In recent years, the phenomenon of bacterial translocation from the gastrointestinal tract, which is the cause of a significant number of hospital infections, has been the subject of close study. Some authors believe that bacterial translocation of intestinal microflora, is the main mechanism of endogenous infection and products of tissue destruction with bacteria enter the bloodstream, a significant part of them is eliminated from the body through the intestine due to the function of small intestine bocalytic cells secreting mucus. Under conditions of a rich nutrient environment, one or another microorganism can multiply intensively in the small intestine.

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One of the key links in the pathogenesis of sepsis is endogenous intoxication as a typical pathological process in sepsis, i.e., the accumulation of endogenous toxic substances is an integral component of generalized infection. Loss of function of detoxification systems in PON entails the progression of

endotoxemia and worsening of gas exchange disorders, including in the detoxification organs themselves, thus closing the vicious circle of thanatogenesis in sepsis. Detoxification therapy is a determinant of the effectiveness of therapy in sepsis.

The decisive factor in the complex of therapeutic measures in sepsis is antibiotic therapy, but the direct toxic effect of antibiotics on the epithelium and reticuloendothelial stroma of the intestinal mucosa also leads to the development of intestinal dysbiosis. In addition, in sepsis in the gastrointestinal tract enzymatic hydrolysis, absorption, secretion, metabolism, as well as sorption processes that primarily protect the internal environment of the body from toxic metabolites are disrupted. Consequently, bacterial translocation is a pathophysiological link that supports and exacerbates the inflammatory process in sepsis in young children. Enterosorbents, binding toxic substances, including bacterial toxins and metabolites in the lumen of the intestine, thereby interrupting the processes of their

recirculation, reducing the toxic and metabolic burden on all organs and systems of the body.

Objective of the study: To evaluate the combined use of selective decontamination and enterosorption in the treatment of sepsis in young children.

Materials and methods of investigation.

The study presents an analysis of the results of examination and complex treatment of 246 infants with purulent-inflammatory diseases at the age of 1 month to 1 year undergoing hospital treatment at the clinic 2 of Samarkand State Medical Institute.

Of the total number of patients there were 109 children with septicemic form of sepsis and 54 children with surgical sepsis.

Clinical and laboratory signs revealed in the course of our study indicate profound homeostasis disorders in children of the first year of life with sepsis, associated with endogenous intoxication, impaired immune status and autonomic regulation of the patient's body. Taking this into account, when treating children with sepsis we used an improved comprehensive etiotropic and detoxification therapy. They were carried out in addition to the conventional use of protease inhibitors, antioxidants, antihistamines, etc. The complex of etiotropic and detoxification therapy included:

1) rational antibacterial therapy; if it was inadequate, the effectiveness of the entire complex treatment was short-lived and unsuccessful due to the depletion of the body's protective reserves;

2) surgical sanitation of the focus of infection in septicopyemic form of sepsis;

3) sanitation of the intestine in order to prevent hypercolonization and penetration of toxins into the internal environment of the body by conducting a combined decontamination of the intestine;

3) application of UVB with antioxidant activity and property to neutralize endogenous and microbial toxins in the blood, and simultaneously application of enterosorption, which helps to neutralize and bind toxins in the intestinal lumen;

4) elimination of toxins from the body by adequate support of functions of organs performing detoxification processes (liver, kidneys, intestines, lungs).

As antibiotic therapy for combined intestinal decontamination, antibiotics that were not absorbed from the gastrointestinal tract and acted only on opportunistic pathogenic flora, preserving bifido- and lactoflora were used. Such antibiotics included ersefuryl, funistatin, and also used metronidazole, with elevated PLA values. To prevent the development of resistant flora, these antibiotics were used in courses of 5 days each (3 courses in succession). The duration of selective intestinal decontamination was determined by the results of bacteriological and microscopic examination of feces in children with sepsis. Enterosorption was performed with Smecta at the rate of 12-15 ml of dissolved powder, 3 times orally, 1 hour after taking medication and food. Duration of enterosorption was determined by elimination of clinical and laboratory signs of intoxication and averaged 10-15 days.

A significant factor in the pathogenesis of sepsis in children of the first year of life has been found to be ANS dysfunction based on hypoxic CNS lesions in the ante- and intrapartum period. In this regard, the use of a cerebroprotective drug of peptide structure Actovegin is the basis of pathogenetic correction aimed at the normalization of neurovegetative regulation. Actovegin was administered at the rate of 0.3-0.5 ml/kg by intravenous stream for 10 days. This therapy was administered to 56 patients, who constituted the first subgroup.

To determine the effectiveness of combined decontamination of the intestine and actovegin were used clinical analysis of the general state of patients and indicators of endotoxemia, indicators of autonomic support and immunoreactivity. The obtained results were compared with the comparison group, which received conventional baseline therapy.

The results of the study of ASL to pathogens in the blood of patients in the dynamics of the therapy are presented in Table 1. As a result of the conducted therapy, the

mean values of the above indexes in Group 1 differ with high significance from the initial values, being characterized by a 2-3-fold decrease of the ASL contents for all types of pathogens (P<0.001). There was also marked a significant decrease of these indexes in comparison with the control group. It should be noted that the ASL content decreased with respect to some pathogens (Streptococcus (P<0,05), Klebsiella (P<0,01)) also after conventional therapy.

Consequently, as a result of the therapy performed in children of the first year of life with sepsis, there is a decrease in the antigenic load, as evidenced by a significant decrease in the ASL content for almost all pathogens. Although these values did not reach normal values, they were 2-3 times lower than in the group of patients who received conventional therapy.

Table 1
Content of circulating ASL to sepsis pathogens in infants at CDC, % (M±m)

ASL to pathogens	Control, n=30	Before treatment, n=129	After treatment	
			First subgroup, n=56	Comparison group (after treatment) n=38
Staphylococcus	2,3±0,4	12,9±0,6***	4,6±0,3* **^^^	11,7±0,2 ***°°°
Streptococcus	1,8±0,2	8,9±0,8***	3,8±0,7* **^^^	7,4±0,7** *°°°
Klebsiella	1,5±0,1	16,8±0,5**	5,6±0,3* **^^^	14,8±0,6 ***^^°°°
Proteus	1,7±0,3	14,3±0,9***	7,0±0,1* **^^^	12,7±0,8 ***°°°
Pseudomonas bacillus	1,3±0,04	15,2±0,8***	4,9±0,2* **^^^	14,7±0,5 ***°°°
Candida fungi	1,9±0,5	22,8±0,6***	12,2±0,4 ***^^^	22,5±0,7 ***°°°

Note: * - differences relative to the data of the healthy group are significant (** - P<0.001), ^ - differences relative to the data of the group before treatment are significant (^^ - P<0.01, ^^ - P<0.001), ° - differences relative

to the data of Group 1 are significant (°°° - P<0.001).

When studying the indices of endogenous blood intoxication in children of the first year of life of the first subgroup, in contrast to the patients of the comparison group, a favorable dynamics was observed (Table 2). Thus, on day 10 of combined decontamination and actovegin administration, the serum MSM content in the first-year old children of this group was significantly lower than that in the group of children who received basic therapy (P<0.05).

It is known that chromatographic study of protein composition of chyme in the intestinal contents of children with purulent-septic diseases is dominated by MSM proteins. Apparently, its level in the blood largely depends on the state of the intestine, in particular, intestinal hypercolonization, contributing to an increase in MSM content in the lumen and may be a link in the mechanism of endotoxemia, including in sepsis. It is quite logical that as a result of combined decontamination of the intestine the content of MSM in the intestinal lumen decreases, which leads to a decrease in their levels in the blood.

Table 2
Indices of endogenous intoxication in children with sepsis at application of CDC and neuroprotection (M±m)

Endotoxemia indicators	Control, n=30	Patients with sepsis			
		Before treatment, n=106	First subgroup, n=56		Comparison group (after tramadol therapy), n=38
			On day 10-12 of treatment	After treatment	
MSM units.	0,25±0,02	0,52±0,01**	0,31±0,02* **	0,24±0,01* ^	0,37±0,03** *

CEC units	1,04±0,02	3,1±0,1**	2,5±0,09*	2,1±0,04***^	3,5±0,14***°
PTC, units.	27,5±1,1	47,2±2,5**	31,2±2,4**	28,1±2,7^^^	49,3±1,4***
LII, units.	1,96±0,18	4,51±0,41***	3,5±0,43**	2,3±0,23^^^	4,4±0,15***°

Note: * - differences relative to the data of the healthy group are significant (* - P<0.05, ** - P<0.01, *** - P<0.001), ^ - differences relative to the data of the group before treatment are significant (^ - P<0.05, ^^ - P<0.01, ^^ - P<0.001), ° - differences relative to the data of group 1 are significant (° - P<0.01, °° - P<0.001),

The content of CIC in the first subgroup of patients in comparison with the indicators before treatment decreased in 1,4 times (P<0,001), and in comparison with the results of the group with traditional therapy after treatment - in 1,5 times (P<0,001). However, in comparison with the results of healthy children, the level of circulating immune complexes in the blood of the patients in groups 1 and comparison group was still 2,2 and 3,4 times higher (P<0,001). In the first subgroup, the initial indexes of blood toxicity and LII statistically significantly decrease by 1.7 and 1.9 times, and reach normal values, but in children of the first year of life of the comparison group, these indexes only tend to decrease and reliably exceed the normal values by 1.8 and 2.2 times, respectively.

In the first subgroup of patients after the treatment there was a significant decrease in the index of spontaneous agglomeration of leukocytes in comparison with the results before treatment and in comparison group after treatment (P<0.001 in each case), which is an indirect sign of decrease of inflammatory activity in a patient (Table 3).

Table 3

Dynamics of PSAL and IJSN in children during treatment of sepsis with CDC (Mm) (n=40)

parameter norm	before treatment n=20	First subgroup, n= 56		Comparison group (after tramadol therapy), n=38
		Day 10-12	After treatment	
PSAL 3,72±0,12 (n=25)	13,1±0,5 P<0,001	11,3±0,6 P<0,001	7,1±0,5 P<0,001	10,7±0,65 P<0,001
YASN 2,67±0,04 (n=25)	2,35±0,03	2,29±0,04	2,45±0,03	2,41±0,04

Note: Where P is the index of reliability of differences in comparison with the norm, P1 is the reliability of differences in comparison with baseline data

Table 4 Indicators of cardiointervalography in patients depending on treatment method

CIG indicators	Control, n=38	The first subgroup, n=56		Comparison group (after tramadol therapy), n=38
		исходные данные	After treatment	
Mo, sec.	0,46±0,02	0,38±0,01*	0,38±0,01*	0,42±0,01
AMo, %	44±1,9	61±3,74**	62±2,7**	63±3,6**
Δx, сек.	0,32±0,006	0,032±0,006***	0,039±0,003***^	0,041±0,02***°
ИИ, units.	478±17	2501±261***	2381±257***	2137±237***

Note: * - differences relative to the data of the healthy

group are significant (* - $P < 0.05$, ** - $P < 0.01$, *** - $P < 0.001$), ^ - differences relative to the data of the group before treatment are significant (^ - $P < 0.05$), ° - differences relative to the data of Group 1 are significant (° - $P < 0.05$).

Analysis of the effect of combined decontamination and actovegin on the state of tension of adaptive mechanisms according to CGI in children of the first year of life with sepsis showed (Table 5.4) that such treatment tends to increase the values of AMo and Δx , as well as a decrease in the IN value with a parallel, although slight, decrease in the value of Mo. Nevertheless, during the treatment of sepsis, the achieved values of CIG differ significantly from the normative values. The difference is due to lower Mo values in patients ($P < 0.05$), higher AMo values ($P < 0.001$), and IN ($P < 0.001$), and lower Δx values in patients ($P < 0.001$).

Although combined decontamination and actovegin have a positive effect on the indicators of adaptive reactions in the body during treatment, this is not fully achieved, which is quite logical, since the severity of the disease still retains its certain level due to the activity of a number of pathophysiological processes that may affect the state of adaptive mechanisms, which is confirmed by the preservation of hypersympathicotonia in the examined children.

Conclusions.

Thus, the use of a new tactic of antibiotic therapy, the distinguishing features of which are sparing attitude to the formation of bifido- and lactoflora, active management of endogenous intestinal flora by application of selective gut decontamination and combined use of enterosocial therapy and inclusion of neuroprotective therapy actovegin, can eliminate hypercolonization, prevent excessive antigen overload and restore the natural

detoxification function of the gut, raise adaptive One of the advantages of this method is that it is not the prerogative of specialized clinics, it can be applied at the periphery as well.

It should be noted that among 54 patients who received combined intestinal decontamination and actovegin, the positive response to the applied treatment was observed in 92.8% of patients. Lethality in this group of patients was 7.14%.

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