INFLUENCE OF OZONE THERAPY ON FETAL CONDITION IN COMMUNITY-ACQUIRED PNEUMONIA DURING PREGNANCY

Khodzhibaeva G.A., Kurbanov D.D., Mukhamedova S.S.
Republican specialized Research Institute of Obstetrics and Gynecology, Uzbekistan

We conducted a comparative analysis of ozone therapy effectiveness in treatment of community-acquired pneumonia in 76 pregnant patients, basing on fetal echocardiogram and Doppler ultrasound of uterine-fetal-placental condition. All pregnant women underwent standard anti-pneumonia treatment, 40 of them received ozone therapy. The study showed, that ozone therapy as a part of a general therapy for community-acquired pneumonia has an antihypoxic effect: it advances oxygen-transfer into the tissues with insufficient blood supply, increases tissue respiration and normalizes blood flow. As a result, uterine-fetal-placental blood flow improved, values of blood flow velocity showed no reliable, statistically significant difference from control group. Values of the fetal echocardiogram also proved a better fetal condition after the ozone treatment.

Community-acquired pneumonia (CAP) is currently one of the most common forms of lung infections during pregnancy.

In Uzbekistan, the incidence of community-acquired pneumonia tends to grow particularly among the pregnant patients. Dynamic maternal mortality from acute pneumonia of unclear etiology increased from 10% in 2001 till 39% in 2003 [6].

It is obvious, that antibacterial therapy does not always guarantee a successful treatment of pneumonia, and should generally include some medical measures aimed at stimulating protective and adaptive body reactions.

One of such methods is medical ozone therapy that let in many cases avoid or considerably reduce the use of medications, which are harmful during pregnancy [2,3,5]. But the effectiveness of the ozone therapy against pneumonia in pregnancy, combined with other detoxication methods, has not been sufficiently studied yet, and requires further research.

Objectives of the study

The aim of our research is to improve the treatment of the community-acquired pneumonia in pregnancy with the help of medical ozone therapy.

Materials and methods

We examined and treated 76 pregnant patients with community-acquired pneumonia, who were divided in two groups depending on the therapy methods. The main group consisted of 40 pregnant women with community-acquired pneumonia of medium severity, who received ozone treatment as a part of the general anti-pneumonia therapy. The comparison group included 36 pregnant women with community-acquired pneumonia, who did not receive ozone treatment. All pregnant women suffered from community-acquired pneumonia of medium severity. The control group included 30 nominally healthy patients with intact pregnancy.

The pregnant women were examined using standard pneumonia research methods. Fetal-placental condition was evaluated by means of fetal echocardiogram and Doppler ultrasound of uterine-placental-fetal blood flow. The pregnant patients were examined at 28-30 weeks and at 38-40 weeks, to determine index of vascular resistance (IVR) – resistance index (RI), pulse index (PI), systolic-diastolic ratio (SDR). Ozonized physiological solution was prepared using equipment “Quaser-II” (Russia, Nizhny Novgorod). Ozone concentration was 0,8 mg/l/kg, in 200 ml of 0,9% physiological solution. The patients attended 6-10 treatment sessions.

Results

In 76% of pregnant patients with community-acquired pneumonia, chronic intrauterine fetal hypoxia of varying severity was diagnosed before treatment (table 1).

Table 1. Influence of ozone treatment on fetal echocardiogram values in pregnant patients with community-acquired pneumonia of medium severity (M±m)

Index	Control group n=30	Pregnant patients with CAP **before treatment** n=76	Pregnant patients with CAP **after treatment**	
			Comparison group n=36	Main group n=40
Average basal rate, BPM	140±1,1	143,0±3,1	143,1±1,1	141,1±1,2
Average duration of stable rythm (min)	18,3±2,3	29,6±1,3	24,5±2,1*	22,6±0,68*
Average number of slow accelerations (SA)	13,5±0,7	1,2±0,6	9,6±0,3*	9,9±0,6*
Average amplitude of slow accelerations (BPM)	24,1±0,6	6,3±1,2	17,3±1,3*	16,5±1,2*
Total duration of slow accelerations (min)	0,8±0,03	0,4±0,02	0,7±0,39*	0,7±0,02*
Average number of decelerations	0,1±0,09	1,3±0,4	0,3±0,04	0,1±0,02*^
Total duration of deceleration (min)	0,2±0,1	1,6±0,6	0,6±0,2*	0,4±0,3*^
Average value of fetal echocardiogram	8,4±0,17	1,6±0,31	6,1±0,36*	6,7±0,37*^

Note: * - P<0,05 reliable difference from initial values; ^ - P<0,05 reliable difference from comparison group after treatment

Table 1 shows, that patients in the study groups had apparent fetal hypoxia before treatment.

Ozone therapy had a positive effect on fetus. Fetal echocardiogram index varied within the limits close to normal. The frequency, amplitude and total duration of slow accelerations increased reliably (till 9,6±0,3 BPM, P<0,001). Fetal echocardiogram index raised from 1,6±0,31 till 6,7±0,37, which is typical for a satisfactory fetal condition.

Similar results were obtained after Doppler sonography (table 2).

Before treatment, we observed deceleration of blood flow in uterine artery, umbilical artery and fetal middle cerebral artery in pregnant patients with community-acquired pneumonia of medium severity.

After basic anti-pneumonia therapy, the pregnant patients with community-acquired pneumonia of medium severity had still changes in blood flow. Despite lower values in comparison with the initial condition, this blood flow changes resulted in higher vascular resistance (RI right 0,44±0,01 and left 0,45±0,01) compared with the main group (RI 0,39±0,03 and 0,42±0,04).

Other values of blood flow velocity also tended to fall (PI - 0,61±0,01; S/D - 1,82±0,02), but were different from the values in the main group (PI - 0,56±0,02; S/D - 1,64±0,01). This proves, that women in comparison group continued to have decelerating blood flow compared with the main group.

Disrupted blood flow in pregnant patients with pneumonia recovered after standard anti-pneumonia treatment in only 2/3 of the patients, though they received minimum two 2 courses of treatment against fetoplacental insufficiency with Actovegin and preparations for better uterine-placental blood flow – kurantil, vitamin E, heparin and fraxiparin.

Table 2. Influence of ozone treatment on values of Doppler ultrasound of uterine and fetal vessels in pregnant patients with community-acquired pneumonia of medium severity (M±m)

Index		Control group n=30	Pregnant patients with CAP before treatment n=76	Pregnant patients with CAP after treatment	
				Comparison group n=36	Main group n=40
a. Uterine					
Dext ra	PI	0,54±0,01	0,86±0,01	0,61±0,01*	0,56±0,02*^
	RI	0,38±0,01	0,55±0,01	0,44±0,01*	0,39±0,03*^
	S/D	1,69±0,02	2,2±0,02	1,82±0,02*	1,64±0,01*^
Sinistra	PI	0,56±0,01	0,93±0,01	0,63±0,01*	0,58±0,01*^
	RI	0,41±0,01	0,58±0,01	0,45±0,01*	0,42±0,04*^
	S/D	1,73±0,02	2,4±0,02	1,86±0,02*	1,75±0,01*^
Umbilical artery					
PI		0,87±0,01	1,21±0,01	0,98±0,01*	0,89±0,01*^
RI		0,57±0,01	0,71±0,01	0,63±0,01*	0,58±0,02*^
S/D		2,36±0,02	3,51±0,02	2,73±0,02*	2,47±0,01*^
Fetal middle cerebral artery					
PI		1,84±0,01	1,08±0,01	1,26±0,01*	1,74±0,03*^
RI		0,82±0,01	0,67±0,01	0,70±0,01*	0,78±0,01*^
S/D		5,81±0,02	3,06±0,02	3,40±0,01*	5,77±0,01*^

Note: * - P<0,05 reliable difference from initial values, ^ - P<0,05 reliable difference from comparison group after treatment

Women in the main group had better uterine-fetal-placental blood flow values by the end of the ozone treatment in hospital. Their blood flow velocity values did not statistically differed from the values in the control group.

The study showed, that ozone therapy as a part of the general treatment for community-acquired pneumonia has an antihypoxic effect. It advances oxygen-transfer into the tissues with insufficient blood supply, increases tissue respiration and normalizes blood flow.

References

1. Avdeev S.N., Chuchalin A.G. Severe community-acquired pneumonia.- Russian Medical Journal.- 2001.- Vol. 9.-№5.- p.177-178

2. Usacheva O.N. Medical ozone in treatment for toxemia of pregnancy. Doctoral dissertation. – Nizhny Novgorod, 1996.

3. Zmyzgova A.V., Maksimov V.A. Clinical aspects of ozone therapy. – Moscow, 2003, 287 p.

4. Nazarenko G.I., Antipin A.N., Novikov Y.K. Antibacterial therapy of community-acquired pneumonia // Pulmonology.-2004.-№1.- p.60-66

5. Preventive use of ozone and prognosis for prenatal infection in infants after pyelonephritis during pregnancy / I.N. Korotkikh, I.V. Verkhovikh, N.A. Starokozheva, I.A. Sharapova // Journal of medical theory and practice. – 2006. – Vol. 4, Nr. 2. – p. 197-200.

6. Yusupova M.A. Immune state of pregnant women with acute community-acquired pneumonia // News of dermo-venereology and reproductive health.- Tashkent.-2004.-№4.- p.75-78