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THE MECHANISM OF DEVELOPMENT OF LIVER DYSFUNCTION IN PREGNANT WOMEN WITH PNEUMONIA

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ABSTRACT

The aim of this study is to analyze the course and outcome of pregnancy in women with acute onset of hepatic cell failure developed after the pneumonia. To achieve this aim retrospective analysis of 78 pregnant women with the appearance of the first signs of liver and jaundice dysfunction was conducted. The results of the retrospective analysis of course and outcomes of pregnancy in woman with pneumonia showed complications as a severe impairment of liver function with the development of encephalopathy and coagulopathic bleeding and multiple organ failure and led to high rates of maternal and perinatal mortality.

KEYWORDS: Pregnancy, pneumonia, liver pathology, liver insufficiency, maternal mortality.

INTRODUCTION

The study of the liver function in pregnant women is important in connection with the adverse effect of liver dysfunction on the course and outcome of pregnancy, perinatal and maternal morbidity and mortality. Diseases that cause impaired liver function in pregnant women are divided into 2 groups: occurring only during pregnancy - pregnancy cholestasis, impaired liver function with preeclampsia, acute fatty degeneration of the liver; occurring outside pregnancy - cholelithiasis, viral hepatitis.[1,2,3]

Hepatic cell insufficiency syndrome (HCIS) is a symptom complex that complicates the course of liver diseases. Hepatic cell failure (HCF) is a clinical syndrome characterized by the sudden development of severe liver dysfunction in a healthy person before that. In most cases, HCF occurs due to acute liver damage of a viral or drug etiology. In patients with HCF, cardiovascular, respiratory and liver failure may develop.[4,5,6,7]

The results of this study showed that severe impairment of liver function with the development of encephalopathy and coagulopathic bleeding and multiple organ failure led to high rates of maternal and perinatal mortality.

The aim of this study is to analyze the course and outcome of pregnancy in women with acute onset of HCF developed after the pneumonia.

MATERIALS AND METHODS

To achieve this aim retrospective analysis of 78 pregnant women with the appearance of the first signs of liver and jaundice dysfunction was conducted.

Statistical analyses of the data were performed by methods of variation statistics. The difference was considered statistically significant at $P<0.05$.

RESULTS AND DISCUSSION

All patients noted acute respiratory viral infections preceding the appearance of jaundice. The terms of development of jaundice after acute respiratory viral infections in 12 patients were 6–7 days, in 3 patients 10–12 days, and in 28 patients more than 2 weeks. The distribution of the examined patients with established HCF by gestational age is presented in Fig. 1.

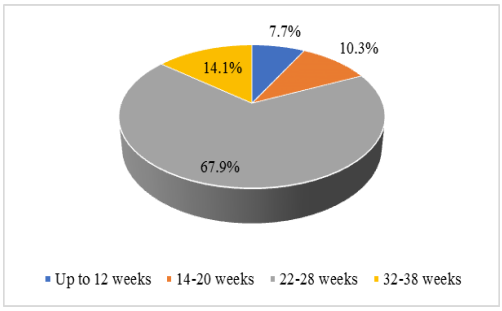

Fig. 1: Distribution of pregnant women with hepatic cell failure by gestational age.

The results of the analysis indicate that with HCF, the timing of the appearance of jaundice coincides with 22-28 weeks in 67.9% of cases.

An analysis of anamnestic data suggests that many symptoms suggesting liver dysfunction were present much earlier than the appearance of icteric staining of the skin and mucous membranes (Fig. 2).

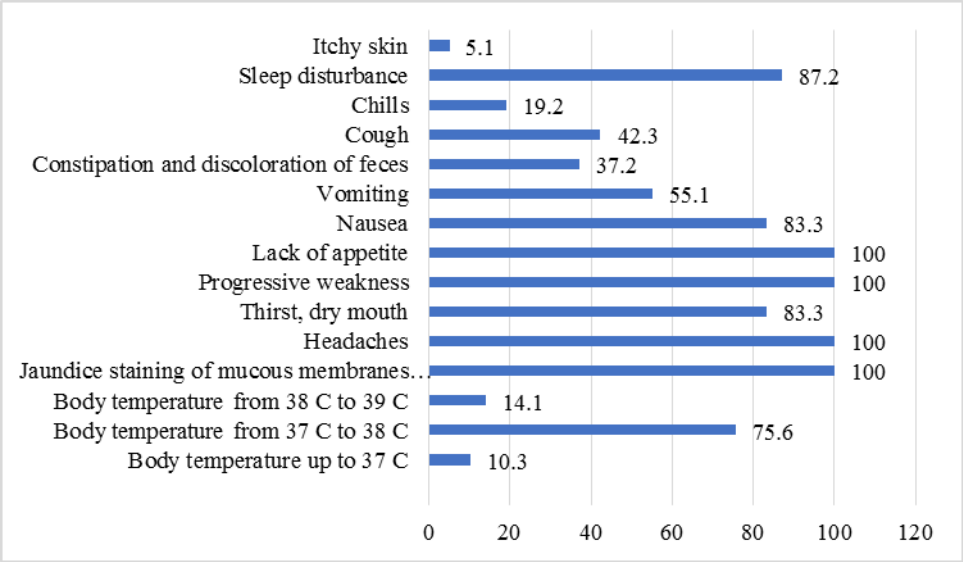

Fig. 2: Clinical symptoms in pregnant women with HCF, n = 78.

The results of the analysis of clinical symptoms in pregnant women with HCF showed that the development of hypothermia was preceded by fever for 4.5±1.2 days, then normalization of temperature was noted.

In the vast majority of pregnant women during the period of jaundice, body temperature was in the range of 37-38^{0}C, an average of 37.5±1.8^{0}C, and 11 (14.1%) had febrile temperature. It should be noted that an increase in body temperature was observed during the period of acute respiratory viral infections to febrile numbers, then there was a period of decline in indicators and, on average, a new wave of increase in body temperature was recorded over the course of 7.7±1.3 days.

All patients (100.0%) noted progressive weakness, general fatigue, and rapid fatigue. A characteristic manifestation was a headache (100.0%), severe during acute respiratory viral infections, then periodically bothered during the day, intensifying during a temperature rise.

It is characteristic that all patients (100.0%) noted a decrease and/or lack of appetite, dry mouth and thirst. An overwhelming number of pregnant women also noted nausea and/or nausea of a constant nature, belching. At the beginning of the appearance of icteric staining, there was increased irritability, anxiety, agitation, which were replaced by apathy, lethargy, some inhibition.

43 (55.1%) pregnant women experienced vomiting 2-3 times a day, the color of "coffee". 29 (37.2%) pregnant women complained of constipation and discoloration of feces. Objectively noted: the tongue is coated, dry in 69 (88.5%), itchy skin in 4 (5.1%) pregnant women.

The results of the analysis of peripheral blood indicators indicate a decrease in the number of red blood cells from 3.2±0.4x10^{12}/L upon admission to 2.2 ± 0.6x10^{12}/L before delivery. Along with a decrease in the level of red blood cells, there was a decrease in hemoglobin from 102±5.8 g/l before delivery to 80.4±6.2 g/l (P <0.05). Moderately expressed leukocytosis of 10.7±2.5 × 10^9/l was noted, before delivery there was a significant decrease on average to 5.2±2.8×10^9/l (P <0.05). The results of the analysis indicate a shift of the leukocyte formula to the left, the number of stab neutrophils increased and by the time of delivery reached an average of 58.4±6.2%.

Noteworthy is progressive lymphopenia from 18.7±2.0% upon admission to 15.5±2.7% before childbirth (P <0.05). Some acceleration of sedimentation rate of erythrocytes is noted - from 28.7±2.2 mm/h at the time of receipt to 30.7±2.7 mm/h after 2 hours. As for hematocrit, the average rate at admission was 28.8±2.8%, then progressively decreased and before termination of pregnancy was 20.8±2.4% (P <0.05).

In the dynamics of observation in the intensive care unit there were signs of increasing respiratory failure. Pregnant women noted pain in the heart, shortness of breath, shortness of breath at rest.

Noteworthy was the increase in the number of heart rate on average at the time of initial consultation to 96.8±7.6 beats per minute. Then a decrease in heart rate was noted and on average reached 78.4±7.2 beats per minute. Moreover, in 19 (24.4%) tachycardia was replaced by severe bradycardia (Fig. 3).

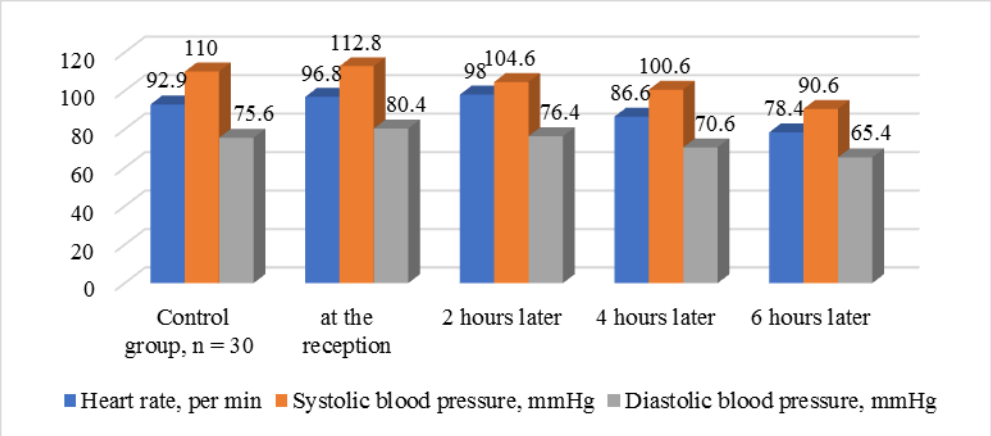

Fig.3: Dynamics of central hemodynamics in pregnant women with HCF.

As for blood pressure (BP), during the initial examination, most pregnant women showed normotension, followed by hypotension in 19 (24.4%) pregnant women, blood pressure reached 90/60mmHg.

The results of the studies indicate a progressive decrease in the level of total protein in the peripheral blood. (Table 1). There was an increase in total bilirubin mainly due to direct fractions with a slight activity of liver enzymes. As follows from the data Table 1. there is a tendency to hypoglycemia. The creatinine level in the peripheral blood of pregnant women at the time of admission was reduced relative to the control values (respectively 44.5±3.3 μmol/L versus 54.4±3.7 μmol/L), in the following hours, the indicators increased 6 hours after admission (P <0.05). ALT and AST also gradually increased from the moment of admission, reaching 6 hours after the admission, up to 48.7±1.1 U/L and 39.8±0.9 U/L against 30.9±0.8 U/L and 29, 4±0.6 U/L in the control group (P <0.05).

Table 1: Dynamics of biochemical, hemostasis parameters in pregnant women with HCF.

Parameters	Control group, n = 30	Observation group, n=48			
		at the admission	2 hours later	4 hours later	6 hours later
Total protein, g/l	65.8±3.7	59.7±4.8	52.8±5.3	50.7±5.4	45.5±2.9
Glucose, mmol/L	4.4±0.4	4.1±0.3	3.9±0.2	3.5±0.2	3.0±0.1
Urea, mmol/L	2.1±0.1	2.7±0.2	3.5±0.4	3.8±0.4	4.0±0.5
Creatinine, μmol/L	54.4±3.7	44.5±3.3	60.3±4.8	62.4±4.3	64.4±3.8
ALT, E/L	30.9±0.8	45.7±0.9	48.7±0.9	50.8±1.2	48.7±1.1
AST, E/L	29.4±0.6	35.5±0.9	37.8±0.8	40.4±1.0	39.8±0.9
Bilirubin - general	8.4±0.3	50.7±2.5	67.8±2.6	80.5±2.9	90.7±3.4
- indirect	5.5±0.8	20.0±1.7	20.1±1.8	22.7±1.5	31.3±1.6
- direct	2.9±0.2	30.7±2.4	47.7±2.3	57.8±2.6	59.4±2.7
Platelets, 10^9/L	264.0±8.6	220.0±9.4	170.4±8.4	150.8±5.7	264.0±8.6
Fibrinogen, g / l	3.0±0.2	5.2±1.2	3.7±1.7	2.0±1.1	3.0±0.2
Partial thromboplastin time, sec	30.4±2.4	28.5±2.4	25.8±2.8	23.7±2.2	30.4±2.4
Prothrombin time, sec	14.4±1.2	22.4±0.8	28.0±0.4	30.1±1.7	14.4±1.2
Protein C, %	120.0±8.7	94.5±10.8	80.4±10.1	72.4±8.9	120.0±8.7
Antithrombin III, %	89.4±7.5	80.5±12.5	77.4±7.4	70.5±8.5	89.4±7.5

The results of the analysis of hemostasis indicators in pregnant women with acute respiratory viral infections, complicated pneumonia and the development of HCF indicate a progressive decrease in platelet count compared to the control group. As for the fibrinogen concentration in the examined pregnant women, at the initial examination hyperfibrinogenemia was noted, then the protein content progressively decreased.

As follows from the data Table 1, there was a progressive deterioration in both partial thromboplastin time and prothrombin time, which also indicates the consumption of blood coagulation factors and the depletion of important anticoagulants. Thus, the level of antithrombin III significantly decreased before termination of pregnancy and the level of protein C reduction was also significant in compare with the day of admission.

We have analyzed the individual values of the parameters of hemostasis in each case in comparison with the data of biochemical studies.
Of the total number of pregnant women examined, a decrease in platelet count, fibrinogen was noted during the observation, which was accompanied by an increase in total bilirubin, mainly due to direct fractions, in parallel a decrease in the concentration of total protein.

Patients noted progressive weakness, headaches, nausea, and lack of appetite. Jaundice staining of the skin and mucous membranes of the eyes was noted. The progression of HCF was accompanied by changes in hemodynamics, which were especially pronounced before delivery. Tachycardia and hypotension were noted. Progressive hypovolemia contributed to the deterioration of organ hemodynamics of vital organs and impaired liver function, the progression of HCF.

The results of a retrospective analysis of cases of maternal mortality showed that attempts to increase circulated volume of blood by blood transfusions, proteins, colloidal solutions on a polymer basis exacerbated the severity of the patient's condition and contributed to the progression of liver failure.

The main principles of observation and treatment of pregnant women with HCF were.
- restriction of proteins, the exclusion of proteins in a diet of animal origin with priority on proteins of plant origin;
- oral hydration in a volume of 150-200 ml every hour;
- infusion of saline, under the control of the urination;
- prescription of lactulose 30 ml - 3 times per day for 5 days;
- the exclusion of the introduction of protein preparations (fresh frozen plasma, albumin);
- siphon enema;
- termination of pregnancy.

CONCLUSION

We considered it necessary to make conclusion that:
- pneumonia during pregnancy could complicate gestational period and lead to development of the HCF;
- the catastrophic situation is due to the high risk of coagulopathic bleeding associated with a double violation of the hemostasis system. On the one hand, impaired synthesis of coagulation factors, and on the other, pronounced consumption coagulopathy;
- due to the progression of disseminated vascular coagulopathy syndrome in the system of microcirculation and perfusion of vital organs, multiple organ failure progresses. Disorders in uteroplacental perfusion cause the development of perinatal complications.

The results of the retrospective analysis of course and outcomes of pregnancy in woman with pneumonia showed complications as a severe impairment of liver function with the development of encephalopathy and coagulopathic bleeding and multiple organ failure and led to high rates of maternal and perinatal mortality.

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