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Therapy optimization at an massive obstetric haemorrhage

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Introduction

Correction of hypofibrinogenaemia during active bleeding requires large volumes of FFP, which may contribute to haemodilution or transfusion-associated circulatory overload (TACO) and transfusion-related acute lung injury (TRALI).[1] The objective of this work is to define the role of the Cryoprecipitate (CP) and Prothrombin Complex Concentrate (PCC) in the acute obstetric blood loss treatment via the assessment of the body water sectors' state, the hemostasis, and the frequency and severity of the Multiple Organ Dysfunction Syndrome (MODS) clinical manifestations.

Methods

Upon approval of the study design by the Ethics Committee, 140 women had been examined (over the years 2006-2018), whose child delivery or early postnatal period (fourth stage of labor) was complicated by an acute severe blood loss with a circulating blood volume deficit of 40 to 60%. Based on the Intensive Treatment (IT) characteristics, the patients had been divided into 3 groups. In the Group 1 (post-hoc analysis, n=50), a normal acute blood loss intensive treatment as per the relevant clinical protocols of the Health Ministry of Ukraine had been being provided. In the Group 2 (n=44), an acute blood loss intensive treatment as per the abovementioned clinical protocols of the Health Ministry of Ukraine with use of the CP as the first-line drug had been being provided. In the Group 3 (n=46), the 4-factor PCC (20 IU/kg) had been added. These groups had been compared according to the demographic profiles, to the terms of child delivery, and to the extent of blood loss. There had been assessed such criteria as follows: RBC count, Hb, Ht, PI, aPTT, Fibrinogen; the body water sectors (viz., the values of the total body fluid, extracellular fluid volume, intracellular fluid volume, and interstitial fluid volume) had been assessed noninvasively, by the Integral Impedance Method; as well as the clinical signs of the MODS. The control points are, as follows: 12 hours, 1, 3, 5, 7, 10, 14 and 28 days after the child delivery. The statistical analysis of the findings for compliance with the normal distribution law had been carried out on the basis of the criterion of the Student's *t*-test.

Results

The contemporary concept of therapy of the hemostatic disorders at an acute blood loss provides for the use of the so called 'transfusion package', that is, a combination of the Fresh Frozen Plasma (FFP), packed RBCs and Thrombocyte Concentrate, on the one hand, and the including the alone and combined factor concentrates as the first-line drugs in the therapy complex, on the other hand.

The use of the CP as the first-line drug at a dose of 8 to 10 Units had enabled to get decreased the total volume of the infusion and transfusion media by 13.7% ($p<0.05$), and the total volume of the administered FFP – by 12% ($p<0.05$) respectively. The adding of the PCC to the relevant Intensive Treatment Guidelines had been resulting in a reduction of the total volume of the infusion and transfusion agents by 24.5% ($p<0.01$), of the administered plasma volume – by 22% ($p<0.01$), and of the cellular volume – by 9.1% ($p<0.05$) respectively. Furthermore, a decrease in the vasopressor support rate (by 5.1 times, $p<0.01$) and in the vasopressor support duration (by 1.5 natural days, $p<0.01$), as well as in the ALV rate and duration (by 5.7 times, $p<0.01$), had been being observed; the number of the patients in need to use of diuretics had been reduced (by 2.9 times, $p<0.01$), as well as the duration of their administration (by 1.7 natural days, $p<0.01$ respectively). The PI and Fibrinogen rates had been corresponding to the norms by the end of the day 1 of treatment.

Table. The frequency and severity of MODS in the comparison groups

MODS signs	Control, (n=50)	CP, (n=44)	PCC, (n=46)
Myocardial insufficiency, number (%)	36 (72%)	21 (47.7%)	7 (15.2%)
- duration of vasopressor support, days	3.4	3.2	1.9
Respiratory dysfunction, number (%)	34 (68%)	18 (40.9%)	6 (13%)
- duration of mechanical ventilation, days	3.6	3.4	2.5
Acute kidney injury, number (%)	23 (46%)	13 (29.5%)	8 (17.4%)
- duration of renal replacement therapy, days	4.3	3.9	2.6
Gastrointestinal dysfunction, number (%)	42 (84%)	30 (68.2%)	14 (30.4%)
- duration of the enteroparesis, days	4.6	4.0	2.2

Discussion

The use of the CP as the first-line drug in the intensive treatment of an acute obstetric blood loss ensures a significant lessening in need for the infusion and transfusion agents. The PCC as the first-line drug prevents the development and progress of the coagulopathy at the treatment of an acute obstetric blood loss, what decreases the frequency and severity of clinical manifestations of the MODS significantly.

References

1. McDonnell NJ, Browning R. How to replace fibrinogen in postpartum haemorrhage situations? (Hint: Don't use FFP!). Int J Obstet Anesth, 2018; 33: 4-7.