Prevention of Thrombotic Complications during Hysterectomy among Women with Uterine Fibroids

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Abstract

The aim of our study was to determine the state of hemostasis in women with benign tumors of the uterus during and after surgery. Thrombotic complication is one of the most dangerous problems in surgical, obstetrical and gynecological practice. In operative gynecology one of the most dangerous manifestations is thromboembolism, which can be met from 0, 5 to 6, 4% cases. We examined 153 women with the uterine fibroids. Main group consisted of 38 patients who were operated with the usage of the autologous plasma and control group consisted of 115 patients who were operated without the usage of the autologous plasma. We studied a condition of the system of a hemostasis of women of the main and control groups at all stages of supervision. The study found that women with uterine fibroids are at high risk of thrombotic complications during surgery and in the postoperative period. We came to the conclusion that using autoplasm in gynecological practice is economically beneficial and help to reduce the use of donor blood and its components during the surgical treatment of gynecological patients.

Keywords: Uterine fibroids, Autologous plasma, Hemostasis system, Thrombotic complication.

Introduction

Uterine fibroids, between endometriosis and inflammatory processes in uterine tubes and ovaries, are a disease which very often occurs among female pathology [1,2]. In gynecological departments women with uterine fibroids make up to 12, 2%, at the same time 60-70% of them need an operational treatment [3,4]. Thrombotic complication (TC) is one of the most dangerous problems in surgical, obstetrical and gynecological practice.

In operative gynecology one of the most dangerous manifestations is thromboembolism, [5,6] which can be met from 0,5 to 6,4% cases. Women after gynecological operations in oncology have higher risk development of TC [7]. Patients with the gynecological pathology without the prevention of the thromboembolism in the preoperative period have high risk of the development of the TC which makes from 17% [8] - 40% [8,9]. Agency for Healthcare Research & Quality (USA) recognized that the prevention of the thromboembolism is a priority and the perspective direction of the preventive medicine that has a high potential for patient’s improvements of the health safety. American College of Chest Physicians (USA) provided recommendations for the preoperative prevention of the thromboembolism [8] in gynecological practice on the basis of the data which was obtained from surgery, urology etc. TC is a manifestation of a thrombotic and/or hemorrhagic syndrome (TGS). TGS is a basis of the general pathology, the universal and nonspecific process which is followed by an imbalance in the anticoagulating potential of blood and makes about 40% of cases of the acute disorders in the system of a hemostasis in the early postoperative period [3,4,5].

Bleeding which begins during an operation and in the postoperative period, is not always a result of technical errors and in most of the cases is caused by the disorder in hemostasis [10]. Tissues of small pelvis possess strong activity of tissue thromboplastin and unstable activity in the activators of fibrinolysis [10]. At the development of the tumoral and inflammatory processes in tissues of the small pelvis and the coagulative potential of tissues is sharply
increased and the activity of the fibrinolytic factors becomes decreased [7.10]. Any surgical interventions, especially traumatic and long, lead to a condition of the hypercoagulation, as a result of the increased secretion of procoagulants from tissues of the wound [11.12].

Nowadays there are many opinions and views on an adequate correction of the disorders in the system of a hemostasis during operations and in the postoperative period in women with the uterine fibroids [13.14]. But, unfortunately, this problem is not solved and it demands further researches in the prevention of the TC during operative and postoperative treatment of gynecological patients.

The aim of the research is to find a definition of the condition of the system of a hemostasis in women with the uterine fibroids during and after operative treatment. The prevention of the TC was carried out by the usage of the freshly frozen autologous plasma in the combination with heparin.

**Materials and Methods**

We examined 153 women aged from 34 to 60 with the uterine fibroids. All patients were operated in a planned order using a section across Pfanneshtil and a median laparotomy. Patients were divided into two groups: the main group (MG) consisted of 38 women to all of them during 7-14 days the preparation of the autoplasma of≈300 ml was carried out.

Before the operation the autoplasma was combined with the heparin in the calculation of 0, 1 Pieces of heparin to 1 ml of plasma. As a result of the direct interaction of heparin with cryo activated anti-thrombin III autoplasma anti-coagulopathic complex of the immediate action was created. Such combination allows us to interrupt a pathological chain of the disturbances in the system of a hemostasis.

The usage of the complex (plasma with heparin) was started from the moment of intubation of a trachea by the speed up to 10 ml/min. The Control Group (CG) consisted of 115 gynecological patients who were operated without the usage of the autologous plasma. To all women of the MG and CG before the planned operative measures, the full clinical and biochemical analysis, diagnostic examination and evaluation of hemostasis system were conducted (the time of the aggregation of the thrombocytes (min.), the height of the aggregation of thrombocytes (cm)), procoagulant (concentration of fibrinogen (g/l), thrombin time (TT), a prothrombin time (PTT), a plasma calcium clotting time (s)), anticoagulating and fibrinolytic links of the system of hemostasis (time of a fibrinolysis of euglobulin (min.)). Activity of the antithrombin III (s) measured by paracoagulative tests and trombo elastography (TEG). Tromboelastogram registered on the TEG® 5000 device (Haemoscope Corporation., USA).

A profile of the coagulation evaluated with parameters of the TEG: R, (minutes) - coagulation time; K, (minutes) - a clot formation period; MA, mm - the maximum density of a clot; the angle,° - angle between the axial line and a tangent to a point of amplitude of 20 mm; LY30, % - a time of clotlisis in 30 min. As the markers of the hypercoagulation status were considered to be a deviation of two and more of four main indicators of the TEG (R, K, the angle, MA) out of limits of reference values in the prothrombogenic party, and the hypercoagulation status-similar change towards bleeding.

In the presence of the coagulative disorders of patients in MC and CG with usega of the TEG verified option of coagulative or fibrinolytic syndromes. Analysis was conducted on stages: I stage - before the anesthesia, II stage - after anesthesia, III stage - after removal of the uterus (with appendages or without them), IV stage-on the third day of the postoperative period. The statistical analysis was made, result was considered to be reliable at the value of ≤ 0,05.

**Results and Discussion**

The volume of an operative measure of the gynecological patients in MG and CG was evaluated by us: total hysterectomy with appendages - 71 that made 46,4%, total hysterectomy without appendages - 8 (5,2%), a subtotal hysterectomy with appendages - 54 (35, 3%), a subtotal hysterectomy without appendages -14 (9,2%), conservative myomectomies -6 (3,9%). Duration of the operation was from 50 minutes to 2 hours 30 minutes.

The type of anesthesia that was used to all women was an endotracheal anesthesia. We studied a condition of the system of a hemostasis of women in MG and CG at all IV
stages of supervision. In patients from MG and CG the indices of all links of the hemostatic system before anesthesia did not differ significantly and were within normal value. But, it should be noted that one of the risk factors for thrombohemorrhagic disorders before surgery is stress. Development of stress leads to the stimulation of the hypothalamic-pituitary, and through it sympatoadrenal systems, further induces respiratory alkalosis, a decrease in cerebral circulation, and the most terrible - changes in the rheological properties of the blood, manifests itself as a thrombophilia [15.16].

Thus, the average time of fibrinolysis of euglobulins, which characterizes fibrinolytic link, in women of the CG was increased by 22.8% (p <0.02) as compared to the women in the MG. In the evaluation of the procoagulative link in system of hemostasis, changes in the direction of the hypercoagulability of women in the CG have been identified, since the concentration of fibrinogen increased in the examined women in CG by 12.5% (p> 0.2), compared with the values for women from MG.

The time of the recalcification of plasma was reduced by 11.9% in women from MG (p> 0.3), compared with the observations of the CG. Before anesthesia disorders were observed in the vascular-platelet branch in system of hemostasis, where the average time of platelet aggregation in patients from MG was reduced by 20.9% compared with the women in the CG. Decreased height of the platelet aggregation in patients in CG, was 3.6 ± 1.8 cm, in women in MG - 4.3 ± 1.8 cm.

The most predisposed to the development of coagulative disorders in our research were gynecological patients in the CG, as an evidenced of our findings. In the reviewed literature, we dealt with the reports of the effect of a combined endotracheal anesthesia, narcoatics (morphine, promedol, etc.), cholinergic drugs (atropine, etc.) and muscle relaxants on the changes in the state of hemostasis towards hypercoagulation, which can cause thrombosis and embolism [12.17].

After combined endotracheal anesthesia in women of CG, the primary anticoagulant of the blood (antithrombin III (AT III)) was decrised by 3.3% (p> 0.5) compared with women in the MG. AT III in women from MG in the II stage of the study remained unchanged, in comparison to the I stage.

In MG at the II stage of the study, the platelet aggregation time was reduced by 1 min (p <0.03), comparing with the I stage of the study. In gynecological patients of CG, the time of platelet aggregation was decreased by 3.4 minutes (p> 0.4), which indicates the more favorable conditions for the occurrence of the thrombohemorrhagic disorders in the hemostasis system in CG.

The height of the aggregation of the platelets after anesthesia did not changed. The time of fibrinolysis of euglobulins at the II stage of the study in the CG significantly increased by 1.3 times (p <0.03) in comparison to the patients from the MG. During the II stage of the study in CG, there was a tendency for fibrinolysis of euglobulins to increase by 14 minutes, compared with the stage I of the study, and in women in the MG - by 12 min (p <0.01). The results indicate an increase in fibrinolytic activity of the blood, as a result of the negative effect of anesthesia. More pronounced changes are observed in gynecological patients in CG. The recalcification time of plasma decreased in patients in CG by 24.7%, and in women in MG by 8.1%.

In the study of paracoagulation tests, we found that after anesthesia in CG, unlike MG, there were weakly positive β-naphthol (β-NT) and ethanol tests (ET), which indicates the activation of fibrinolysis in this group. Thus, women in the CG are at high risk in development of thrombosis or even embolism, because of the changes in the coagulation potential of the blood. Important role in the pathogenesis of hypercoagulable syndrome is played by the decrease in AT III.

The share of AT III accounts for 80% of the primary anticoagulant activity of the blood. Spontaneous thrombosis and thromboembolism occur with decrease of AT III by 40-60%. In our case, after removal of the organ (the uterus with or without appendages), AT III in women has decreased by 25%, which characterizes the progression of hypercoagulation syndrome. In women from MG, activity of AT III was increased by 19%, preventing the disseminated intravascular coagulation (DIC).

The reduction in the concentration of fibrinogen in the MG by 14.3% (p <0.04) is due to the utilization of the fibrinogen in the area of the postoperative wound. A significant reduction in TT and PTT in women in the MG was observed.
We believe that reduction of TT and PTT can occur due to the flow of tissue thromboplastin into vessel flow when the tumor is removed along with the uterus. At this stage of the study, we detected sharply positive 8-NT and ET in gynecological patients from CG, indicating the presence of chronic disseminated intravascular coagulation (DIC) syndrome, the so-called coagulopathy of consumption [6.18].

On the 3rd day of the postoperative period, the level of AT III in women from CG was reduced by 1.4 seconds, compared to the patients in MG. In our opinion, decreased levels of AT III are due to high needs and depletion of the reserves of anticoagulants in the postoperative period. Increased level of blood fibrinogen concentration in CG on third day after surgical treatment is associated with increased synthesis in response to high needs, as a result of intravascular clot formation. Thus, the time of fibrinolysis of euglobulins is increased in CG by 1.5 times in comparison to MG (p < 0.003). It can be understood that in both groups, before anesthesia, the basic indices of the TEG were approximately the same (p < 0.05).

After anesthesia in CG, we can see a tendency to development of hypercoagulation: decreased values of R and K in comparison with MG before anesthesia; thickening of the clot is noted, which demonstrates an increased Angle index; thickness of the clot - MA; lysis of the clot - LY30, remains unchanged. In the MG changes are opposite. After removal of the organ, the tendency remains: in CG results changed characteristics to hypercoagulation syndrome and in MG to hypocoagulation. On the third day of the postoperative period, changes are aggravated, and it can be reliably seen that the CG has a pronounced tendency to thrombosis, and the changes revealed in the MG are more likely to development of hypocoagulation.

Revealed changes in the study of TEG data, it can be concluded that the thromboelastography method can be used in the diagnosis of both hypocoagulation and hypercoagulable states. Obtained and analyzed data of the main indices of TEG show that women without prophylaxis (autoplasm with heparin) have an increased risk of development of TC, than women who underwent transfusion during operation. The changes in the four main indices of TEG on the third day of the postoperative period in MG indicate hypocoagulation compared to the rates before anesthesia, and in the CG changes characterized as hyper coagulation.

Post operative period in patients in MG characterized by favorable clinical course.

In all women from MG, postoperative wounds healed with primary tension. The stitches were removed from patients of MG 6.2 ± 0.7 days, and in women from CG by 7.3 ± 1.1 days (p <0.05). In the postoperative gynecological patients from CG, such complications as: pelvic infiltrate - 1 case (0.9% ± 0.7), seromas in the postoperative wound area - in 4 women (3.5% ± 2.9), inflammation of vaginal stump - in 3 women (2.6% ± 2.2). Analyzing the course of the postoperative period, it should be noted that the average length of stay at hospital of gynecological patients from MG was 8.9 ± 1.6 days, in women from CG - 10.9 ± 2.8 days (p <0.05).

**Conclusion**

- Women with uterine leiomyomas have hypercoagulable disorders in the system of hemostasis during surgical treatment and in the postoperative period.
- Usage of an immediate prophylaxis (freshly frozen autologous plasma in combination with heparin) in gynecological operations leads to activation of the anticoagulant link in hemostatic system, which reduces the risk of increased hypercoagulation and improves postoperative period.
- Usage of autoplasm in gynecological practice is economically better and helps to reduce the use of donor blood and its components during surgical treatment in gynecological patients.

**References**


