Postoperative complications - massive transfusions in radical malignant gynecological surgeries

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Summary

At the Institute of Gynecology and Obstetrics we examined 24 women who were radically operated on and received massive transfusions during the intraoperative and postoperative period. Twelve developed massive transfusion complications such as urticaria, fever, and respiratory insufficiency known as TRALI (transfusion-related acute lung injury).

Key words: Radical malignant gynecological surgeries; Blood loss; Massive transfusion; TRALI.

Introduction

Malignant tumors of the female genital tract are not rare and they make up 5% of all malignant tumors [1]. In the United States, uterine cervical cancer is the sixth most common solid cancer in women, after carcinoma of the breast, lungs, colorectal carcinoma, carcinoma of endometrium and ovary [1]. The mean age for cervical carcinoma at the time of diagnosis is 52.2 years, and the distribution of cases is bimodal with peaks at 35 to 39 and 60 to 64 years of age [2]. Lifetime risks for cervical carcinoma show significant geographic variation, ranging from 0.4% in Israel to 5.3% in California and 7.2% in Colombia, where cervical carcinoma is the most common malignancy in women [1].

In developed countries, most cases of cervical cancer occur in women who have not had regular Pap smear screening [1]. However, most patients in developing countries present with advanced disease that may have already eroded into the bladder, rectum, pelvis nerves, or bone [2].

If women were screened in time, we could operate on them in different phases of disease. Patients usually have different comorbidity and belong to ASA score groups I and II. They require good preoperative evaluation and good intensive care therapy postoperatively. The surgical procedure is very extensive and radical with a high blood volume loss. These patients receive high doses of red blood cells and fresh frozen plasma and platelets, and most undergo massive transfusions [3].

Uncontrolled hemorrhage, and by way of consequence, massive transfusion (MT) is a frequent complication of radical gynecological surgery. MT is commonly defined as replacement of a large blood mass during a 24-hour period [4]. A dynamic definition of massive transfusion, such as the transfusion of four or more red cell concentrates within one hour when ongoing need is foreseeable, or replacement of 50% of the total blood volume within three hours, is more relevant in an acute clinical setting [5]. Transfusions today are extremely safe. Complications may be divided into infectious and noninfectious types [6].

Infectious complications include human immunodeficiency virus infection (HIV), viral hepatitis (transfusion-associated hepatitis - TAH), transmission of other viruses, bacterial contamination, etc.

Noninfectious complications include alloimmunization and hemolytic transfusion reactions (AHTR), transfusion-related acute lung injury (TRALI), immunomodulation, etc.

Massively transfused patients can show evidence of defective hemostasis in a high percentage of cases. Coagulopathy may result from hemodilution, hypothermia, the use of fractioned blood products and disseminated intravascular coagulation (DIC) [8]. However, pulmonary complications after a massive transfusion occur with high frequency, as high as 75% in some studies, and may significantly contribute to preoperative morbidity and mortality [7]. The most common complications are respiratory insufficiency with acute respiratory distress syndrome (RDS), known as TRALI in the more recent literature.

Materials and Methods

After a precise diagnosis and histopathologic confirmation of cervical carcinoma demanding radical surgery – Wertheim's hysterectomy – we treated the patients postoperatively with antibiotics according to cervical antibiotic testing performed prior to surgery. From a gynecological point of view, follow-up of complications after massive transfusions is very delicate.

In this observational study, we determined the blood loss, massive transfusion rate and complications in radical malignant surgeries of the female genital tract. In the largest hospital in Belgrade, we found 24 patients who had received massive transfusions intra- and postoperatively. Twelve patients had complications after a massive transfusion of red cells, fresh frozen

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plasma and platelets. All complications were severe reactions to transfusion resulting in acute lung collapse damage due to blood transfusion. All patients had no transfusion history, and the transfusion was stopped because of RDS which developed on the first or second day postoperatively.

Detailed information about postoperative morbidity is infrequently supplied. Urinary tract infection is the most common complication, related to the need for prolonged catheter drainage. Other febrile morbidity from such cases as atelectasis or wound infection is also relatively common [2]. Venus thrombosis is undoubtedly underdiagnosed, but with proper prophylactic measures, pulmonary embolism is infrequent. Vesicovaginal or uterovaginal fistulas occur in approximately 1% of the cases [2].

Results and Discussion

The blood loss of our patients who underwent radical gynecological surgery because of a positive malignant diagnosis was between 400 and 6,000 ml. The highest volume of transfused red blood cells was 5,700 ml and the smallest loss was 450 ml, which was also the smallest volume of transfused blood and blood products during surgery (Table 1).

Table 1. — *Blood loss volume and number of patients.*

	Volume (ml)	Number of patients	% of patients
Blood loss	400-500	1	4.16
	500-1,000	17	70.8
	1,000-2,000	2	8.33
	2,000-3,000	1	4.16
	3,000-4,000	1	4.16
	4,000-5,000	1	4.16
	5,000-6,000	1	4.16
Total	6,000	24	99.93

We identified 12 patients (50%) who developed complications after a massive transfusion in the postoperative period, either in the operating room or within two hours of admission to the ICU (intensive care unit). Complications included severe urticaria, severe respiratory distress, tachypnea, tachycardia, fever and could be seen in the physical, laboratory and X-ray examinations. Most of them needed oxygen support with an oxygen mask or mechanical ventilation, depending on their vital signs and lung injury score (LIS). This score is determined by arterial blood gas analysis and chest X-ray. By examining these 12 patients, we found different categories of LIS. Eight patients with small LIS had small lung injuries and needed only oxygen mask support. However, there were four patients with a high LIS (over 2.37) who needed mechanical ventilation (Table 2). They had severe respiratory insufficiency. Duration of mechanical ventilation was 7.4 ± 2 days. Outcome depended on complications. Two patients (8.33%) died of severe respiratory distress syndrome and acute severe cardiomyopathy. They had massive blood loss during surgery (5,700 ml) and at the same time massive transfusions. The LIS was very high (2.5). LIS was calculated at 0 to 24 hours and did not change significantly (2.5 ± 0.53) within the period of 24 hours. Eleven patients survived after intensive resuscitation at the ICU during the period of a few days.

Table 2. — *LIS of patients with complications due to massive transfusion.*

	LIS Score		
	0	0.1-2.5	≥ 2.5
No. of patients	8	0	4
%	33.33	0	16.66
Total		50%	

LIS: lung injury score.

Conditions such as radical and extensive surgery, trauma, sepsis, gynecological malignancies, comorbidity such as hematological and cardiac disease, can all predispose to massive blood loss and massive transfusions during surgery and afterwards. Acute blood loss is a very common problem which follows radical gynecological surgeries. Transfusion is often necessary, however it is not always benign. Inadequate perfusion, even if not associated with overt hypotension, can set off the neurohumoral cascade, ultimately leading to sequential organ failure. Clinically, fever, shivering, tachycardia, cough and different degrees of respiratory distress may be seen [3]. Hypotension and urticaria may also occur. Generally, there is hypoxia in arterial blood gases (PaO_2 = 30-60 mm Hg). Bilateral pulmonary edema may be detected in chest X-ray. Respiratory support is essential while managing the complications after massive transfusion. In 70% of the cases an oxygen mask is sufficient and in 30% of the cases mechanical ventilation is necessary [7]. The mortality rate is about 5% in complications such as pulmonary edema, respiratory insufficiency and pneumonia [7]. With appropriate treatment, patients' conditions could be improved without any sequels during the following few days [7].

From studies on the resuscitation of trauma patients, it was shown that a dose-response relationship existed between early blood transfusions and the later development of multiorgan and pulmonary failure [8]. Rosenberg demonstrated a linear relationship between the number of units transfused and mortality, with 21 to 39 units being associated with a 25% mortality rate and more than 40 units with a 52% mortality rate [8]. Miller documented five survivors with more than 50 units of blood after a massive transfusion [9].

In the operating room with a hemorrhaging patient, it is often difficult to evaluate the appropriateness of transfusion. The two most often quoted reasons for administering red cells are acute bleeding and augmentation of oxygen delivery, rather than the patient's hemoglobin concentration [10]. It may be that, although a Hgb level of 7.0 or 8.0 g/dl seems an appropriate threshold for transfusion in surgical patients without cardiac diseases [11, 12], a higher threshold of 10.0 g/dl may be more appropriate for patients at significant risk for myocardial ischemia [13].

Conclusion

In addition to complete gynecological surgical removal of a mass, as a middle step to further treatment such as radiation or chemotherapy, there are also vital complica-

tions induced by massive transfusions. Many gynecological patients with malignant tumors require blood transfusions to replenish massive blood loss from the operating area. Early recognition of hemorrhaging and complications of massive blood transfusion is the key to optimal care for these patients. However, control of bleeding and restoration of the circulating blood volume must remain the cornerstone in the care of these patients.

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