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Treatment of haemorrhagic shock: a case report

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ABSTRACT

The aim of this case report is to demonstrate that during extensive and long-lasting mutilating operations it is necessary to use an aggressive volume replacing approach to maintain adequate tissue oxygenation.
A satisfactory level of tissue oxygenation is necessary to uphold the function and structure of cells, tissue and organs. Monitoring the haemodynamic function during the operation is an important task for the anaesthesiologist.
We present a case of a 58-year-old woman with widespread malignant disease, who underwent surgical treatment in our hospital.
The operation was mutilating and long-lasting. During the perioperative period the patient received a large volume of fluids and blood products due to extensive intraoperative blood loss. High doses of vasoactive drugs were also introduced to achieve haemodynamic stability.
Due to adequate and aggressive volume replacement, haemodynamic stability was eventually achieved and the outcome was beneficial for our patient.

Key words: haemodynamic stability, blood loss, volume replacement

INTRODUCTION

Adults who lose more than 15% of their blood volume usually require blood transfusions to maintain the transmission capacity of oxygen. Intraoperative blood loss is estimated by adding the amount of blood in the aspiration bottle, measuring the weight of the pads during and after the procedure, and estimating the amount of blood in the rinse solution. Blood remission must be adequate; hemoglobin should be determined intraoperatively (1).
In this case, report we describe a patient with significant hemodynamic instability that occurred during the intraoperative period due to massive loss of circulating blood volume.
Intravenous fluid administration is the main therapy that stabilizes the patient and reduces the effects of hemorrhagic shock (2).

CASE PRESENTATION

A 58-years old female, with a history of diabetes, hypertension and hypothyroidism was hospitalized for the surgical treatment of a recurrent tumor process in the pelvis.
An eight-hour operation took place. A pelvic exenteration was done, with resections of the urinary bladder, rectum and uterus - which had extensively merged with the tumor tissue.
During the perioperative period, the patient was extremely hemodynamically unstable due to extensive blood loss. The total volume losses during the operation were 13990ml. Out of that amount 9600ml was blood, while her estimated circulating blood volume was 7000ml. Volume replacement was performed with crystalline and colloidal solutions, erythrocyte concentrate and fresh frozen plasma (Table 1). Since hemodynamic stability could not be achieved solely via volume replacement, vasopressor (norepinephrine) and inotrope (epinephrine) infusions were also started.
Because the measurements received through the arterial cannula in the radial artery were inadequate, the measurement of arterial pressure was started directly inside the aorta. At the end of the operation, the aorta artery cannula was removed and inserted into the right femoral artery.
Despite the attempts of hemodynamic stabilization by aggressive blood transfusion and large volume solutions, along with the continuous infusion of vasopressors and inotropes, the patient was highly hemodynamically unstable (Figure 1).
Due to refractory hemodynamic instability, in agreement with the surgeons, the surgical procedure was terminated. The patient was admitted to the Intensive Care Unit. The immediate postoperative course yielded further vasopressor support with norepinephrine, epinephrine and terlipresine; aggressive infusion replacement and replenishment of blood and blood derivatives, as well as antifibrinolytics and recombinant factor VII. Continuous infusion of epinephrine was discontinued on the day of the surgery, and low doses of norepinephrine were needed for the next two days. Hemodynamic stability was restored on the third postoperative day (Table 1).
Renal replacement therapy was initiated on day one due to oligo-anuria, uremia and metabolic imbalance. On the second postoperative day the patient was subjected to a new surgical procedure to complete the planned surgical treatment. The operation was uneventful.
On the 30th postoperative day the patient was transferred to the surgical unit.

DISCUSSION

Volume replacement is the basis of hemodynamic stabilization in hemorrhagic shock (3). Transfusion therapy is a supportive part of the treatment of many diseases and clinical conditions. It is justified only in cases when the lack of blood component cannot be compensated by another, alternative way, and non-adherence would cause deterioration of the clinical condition or endanger the patient's life (4).
The standard therapeutic procedure during volume replacement must achieve the correction of global hemodynamic blood pressure variables, leading to a variable outcome of critically ill patients (5). The variability of outcomes is the result of unrecognized shock that is masked by the patient's compensating mechanisms (6). Poeze et all (7) have shown that there is no ideal hemodynamic variable that could serve as a predictor of outcome.
In most cases, an accurate diagnosis and therapy depend on the precise measurement of hemodynamic parameters (8).
Although the pulmonary artery catheter is the "gold standard" for hemodynamic monitoring, less invasive methods such as PiCCO (Pulse Contour Cardiac Output), LIDCO (Lithium Dilution Cardiac Output), transthoracic and transesophageal echocardiography are used for hemodynamic monitoring and the assessment of volume status in critically ill patients (9).
Furthermore, large blood loss leads to coagulopathy. To determine the degree of coagulopathy precisely, a thromboelastograph (TEG®) and/or thromboelastomer (ROTEM®) should be used. These methods provide global information on the dynamics of development, stabilization and dissolution of clots that reflect in vivo hemostasis (10).
None of the aforementioned monitoring was available intraoperatively. We estimated the

volume replacement by electrocardiogram, pulse, invasive arterial pressure, central venous pressure measurement and laboratory findings (complete blood count, acid-base status and coagulation parameters). Static parameters of hemodynamics were the leading source in the decision-making and therapy adjustment.

Despite the lack of above mentioned monitors, the patient had a satisfactory postoperative outcome and recovered well.

CONCLUSION

In patients undergoing major surgical interventions with large blood losses, it is imperative to use aggressive volume replacement in order to achieve adequate tissue oxygenation. Large fluid inputs also carry a significant danger of potential complications, so additional hemodynamic monitoring should be employed as early as possible, after the resuscitation phase has ceased.

In our case, the patient responded well to our resuscitation measures, so we did not expand the monitoring any further. At the same time, various methods of surveillance are available to the clinician, reducing the occurrence of multiple organ dysfunction - or its early recognition and treatment.

Table 1. Numerical display of volume loss and its replacement

		INTRAOPERATIVE	**0.DAY**	**1.DAY**
VOLUME LOSSES (ml)		12690	7750	3125 + CVVHFD 600ML
VOLUME REPLACEMENT (ml)	Crystalloids	10000	4000	4000
	Colloids	2500	500	1000
	RBC Concentrates	4040	4310	1880
	FFP	2250	3370	--
	Cryoprecipitate	--	980	--
	Thrombocytes	--	1508	300
	Albumins 5%	--	--	250
TOTAL VOLUME REPLACEMENT (ml)		18790	14668	7430
Continuous norepinephrine infusion (mcg/min)		77	13	19
Continuous epinephrine infusion (mcg/min)		23	--	--

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