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Autotransfusion — an alternative to allogeneic transfusions

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Summary

Autologous donation is a procedure involving the collection of blood and blood components from a donor who is also the recipient of his or her own, properly processed and prepared donation. Autotransfusion aims to increase the safety of transfusion by using the patient's own blood. The advantages of autotransfusion outweigh its limitations, which is why it is worth recalling this method and re-expanding its use to provide blood or its components for transfusion. A return to systematic autotransfusion procedures may prove to be a golden mean, given the decreasing number of blood donors and the constantly growing population of patients requiring transfusions.

Keywords: autotransfusion; blood donation; autologous donation

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Introduction

Autotransfusion, otherwise known as autologous transfusion, is nothing more than a procedure involving the transfusion of blood or blood components to a person who is both a recipient and a donor of the donation. The use of the autotransfusion process gained its popularity in the 1980s, when there was a significant increase in cases of HIV transmission through allogeneic transfusions. The threat of infections prompted doctors to use the autotransfusion procedure more often. This form of blood treatment has been shown to be safer, as it not only reduces the risks associated with immunization with foreign antigens, but most importantly prevents the transmission of blood-borne infections [1–3].

However, it turns out that autotransfusion cannot always be used, because despite its many advantages, it also has some limitations.

Moreover, in terms of the advantages of this process, the use of autotransfusion makes it possible to reduce the viscosity of blood by diluting its aggregated elements and reducing platelet aggregation, while improving flow through the microcirculation. Such action also increases oxygen availability to tissues. This occurs by shifting the oxygen dissociation curve to the right. After blood collection, the loss of iron present in the red blood cells results in a decrease in the hematocrit index, which drives an increase in reticulocytosis, and with intensive stimulation of erythropoiesis in the bone marrow and sufficient iron stores, leads to

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Table 1. Advantages and limitations of autotransfusion

Advantages	Disadvantages
Reduction of transmission of blood-borne diseases	Possible bacterial infections
Prevention of immunization with blood cell antigens	Circulatory overload with transfusion and concurrent fluid therapy
Reducing the risk of most adverse post-transfusion reactions, including severe allergic reactions, immunosuppression, graft-versus-host disease transfusion type (TA-G-vHD)	Incidental possibility of occurence of certain adverse reactions, such as non-hemolytic febrile reaction
Replenishment of blood and blood components	Destruction of unused donation
Alternative for people with rare blood type or with antibodies directed against common antigens	Errors of medical personnel and transfusion of blood to another patient
Easier healing of postoperative wounds	Risk of post-donation anemia and the need to transfuse blood from another donor (perioperative anemia increasing the likelihood of transfusion of allogeneic blood)
Reduction in the volume of blood transfused during surgery	Logistical challenge in terms of the need for the patient to donate blood or its components at the blood transfusion center hen autotransfusion before surgery

increased red blood cell production and enhanced oxygen transport to tissues.

The limitations of autotransfusion can also be attributed to its use only during planned procedures: orthopedic, cardiac, urological, gynecological, or vascular surgery. Autologous transfusion can sometimes result in reactions and adverse events (Table 1), and in the case of unused donations, the costs of their disposal are incurred [4–6].

Clinical division of autotransfusion

Based on the application, we distinguish the following:

— preoperative autotransfusion,
— normovolemic hemodilution,
— autotransfusion using extravasated blood:
  • intraoperative autotransfusion — blood recovered from the surgical field,
  • postoperative autotransfusion-blood from surgical wound drainage.

Preoperative autotransfusion

The use of preoperative autotransfusion has been significantly reduced in recent years. This is linked to the difficulties associated with the patient's volunteering to donate blood or blood components, such as to the Blood and Blood Donor Center, and its proper preparation for release. As with allogeneic components, for preserved whole blood (PPC) and red blood cell concentrate (RBC), a serological compatibility test is performed, and it is necessary to collect blood, process it, and conduct qualification tests. Therefore, the cost of these processes is the same as for allogeneic blood component units. However, additional financial expenses may arise from the obligation to destroy donations that were not transfused, as unused autologous blood components, according to regulations, cannot be transfused to any other person. Therefore, it is important to carefully plan the need for a specific number of autologous blood units. This is why autotransfusions are recommended during planned procedures that carry a risk of significant blood loss [7]. They are most often used during: hip replacement, vascular surgery or cardiac surgery. Rules are also established to determine who can become an autologous donor. In accordance with the Ordinance on the Conditions for Collection of Blood from Blood Donor Candidates and Blood Donors and the Announcement of the Minister of Health on the Requirements of Good Practice for Collection of Blood and Its Components, Examination, Preparation, Storage, Dispensing and Transport for Organizational Units of the Public Blood Service, as well as the Recommendations and Rules for Qualification of Blood Donors, autologous blood donors do not have to meet all the criteria for blood donors, i.e. age or weight. The determining factor for the possibility of autologous donation is primarily the clinical condition of the donor [3–5, 8].

Examples of eligibility for autologous blood donation [4, 9]:

1. A detailed evaluation of the cardiovascular and cerebral circulation is recommended for patients above 70 years of age.
2. Children may be eligible for the procedure

provided written consent is obtained from their parents or legal guardians. Above 16 years of age, the teenager also consents to the donation (this is in accordance with the statutory regulations concerning the professions of physician and dentist [Article 32, paragraph 5] and the Patient Rights and Patient Rights Ombudsman Act, which stipulates the requirement for obtaining the consent of a patient who is at least 16 years old for medical procedures, alongside the required consent of a legal representative. In the case of a discrepancy between the decisions of, for example, a parent and a minor patient, the matter is resolved by the guardianship court).

3. In the case of individuals weighing less than 50 kg, the volume of blood collected for autotransfusion should not exceed 12% of the circulating blood volume (approximately 8 mL/kg).
4. For children of less than 10 kg, b.w. autotransfusion is not advisable due to technical difficulties in blood collection, such as access to a vein or the child's lack of cooperation during donation.
5. It is permissible to collect blood in pregnant women for autologous transfusion or intrafetal transfusion (treated as autologous transfusion), provided the consent of the patient and the doctor in charge of the pregnancy is obtained.

Absolute contraindications for autologous blood donation include [5, 9]:

— Hb level < 10 g/dL (Hb 10–11 g/dL — individual indications),
— active bacterial infection — active bacterial infections or the threat of such infections, e.g., in the case of a tooth extraction within 24 hours, a catheter permanently inserted into the urinary bladder, treatment with antibiotics, recent diarrhea (within the last 2 weeks), open cuts or wounds,
— respiratory failure,
— severe aortic stenosis,
— myocardial infarction within six months,
— severe ischemic heart muscle disease,
— severe circulatory failure,
— cardiac defects progressing with cyanosis,
— unstable hypertension (severe forms of hypertension),
— brain tumor, neurological disorders, epilepsy, stroke within the last 6 months, cerebral circulatory failure.

The finding of blood-transmitted infection markers in the donor is not an absolute contraindication to preoperative blood donation. The final decision on the donation and transfusion of autologous blood in such a case is made by the referring physician/doctor who is to perform the transfusion. According to the guidelines, serological testing is mandatory and molecular testing for the presence of genetic material of HIV, HBV or HCV is recommended. This measure, is to protect the donation in case of an administrative error, resulting from incorrect identification of the patient and transfusion of blood to another person.

Prior to donation, each donor should be informed of possible side effects, including serious adverse post-transfusion reactions, as well as the possible need for allogeneic blood transfusion if more blood is lost than anticipated. The donor must give written consent to the donation procedure. Each donation should be registered. A blood donor is registered and documentation is maintained in accordance with applicable regulations, which are the same as those for allogeneic donors.

Rules for collecting donations

Collection of autologous donations should preferably take place at the Blood Transfusion Center upon written referral issued only by the health care provider who will receive the blood or blood components. Blood is collected at intervals of every 3–7 days if the hemoglobin concentration remains above 11 g/dL. The procedure used in this way is important because the erythropoietic response to autologous blood collection cannot maintain sufficient hematocrit levels in the patient. During the period when the patient is donating blood, he should start supplementing with an iron preparation in order to properly stimulate erythropoiesis. Iron lost with blood significantly reduces efficient erythropoiesis, and supplementation is intended to stimulate it. In some cases it is necessary to administer erythropoietin. Typically, 1–2 procedures for collecting autologous blood are performed before the planned surgery. The last collection is best performed 7 days before surgery, and a minimum of 72 hours before the procedure. Approximately 450 mL of blood is drawn from a donor weighing a minimum of 50 kg. For those weighing between 45 and 50 kg, it is recommended to collect 405 mL of blood without removing the preservative fluid from the container, while for those weighing < 45 kg, blood should be collected in smaller containers (200–250 mL). In a situation where reduced-volume containers are not available, the volume

of preservative fluid should be matched to the volume of blood collected (less than 405 mL) [4, 5, 7, 10, 11].

The autotransfusion procedure itself is no different from an allogeneic transfusion. In this procedure, the same serological and virological tests are performed (with the exception of molecular tests, which are not always conducted for autologous donations, however they are recommended) as for allogeneic transfusions. Each collected container of blood or blood components from an autologous donor versus an allogeneic component must be labeled with the designation, "autotransfusion", as well as donor/recipient data such as: name, surname, date of birth/PESEL, name of the unit or organizational unit of the medical entity's establishment transfusing blood or blood components, donation number, ABO and Rh system group, date of collection, expiration date, as well as the notation , "risk of infection" if molecular testing was not performed or testing was performed confirming the presence of markers of infectious agents. If both serological and molecular tests are performed and a negative result is obtained, the above-mentioned notation is not placed, and the field in this place on the label is left blank [12] (Fig. 1). Storage of autologous blood is carried out in specially labeled equipment so that there is no confusion, while the storage conditions and expiration date of the blood components are no different from those of an allogeneic donor. The patient donates whole preserved blood (KPK), which remains in the container for clinical use, and its expiration date is 35 days in the case of donation to CPDA-1 fluid. From the collected whole preserved blood it is possible to prepare: red blood cell concentrate (KKCz), platelet leukocyte sheepskin and fresh frozen plasma (FFP). It is also possible to collect individual autologous blood components by apheresis, such as platelet-poor leukocyte concentrate derived from apheresis is valid for 5 days and stored like other UKKP at a temperature of +20 to +24°C. In most cases, the transfusion uses a preparation of the platelets, which can be stored for 42 days at +2 to +6°C under the conditions of preparation with an enrichment solution. FFP is usually not received by the hospital and, like the leukocyte-platelet sheepskin, remains destroyed in the CKiK, since in the case of autotransfusion [9].

In patients before autotransfusion, as with allogeneic blood components, the following should be performed [13, 14]:

— determination of ABO and RhD blood group according to the techniques used for patients;
— testing for the presence of immune antibodies directed to red blood cells; this test is performed because there is always a risk of transfusion of allogeneic blood during the procedure.

Before transfusing autologous blood, it is necessary to:

— perform the determination of A, B and D antigens from the blood sample taken from the drain segment;
— compare the obtained blood group result from the drain segment with the patient's confirmed blood group result;
— perform a crossover test.

Prior to transfusion of PPC or CRC, it is necessary to compare the patient's data (check whether the patient's personal information, i.e., name, PESEL/date of birth, are consistent with the information appearing on the confirmed blood group result, the result of the matching test and the container, as well as with the information given by the patient/read from the patient's wristband during verification) (Fig. 2). For full verification, it is also necessary, to compare the recipient's blood type shown on the blood type result with the match sample [13], any non-transfused component must always be destroyed in apresented on the blood group result with a compatibility test [13].

Acute normovolemic hemodilution

Acute Normovolemic Hemodilution (ANH) is a blood saving technique aimed at reducing red blood cell loss during surgery. The method was first used in 1946, and has since found widespread use in postpartum hemorrhage, cancer and orthopedic surgeries, such as joint replacement and spinal surgery. These procedures involve large areas of trauma, which involves significant blood loss and the need for blood transfusion. Preoperative isovolemic hemodilution involves drawing blood immediately before surgery to then supplement the volume of circulating blood with crystalloid solution (0.9% NaCl), Ringer's fluid, multi-electrolyte or colloid fluid (albumin solutions). The basis for the administration of fluids is their appropriate choice and the maintenance of total protein concentration at 5 g/dL, to ensure adequate colloid-osmotic pressure. It is assumed that each 1 mL of collected blood is supplemented with 3 mL of crystalloid solution, while for colloids 1 mL per 1 mL of collected blood. AHN is usually performed after anesthesia, before the start of surgery [15, 16]. The entire process begins with the collection of a fixed amount of blood calculated based on:

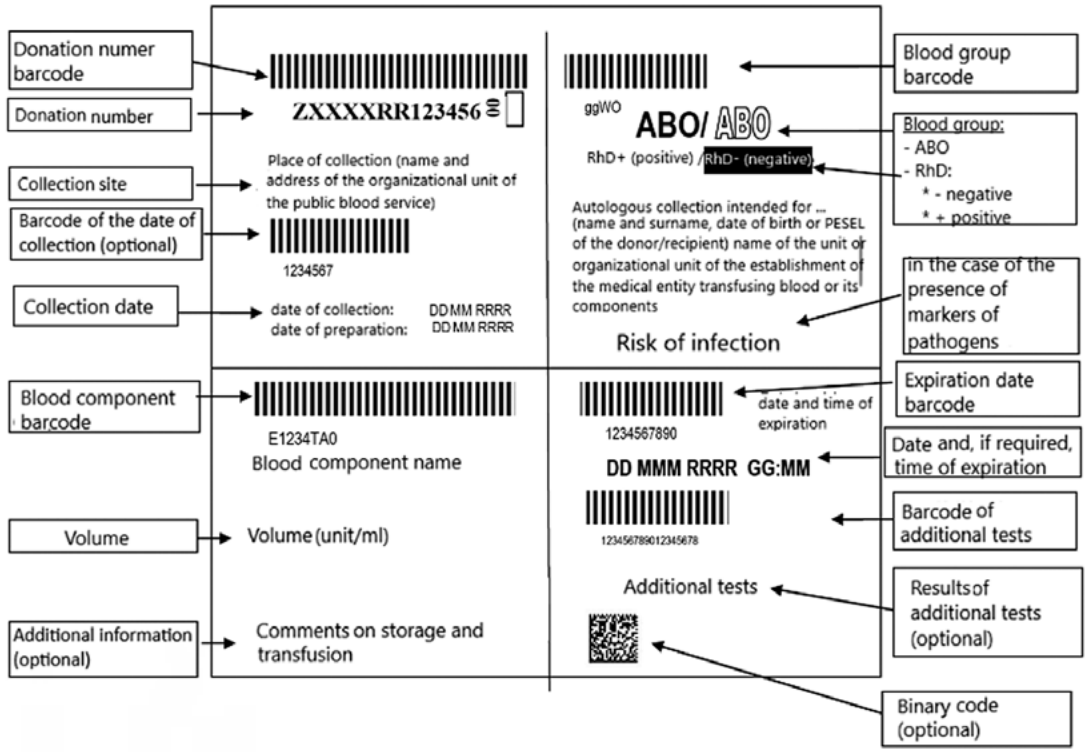

Figure 1. Model of a label used for labeling containers intended for autotransfusion [9]

— hemoglobin concentration and/or hematocrit value — the lowest acceptable Hb value during surgery is 5–8 g/dL, while maintaining normovolemia, so higher Hb or Ht values authorize blood draws (e.g., preoperatively determined Hb level >12 g/dL). The patient's initial hematocrit and circulating blood volume are key factors in estimating the amount of blood to be drawn before surgery. Typically, patients with a higher hematocrit have a higher success rate of hemodilution because more red blood cells can be collected from them [15];
— the patient's estimated volume of blood loss during surgery;
— total blood volume — blood volume increases with weight. A man weighing 70 kg has about 5 liters of blood. Women have a slightly lower blood volume per body weight. For example, the blood volume of an adolescent woman weighing 55 kg will be about 3,500 mL (55 kg × 60–65 mL/kg);
— red blood cell mass — red blood cell mass is calculated based on hematocrit and blood volume. Patients with a calculated higher red blood cell mass can donate more blood;
— the clinical condition of the patient;

Figure 2. Example of an autologous donation RBC label

— red blood cell replacement time — this is the estimated time to replenish stored blood after surgical blood loss. ccordance with regulations [9].

Blood is collected in containers that are properly labeled with the patient's name with the notation,

"autologous donation", so that there is no confusion during transfusion. Blood collected from the patient is stored in a refrigerator at a temperature of +2 to +6°C for 24 hours or 8 hours at a room temperature of +20 to +24°C. Rapid transfusion of colloidal or crystalloid fluids is intended to adequately dilute the blood and lower the hematocrit, thus sparing the red blood cells. This is because the patient loses blood with a lower hematocrit due to dilution. It is considered that hemodilution can be used in patients who can tolerate lowering the hematocrit to 21% or lower. Carrying out this process reduces the concentration of oxygen present in arterial blood and triggers a hemodynamic process, leading to blood concentration equalization and increased oxygen utilization. Hemodilution improves the rheological properties of the blood, resulting in better perfusion of organs, including the lungs. There is a decrease in peripheral and pulmonary vascular resistance, resulting in increased blood flow in the lungs. It influences an increase in myocardial contractility and cardiac output, as a result of increased stroke volume due to increased venous return. The proper functioning of the above-mentioned compensation mechanisms is dependent on the maintenance of normovolemia [5, 16–18].

The use of normovolemic hemodilution obliges frequent measurement of pH and blood chemistry. During the process, a series of hematocrit tests and arterial blood gasometry are performed, which allow us to determine the estimated blood loss, the effectiveness of replenishing circulating blood with fluids, as well as the degree of oxidation. We can learn about the need to supply oxygen to the patient's body at the same time from the electrocardiogram, which may show tachycardia suggesting myocardial ischemia. These are among the first signs of hypoxia.

The first unit of blood drawn has the highest hematocrit values, as well as the highest platelet count or concentration of plasma clotting factors. At the end of the procedure, the previously collected blood is transfused to the patient in order from the last donation to the first one collected in order to quickly replenish the lost blood components [15].

Benefits and risks of normovolemic hemodilution [5, 13, 16, 18].

Benefits include:

— reduction in blood viscosity,
— reduced incidence of thromboembolic complications in the perioperative period — this prevents microembolism of the pulmonary parenchyma,
— improved microcirculation and prevention of anemia-induced hypoxia,
— lowering the absolute loss of red blood cells by supplementing circulating blood volume with crystalloid or colloidal fluids while limiting erythrocyte loss,
— reverse transfusion of platelets and clotting factors to the patient,
— reducing the possibility of acidosis.

Risks:

— poor tolerance of the procedure when Hb values are too low with associated tissue hypoxia, hypervolemia due to excess transfused fluids to supplement blood volume.

Indications and contraindications for qualifying a patient for normovolemic hemodilution dilution of clotting factors are presented in Table 2.

Compared to preoperative autologous transfusion, ANH autotransfusion is a simple procedure with low cost and short blood storage time. ANH is the only method that provides autologous blood, with rare disruption of platelet function, clotting factors and loss of a small number of red blood cells. When combined with preoperative autotransfusion, ANH effectively prevents postoperative bleeding and anemia. It represents a safe and effective method of autologous transfusion and should therefore be available for widespread use [3].

Intraoperative autotransfusion

The use of intraoperative autotransfusion is recommended in cases where bleeding exceeding 20% of circulating blood volume is expected [3]. These include cardiac surgery, orthopedic surgery, vascular surgery or gynecologic surgery. The use of intraoperative autotransfusion can improve postoperative Hb levels, increase oxygen binding capacity, and tissue oxygenation. In addition, patients who receive intraoperative autotransfusion recover cellular immune function faster [1, 3]. Transfusion of extravasated blood is invaluable when blood is not available for patients with immune antibodies. It also allows for rapid replenishment of blood without exposing the patient to immunization.

The principle of this method is to recover the patient's lost blood from the surgical field. It involves the use of specialized equipment and aspiration of the extravasated blood. The blood is transported to a reservoir, where it is combined with an anticoagulant to prevent clotting. Freshly extravasated blood has been shown to contain a large amount of free hemoglobin, inflammatory mediators and many other contaminants, so washing is recommended. The washed blood is drained into a collection con-

Table 2. Indications and contraindications for qualifying a patient for normovolemic hemodilution dilution of clotting factors

Indications	Contraindications
Probability of transfusion exceeding 10%	Serious cardiovascular and pulmonary disorders
Expected significant blood volume loss (about 20%)	Renal dysfunction
Qualification of the patient when the preoperative hemoglobin concentration is at least 12 g/dL	Bacterial infections or risk of bacteremia

tainer through a system of drains. When at least 200 mL is collected in the container, the recovered blood is centrifuged and suspended in isotonic NaCl solution, and the erythrocyte suspension is pumped into a container for blood transfusion. In this case, the recovered blood is again ready for transfusion. If immediate transfusion is not possible, the blood should be stored at 2–6°C. Recovered erythrocytes are fresh, with no storage changes, so they can be stored for up to 6 weeks, but usually transfusion takes place immediately after the procedure, since red blood cells show their greatest clinical utility up to 2 weeks, when the level of 2,3-diphosphoglycerate (DPG) is high. After this time, it is depleted by 95%, and is virtually absent after 3 weeks. The depletion of 2,3-DPG causes a leftward shift in the hemoglobin-oxygen dissociation curve, which can reduce the removal of oxygen from the hemoglobin molecule at the tissue level [2]. It turns out that using the aforementioned method, we are able to recover about 50% of the blood lost during the procedure. The quality of the prepared blood shows no major differences from allogeneic blood, if all precautions have been taken beforehand [1, 10, 19]. The recovered erythrocyte mass is characterized by high hematocrit values of about 50–60%, low free Hb concentration and normal platelet count. In addition, it is devoid of clotting factors, as well as fibrinogen degradation products, which contributes to the low rate of thrombotic complications after transfusion [18]. Interestingly, a rich source of recovered red blood cells can be the gauze pads used to wipe blood from the surgical field. It has been estimated that each 18 × 18-inch laparotomy sponge can contain up to 100 mL of red blood cells. The gauze pads are soaked in a bowl of saline and then wrung out to recover the extravasated blood, but this is not recommended because of the potential for contamination and infection [1]:

There are also contraindications to this therapeutic method. Most of the contraindications are relative. The most important include [1, 5, 19]:

1. Lysis of red blood cells caused by washing the recovered cells with a hypotonic solution, i.e. hydrogen peroxide. If the blood is washed properly, the destroyed cells should be washed away along with the impurities. If one proceeds with blood transfusion without adequate washing, adverse reactions may occur, i.e.: renal failure, decreased hematocrit, increased lactate dehydrogenase, increased total serum bilirubin, the occurrence of disseminated intravascular coagulation.
2. Contamination of donated blood with disinfectants commonly used for skin disinfection.
3. Improper asepsis of the surgical field from which blood is drawn.
4. Risk of bacterial contamination of blood, especially in patients after extensive abdominal trauma with gastrointestinal tract damage.
5. The patient's malignancy. Due to the possibility of transfusion of tumor cells, which are the source of tumor spread, there are doubts about the use of this method in oncological patients. Clinicians are concerned that, along with the recovered blood, there is a likelihood of transfusion of cancer cells that may proliferate in the body causing metastasis. Recent studies report that specific malignancies have been identified, i.e.: lung, colorectal, liver or prostate cancer, for which the procedure is safe as long as a leukocyte filter is used, as well as a detailed evaluation of recurrence and metastasis before and after surgery [1, 3, 20].
6. Placenta previa in pregnant women.
7. Hematologic diseases: e.g., thalassemia, sickle cell anemia.

The intraoperative autotransfusion procedure is the only form of blood transfusion accepted by Jehovah's Witnesses. This aspect is of great importance to them, since any other form of transfusion is considered a grave sin (conduct contrary to the Bible) and results in exclusion from society and the family. According to the denomination of Jehovah's witnesses, it is forbidden to transfuse someone else's blood as well as one's own extravasated blood. Some of them agree to intraoperative blood recovery, provided that the apparatus is continuously connected to the body during surgery [21, 22].

When the patient absolutely refuses blood transfusions, other alternative methods should be used to avoid both autologous and allogeneic transfusions. Several approaches have been developed to offset blood loss during surgery [22, 23]:

— use of surgical and pharmacological methods to reduce blood loss,
— use of drugs that stimulate erythropoiesis, e.g., iron preparations, erythropoietin, stimulate thrombopoiesis, e.g., thrombopoietin receptor agonists,
— use of blood replacement fluids, i.e. crystalloid and colloid solutions,
— elimination or reduction of bleeding — inducing drugs.

Postoperative autotransfusion

Postoperative autotransfusion involves using the extravasated blood and then collecting it with a surgical drain. Postoperative autotransfusion is recommended for patients with an anticipated blood loss of 900 mL or more and the ability to collect it from the surgical field. This method is effective for bleeding from the surgical wound, when bleeding reaches 100 mL/hr. It is most often used during thoracic, abdominal, spinal or hip surgery. The collected blood is properly filtered and washed, as its recovery involves partial hemolysis, loss of fibrin, and high concentrations of inflammatory cytokines or cellular fragments. Heparin or citrate is added to the collected blood to recover about 50–60% of the red blood cell mass. The blood should be transfused within 6 hours of starting to collect it, and the entire procedure should be documented. If the blood is not transfused in the given then it is destroyed according to the regulations. The risk of transfusion of blood recovered from drainage can cause infection, including post-transfusion sepsis, hypotension, hemolysis, kidney damage or disseminated intravascular coagulation [5, 15].

Contraindications to postoperative autotransfusion include:

— bacterial infections of the surgical wound,
— neoplastic diseases,
— topical use of substances that have procoagulant properties, such as collagen — this increases the risk of clotting activation.

Complications and adverse reactions of autotransfusion

The mechanism of adverse post-transfusion reactions after autotransfusion procedures may in some cases be the same as after allogeneic blood transfusion. Studies show that non-hemolytic post-transfusion reactions after autotransfusion procedures occur 10 times less frequently than after allogeneic transfusions. Often, reactions occurring after autologous transfusions are related to the patient's current condition. The most common complications include [5, 18]:

— Coagulopathy — blood lost during a surgical procedure contains all blood components. Processing of extravasated blood returns only red blood cells to the body while clotting factors and platelets are removed during the blood washing process. In such cases, there is a need to supplement their deficiency. Fragments of platelet cells that have not been adequately washed out may be responsible for the onset of disseminated intravascular coagulation syndrome;
— Other coagulation disorders — a complication occurring due to activation of transfused aggregates of platelet cells and leukocytes. It can manifest clinically in the form of intravascular coagulation syndrome or increased permeability of pulmonary capillaries as acute respiratory distress syndrome (ARDS);
— Infections — these complications can occur when intraoperative autotransfusion is performed during surgery in an infected surgical field. Transfusion of stored blood with high concentrations of inflammatory mediators is associated with transfusion of pyrogenic substances
— Embolism — microaggregates composed of platelets and white blood cells can cause blockages in the peripheral circulation;
— Circulatory overload and hypotensive reactions — arise from failure to follow transfusion indications.

Summary

The last several years have witnessed a steadily growing demand for blood and blood components. The population is getting older, and the number of potential recipients is beginning to far exceed the number of blood donors. This is one of the reasons why alternative methods to allogeneic transfusion, including the use of autotransfusion, should be increasingly used. The possibilities offered by autotransfusion are often the only chance for people who have antibodies directed to a common antigen or for those with a rare blood type.This form of transfusion eliminates the transmission of infectious agents and the occurrence of other adverse reactions. Autologous transfusions are

recommended and used primarily during planned extensive surgeries in which significant blood loss is anticipated. They also serve as an alternative in the aftermath of procedures for individuals for whom compatible allogeneic blood is not available, and in some cases in Jehovah's Witnesses. Despite their advantages, autotransfusions are not as popular as before, but it is important to remember that this procedure allows for the availability of blood transfusions and their components [1, 2, 15, 17, 24].

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