Autologous transfusion

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Autologous transfusion

Three methods of autologous transfusion.

(i) Cell salvage:

(ii) Preoperative autologous donation

(iii) Acute normovolaemic haemodilution

Cell salvage

This technique can be performed intraoperatively (ICS), postoperatively (PoCS), or by both ways.

The process involves collection of shed blood from the surgical field. The salvaged blood is then either filtered or washed and processed prior to retransfusion back to the patient in the immediate postoperative period

devices available for cell collection,

(i) Blood may be collected from surgical suction into reservoir canisters. It is then processed in batches (1000 ml salvaged blood) producing units of packed red blood cells for reinfusion.

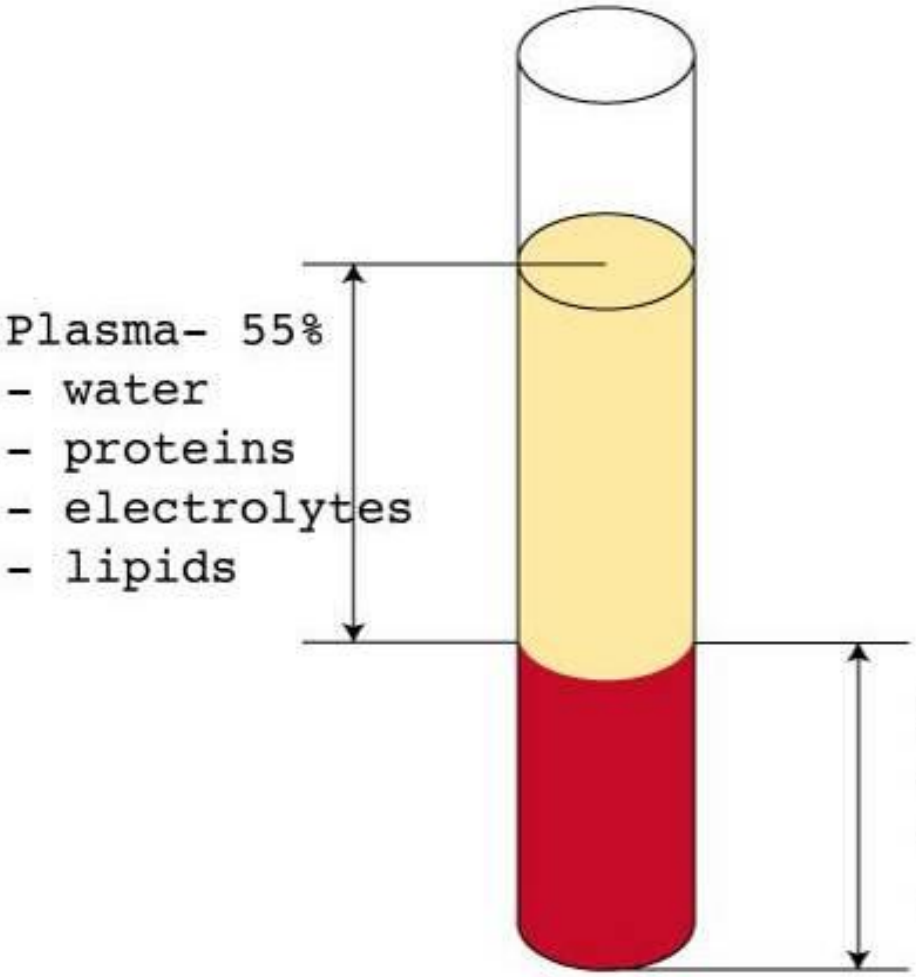
The cycle can be repeated once further quantities of blood are salvaged.

devices are available for cell collection

(ii) A semi-continuous system may be used where blood is simultaneously scavenged, anticoagulated and washed ready for reinfusion. Smaller volumes of blood can be processed with this system.

(iii) Simple single use reservoir bags, which are attached to surgical drains to collect blood lost after the operation

Blood Components



Plasma- 55%
- water
- proteins
- electrolytes
- lipids

Formed Elements - 45%
- Red Cells
- White Cells
- Platelets

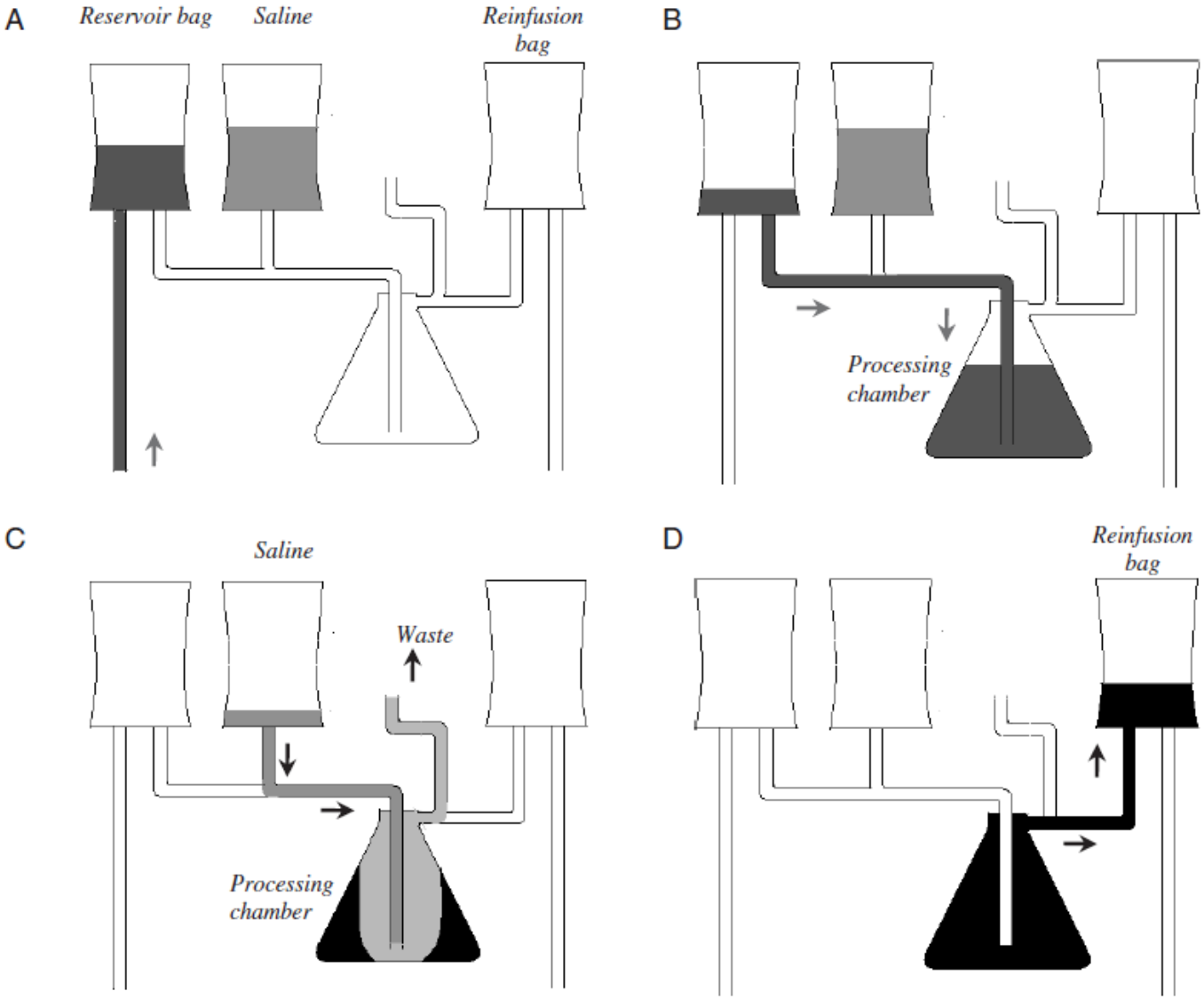


Fig. 1 (A) Suctioned blood is heparinized, filtered and collected into a reservoir bag. (B) Blood passes into the processing chamber (spinning bowl or disc device). (C) Red cells are separated from debris and other blood components using centrifugal fractionation. The waste component is removed. The red cells are washed in saline and centrifuged again. (D) The cells are transferred to a reinfusion bag ready to be given back to the patient.


autoLog
Medtronic
STOP

Advantages

provides a supply of red blood cells in proportion to the losses and theoretically an unlimited amount of blood may be collected.

technique of choice when large blood losses are expected and becomes cost-effective with large volume losses.

PoCS utilizes simple and inexpensive devices.

Reducing the requirement of allogenic blood transfusion. accepted by some Jehovah's Witnesses.

Disadvantages

ICS requires complex specialized equipment

high level of training is required for the operator.

The process is complex and can result in serious complications

The blood salvaged may contain cell debris, free haemoglobin and micro-aggregates.

Precautions and contraindications

contraindicated in patients with sepsis and in contaminated surgery, for example bowel surgery.

The use of cell salvage in malignant disease and obstetrics remains controversial

Complications …..

significant chenges in haematological parameters may occur

Electrolyte disturbances such as increased concentration of sodium and chloride and reduced magnesium, calcium and albumin.

Dilutional coagulopathy as washed blood does not contain platelets or clotting factors.

This may require blood component therapy.

Complications….

Incorrect use of washing and filtration devices may result in red cell destruction.

potential for air embolism

Pyrexia is often reported following re transfusion of unwashed salvaged blood, occurring with an incidence ranging from 1.5 to 12%.

Controversies…

cost-effective is limited.

reduced the rate of exposure to allogenic blood transfusion by 40%.

It did not adversely affect mortality or complications such as bleeding, infection, myocardial infarction, thrombosis and stroke.

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Controversies

Malignant cells may be removed by filtration and further reductions achieved by irradiation. This remains an area of much research.

The use of cell salvage during caesarean section remains controversial because of concerns regarding amniotic fluid embolism and rhesus sensitisation

Preoperative autologous donation

The patient is required to present to a National Blood Service for repeated blood donation of 450 ml blood every few days prior to elective surgery.

This process commences up to 5 weeks

prior to surgery allowing the collection of up to 4 units of blood.

Oral or i.v. (faster increase in Hb) iron supplementation may be required to maintain erythropoiesis.

common in parts of Europe and the US

Preoperative autologous donation

The last donation should take place at least 48–72 h before surgery .

The blood is collected into citrated phosphate dextrose blood bags and stored in the blood bank in the conventional manner.

It should be clearly labelled to identify it from allogenic units.

. There must be clear communication and documentation that PAD blood is available

Advantages

The technique provides up to 4 units of blood, which will cover many elective operations

The risks of viral transmission and immunologically mediated haemolytic, febrile or allergic reaction are virtually eliminated

. Immunemodulation seen after allogenic transfusion does not occur. This may decrease the risk of postoperative infection and recurrence of cancer.

Disadvantages

The system requires a great deal of logistical planning well ahead of surgery.

This may be a particular problem where surgery is rescheduled at short notice.

Predonated blood must be clearly labelled in the blood bank and the risk of human error remains.

Disadvantages

Up to 50% of predonated blood is unused

this wastage together with costs of administering PAD programmes results in higher cost per unit of blood in comparison with allogenic blood.

Not all PAD patients are able to tolerate

Iron therapy may be insufficient to support increased erythropoiesis. Erythropoietin may be used but this adds to the expense and is not without side effects;

for this reason, it is not routinely recommended

Precautions and contraindications

- The patient must be able to tolerate repeated phlebotomy and the resultant haematological and cardiovascular challenges

- Patients are excluded if they have pre-existing anaemia, cyanotic heart disease, ischaemic heart disease, aortic stenosis or uncontrolled hypertension.

Complications

All the usual complications of blood donation/storage may occur, including bacterial contamination at collection and haemolysis because of improper collection, handling, storage or transfusion technique.

In a recent report, several instances were reported where allogenic blood was transfused, despite availability of PAD blood, because of lack of communication

Controversies

In practice, it is difficult to maintain erythropoiesis and Hb concentrations during weekly autologous blood donation.

So much so, it is suggested that the patient who embarks on a PAD programme with a Hb of 13 g dl1 ends up undergoing surgery with a Hb of 10 g dl and 3 units of autologous blood in the blood bank.

The lower preoperative Hb at the start of surgery increases the need for perioperative transfusion, which may offset some of the benefits.

Controversies

For these reasons PAD is only recommended in the following specific circumstances in the UK

Patients with extremely rare blood groups or multiple red cell antibodies where cross-matching is very difficult

Patients donating bone marrow

Patients who are so reluctant to receive allogenic transfusion that they would refuse surgery otherwise (within reason).

Acute normovolaemic haemodilution

ANH is performed in the anaesthetic room shortly after induction of anaesthesia.

A large-bore cannula is inserted to allow the collection of 15–20 ml kg of blood prior to surgery.

Blood volume is restored with crystalloid or colloid.

The collected blood is carefully labelled and kept with the patient in the operating room at all times; there is no need for refrigeration.

Acute normovolaemic haemodilution

The blood is transfused back to the patient at the end of surgery once haemostasis is achieved.

The technique has similar exclusion criteria as for PAD.

To achieve maximum efficacy in terms of Hb spared, aggressive haemodilution is required to haematocrits of approximately 20%.

Advantages

performed immediately prior to surgery eliminating the need for the complicated preoperative donation regimes and storage requirements.

It produces whole blood containing platelets and clotting factors.

The haemodilution results in a lowered haematocrit so that during surgery relatively dilute blood is lost because of surgical bleeding

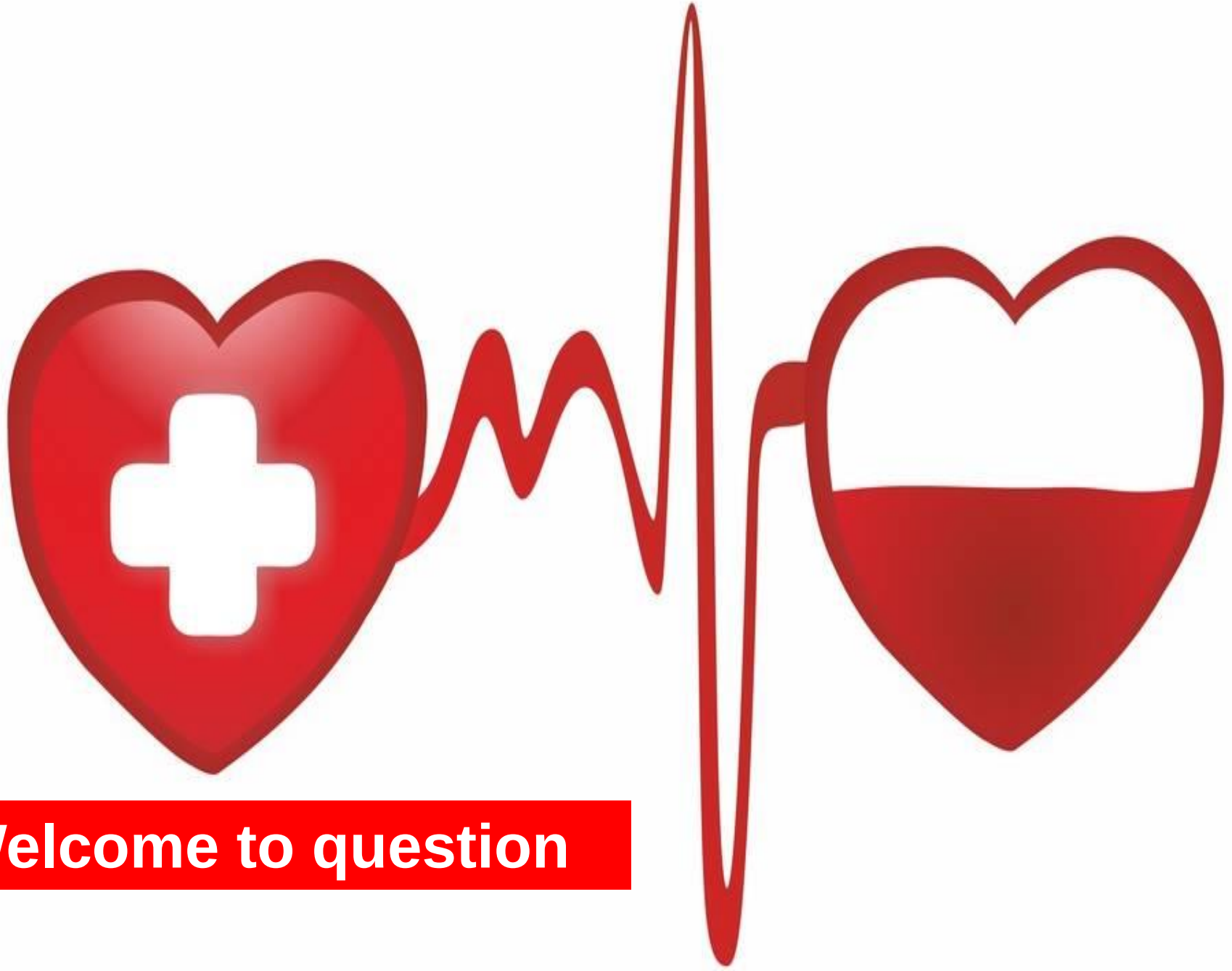
Blood is maintained at the point of care reducing the risk of blood mismatch because of administrative errors.

Disadvantagesand complications

There is an acute and significant reduction in haematocrit leading to haemodynamic instability and a possibility of myocardial ischaemia in susceptible patients.

Additional training is required for anaesthetic personnel.

Complications arise becauseof the physiological effects of the acute haemodilution



Welcome to question