Cell Saver and Bloodless Surgery

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When considering surgery, many find it difficult to imagine entering invasive procedures without the option of accepting blood transfusions should the need arise. However, the medical community has been dealing with this issue mainly when treating Jehovah's Witnesses in the past century who refuse to accept blood transfusions.. Bloodless surgery was needed. To quote: "Originally developed to accommodate Jehovah's Witnesses, the practice has gone mainstream with many hospitals promoting their bloodless surgery programs to the general public" - *The Wall Street Journal*

Traditional blood transfusions can result in the transmission of Viruses, Bacteria, or run the risk of Administrative errors, and the threat of mutating diseases that are harder to catch in screening also presents a problem. Some cancers, such as gastric and pancreatic cancer, Have a known correlation with blood transfusions, which increase the rate of recurrence. Another problem was that standards for blood transfusion were not clearly defined and varying amounts of blood would be used, Some even in situations that were not even necessary to begin with (1 in 4 cases). Even patients own blood that has been stored degrades and deforms in the time it is outside the body and when it returns, it doesn't flow through blood vessels or carry oxygen as well as it had before. Transfusions can suppress the immune system, for example, leaving a patient open to infection, slower healing and a longer recovery time.

When dealing with Bloodless surgery, there are preoperative steps that must be taken dealing with increasing the RBC count (Which can be done using B12, Iron, Folic Acid). Erythropoietin (EPO), a genetically engineered hormone, stimulates the bone marrow to produce red blood cells, and can also be used several weeks before hand. In fact, it is suggested to use 6 weeks prior to surgery. By increasing initial RBC mass, and decreasing transfusion threshold (or point where a transfusion would be needed) , can allow greater RBC loss during surgery.

Patient positioning is also important while in surgery, pressure changes by position relative to the heart will affect blood pressure and chances of excessive bleeding. The ambient temperature is also important to keep warm and should be taken into consideration to keep the patient from cooling, and hindering the ability to form clots.

Intraoperative Blood Salvage (IOBS) (also known as the Cell Saver) is used if intraoperative bleeding becomes heavy. This allows the patient to recover shed blood as it flows through the device, filters debris, washes red cells as they circulate, and can save up to 15% of blood that would have been lost. Only used when loss expected to be 1 liter or more in an adult patient. Some types even are able to be used on infants, and some simple versions are good for post operative to keep blood from being wasted.

Using hemodilution can also save Red Blood Cells. Hemoglobin-rich blood is taken from a vein and replaced by an equal amount of a nonblood fluid to expand the volume to its original amount; the patient's own drawn blood is held for use after surgery. Albumin, a protein found in plasma, can also be used to maintain or increase blood volume, or to manage an underlying medical condition

Just to mention some other materials used concurrently in bloodless surgery; The Argon Beam Coagulator: An electrocautery device that deals with small-artery bleeding and commonly used in surgeries on organs that bleed easily; Microwave Coagulating (Uses Microwaves) and Harmonic Scalpels (Uses High Speed Vibration) to cause coagulation.; Nonblood Fluids: Ringer's lactate, hetastarch, dextran and saline are used to control blood volume and prevent shock while facilitating red blood cell circulation; Heart-lung bypass machines: that circulate a patient's blood during surgery; High-tech scalpels that clot the blood while they cut tissue or freezing tissue before it is cut. Brain surgeons can use the gamma knife which delivers a high dose of radiation to exact points in the head through small holes in a helmet.

However, are bloodless procedures really better than using transfusions? After surveying patients who received transfusions and those that used bloodless surgery, the length of stay in the hospital was 4.03 days and 2.64 days respectively, with a readmission rate of 12.3% and 2.5%. The cost of blood in the US, including testing, is about $500. Most insurance will not reimburse the cost of the first 3 units of blood given to a patient per year. "However, hospitals may be reimbursed for drugs that boost a patient's red blood cell count. Geisinger Medical Center began a blood conservation program in 2005 and reported a recorded savings of $273,000 in its first six months of operation."

Shander (A director of the Englewood Institute) encourages using less blood, believing that withholding blood is a viable and preferable choice for most patients. This benefits patients and ensures surgeons pay close attention to their technique and "tests their willingness to depart from tradition", seeing as progress is rarely made by repeating the same routines. As of 2006, 160 bloodless centers nationwide with an increasing amount of physicians taking up the challenge of bloodless surgery, but it is important to work on increasing the efficiency of devices like the Cell Saver, and finding more ways to advance the field.

Sources

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