

high in fibre, without excess caffeine containing drinks or alcohol, should keep the patient with true functional hypoglycaemia free of symptoms.

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Abuse of fresh frozen plasma

Replacing the blood volume of a patient over 24 hours or less may lead to widespread bleeding because of defective coagulation. Stored blood contains virtually no functioning platelets, and factor V and factor VIII deteriorate during storage.¹ A massive transfusion is therefore accompanied by dilution of these clotting factors, but bleeding after massive transfusion is more likely to be caused by consumption of clotting factors.² Disseminated intravascular coagulopathy commonly follows trauma, sepsis, and hypotension—conditions that often necessitate a large transfusion. Because disordered blood coagulation may follow the transfusion of large volumes of stored blood it is often suggested that one or two units of fresh frozen plasma should be transfused routinely with every four units of stored blood.³ Yet nothing but anecdote supports this contention.

Many patients who receive a massive transfusion do not bleed abnormally, and one study showed that transfusing one unit of fresh frozen plasma for every three of whole blood or packed red cells did not reduce the amount of blood transfused.⁴ If abnormal bleeding does occur, thrombocytopenia, not deficiency of factor V or VIII, is the likeliest cause.⁵ A consensus development conference of the National Institutes of Health therefore recommended in 1985 that fresh frozen plasma should not be given as a supplement to blood transfusion unless an abnormality of blood coagulation was suspected on clinical grounds and had been confirmed in the laboratory.⁶

Fresh frozen plasma is often given as a volume expander, and an American study found that volume replacement was the sole indication for using half of the fresh frozen plasma supplied by one transfusion centre.⁷ The consensus conference advised that fresh frozen plasma should not be used for this purpose because safer, cheaper, and more readily available volume expanders exist.

Furthermore, the indiscriminate use of fresh frozen plasma

is hazardous. Blood, or any of its unpasteurised derivatives, may transmit infection, including hepatitis and the acquired immune deficiency syndrome. Occasionally, the antibodies present in plasma may produce harmful effects—for example, leucoagglutinins may cause pulmonary infiltrates.⁸ Anti-A and anti-B in plasma may destroy the recipient's red cells, although this hazard can be avoided by using fresh frozen plasma that is ABO compatible. Fresh frozen plasma may also cause hypersensitivity reactions.⁸ To take a wider view, any fresh plasma retained at a regional transfusion centre and supplied as fresh plasma to hospitals is withheld from the national Blood Products Laboratory. In north west London so much fresh frozen plasma is now called for by doctors that the transfusion centre cannot send its quota to the Blood Products Laboratory, which needs it to manufacture factor VIII and, coincidentally, albumin. Consuming fresh frozen plasma as an unnecessary adjunct to transfusion thus delays Britain's self sufficiency in factor VIII.

The proper indications for using fresh frozen plasma are few. The commonest indication is abnormal bleeding in which a clotting defect has been proved. This category includes some patients with established disseminated intravascular coagulopathy and some with liver disease who are either actively bleeding or about to undergo major surgery.⁹ Whether fresh frozen plasma or clotting factor concentrates should be given prophylactically to patients with liver disease before needle biopsy is debatable¹⁰; bleeding at biopsy seems to be unrelated to the prothrombin time.¹¹ Anti-coagulant action by compounds of the coumarin type may be reversed within 6-12 hours with vitamin K, but in more urgent circumstances fresh frozen plasma is required. Fresh frozen plasma may also be indicated in thrombotic thrombocytopenic purpura, although "outdated" plasma has been reported to be equally effective in this uncommon condition.^{12,13} Finally, fresh frozen plasma is required for patients with rare isolated factor deficiencies—of, for instance, factor V and factor X—for which specific concentrates are unavailable.

Surgeons and anaesthetists are the greediest consumers of fresh frozen plasma, and often they are misusing it. They should restrict their demand for this scarce resource.¹⁴

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