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ABO mismatching errors in heart transplants

Sir—Recent adverse publicity in the USA about a patient who received an ABO mismatched heart transplant is a tragedy that will reoccur unless steps are taken to preclude such an event. Standard procedures need to be instituted so that such mistakes cannot be made. 12 years ago, ABO mismatching errors in heart transplants resulted in eight deaths, and prompted me to to suggest a remedy.[1] I proposed that a red-cell crossmatch be done for all organ transplantations. This final check, has been universally mandatory for all blood transfusions for many years. Because an error would be equally disastrous for organ transplantation, there is no reason why the same test would not be used. Almost all the ABO mismatching errors that have occurred were because of clerical, administrative errors.

I recommended that hearts for transplantation be sent to the blood bank, not to the operating room. The red-cell crossmatching should be done in the blood bank, and then the heart can be released to the operating room. This simple 10-min test should be mandatory for heart transplantations, where an error invariably leads to certain death.

An HLA-antibody crossmatch test is also important for organ transplantations. It is usually argued that the urgency to proceed with the operation supersedes the need for an HLA crossmatch. However, for kidney transplantation, as Nishikawa and I have shown,[3] even 1 h extra cold ischaemia time has no adverse effect on 3-year graft survival rate. For heart and liver grafts, one possible procedure would be a 30-min cytotoxic crossmatch test to identify strong positive crossmatches. Weak crossmatches, if identified within a longer incubation period, can be treated with plasma exchange or other measures.[3]

The complex logistics of distant organ procurement, large recipient pools, and surgical urgencies invite errors. The last-minute tests that protect against a mistake are the red-cell and HLA crossmatching tests. Is it not time that red-cell crossmatching, which has been obligatory for blood transfusions, also be compulsory for organ transplantation?

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Blood transfusions: a hidden source of lead exposure

Sir—Lead is toxic to the developing nervous system,[1,2] and blood transfusions are a potential source of lead exposure.[3] Extremely low birthweight (ELBW) infants (who need repeated blood transfusions), together with those who need double-volume exchange transfusions, cardiac surgery necessitating bypass, extracorporeal membrane oxygenation (ECMO), or chronic transfusions, are extensively exposed to donated blood.

In 1991, we showed[3] that premature infants were exposed to unacceptably high amounts of lead through blood transfusions. To ascertain if hazardous concentrations of lead (PbB) are still present in transfused blood, we measured the PbB of 100 units of blood by atomic absorption spectroscopy. The mean PbB was 0·11 μmol/L (SD 0·17) and the median was 0·07 μmol/L (range 0·02–1·37). Two units had PbBs of 0·99 μmol/L and 1·37 μmol/L, respectively, representing an unacceptable hazard of lead exposure, particularly for ELBW infants, who often receive multiple transfusions from the same donor.

In 2001, ELBW infants received an average of 3·3 transfusions each of about 15 mL/kg during their admission to Rainbow Babies and Children's Hospital. If a unit contains 0·97 μmol/L PbB, the infant would receive 3 μg/kg intravenously on the day of transfusion. Infants undergoing exchange transfusion receive twice their volume of blood (160 mL/kg), equivalent to 32 μg/kg of lead. After exchange, 90% of the infant's blood is donor blood, thus their PbB would be 0·87 μmol/L.[4]

Acceptable concentrations of intravenous lead exposure are unknown. WHO has set a provisional tolerable weekly oral intake of 25 μg/kg.[5] We have calculated a daily permissible value of intravenous lead based on the following: given that only 10% of lead is absorbed from the gastrointestinal tract, a weekly permissible intravenous dose would be 2·5 μg/kg, and therefore a daily permissible dose would be 0·36 μg/kg. To limit the dose of a premature infant receiving a 20 mL/kg blood transfusion to less than 0·36 μg/kg (and assuming blood transfusion is the only route of exposure to lead), the donor unit must have a lead concentration of less than 0·09 μmol/L. 64% of our measured units fit this criteria. To achieve these lower exposures, we recommend that all units designated for paediatric patients be screened for lead concentration, and that only units with lead concentrations of less than 0·09 μmol/L be used in these patients.

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