

Transfusion in inner space: Blood products for intrauterine transfusion

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Overview

- The fetus as transfusion recipient
- Technical aspects of intrauterine transfusion
- Indications for intrauterine transfusion
- Red cells for fetal transfusion
- Platelets for fetal transfusion

The fetus as a transfusion recipient

- No name, no gender, no DOB
- No ID band
- No 'pre-transfusion sample'
- Designated name- Maternal Surname, First Name (Fetus)
- Estimated/projected DOB
- Separate identity to mother for transfusion
- Small size

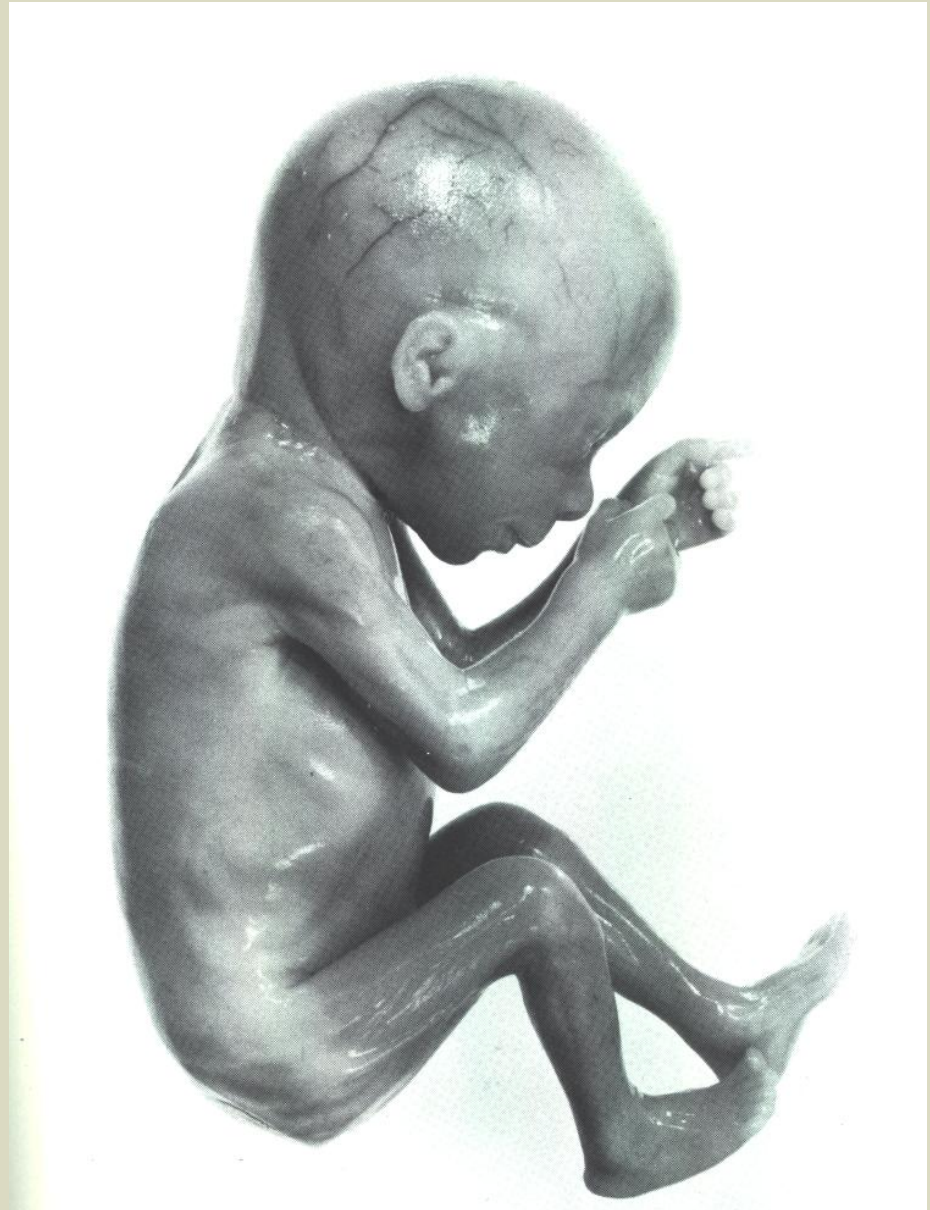
The fetus as transfusion recipient

- Complex immunological effects of transfusion, poorly defined
- Best seen as 'immunocompromised' recipient
- At risk of viral transmission (CMV)
- At risk of TaGVHD (irradiation)

Technical aspects of intrauterine transfusion

- IPT feasible from 15-16 weeks gestation
- IVT feasible from 18-20 weeks gestation
 - IVT allows FBS
 - Immediate correction of fetal anaemia
 - IVT can reverse fetal hydrops
- Ultrasound guided
- ± Fetal paralysis (pancuronium)

20 weeks gestation, EW 250g, EBV 45mls



The first IUTs

- Intrapertitoneal transfusion 1960s
 - Amniocentesis with injection of contrast
 - 24-48 hours later, fetal gut outlined by contrast
 - X-Ray localisation of needle into fetal peritoneal cavity
 - Red cells absorbed via thoracic duct into fetal circulations over 5-6 days
- Intravascular transfusion 1980s
 - Fetoscopy and intravascular transfusion into umbilical vessel

Intrauterine transfusion in 2008

- Fetal red cell transfusion
 - Haemolytic disease due to red cell alloimmunisation
 - Fetal anaemia due to congenital infection (Parvovirus)
 - Fetal anaemia in twin to twin transfusion (donor twin)
 - Fetal anaemia due to massive FMH
 - Fetal haemorrhage (tumours etc)
- Fetal platelet transfusion
 - Thrombocytopenia due to platelet antigen alloimmunisation

Complications of IUT

- Cord haematoma with arterial vasospasm and fetal bradycardia
- Fetal exsanguination
- Premature rupture of membranes
- Infection
- Augmentation of maternal alloimmunisation and new antibodies due to FMH
- Long term consequences of transfusion

Procedural complications

- Cohort study 254 fetuses/740 IUTs, 1988-2001 (single centre)
- Red cell transfusion for alloimmunisation
- 225/254 (89%) survival
- 19 fetal deaths (7PR), 10 neonatal deaths (5PR)
 - 2 intrauterine infection (E.coli) (both PR)
 - 2 PPRM (1 PR)
 - 18 emergency deliveries (15 PR)
- Total complications 3.1%, 1.6% loss rate per procedure

Procedural complications

- Platelet transfusion in AIT
- Increased risks of bleeding and bradycardia
- Recent studies suggest 6% fetal loss rate





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02/10/2006 05:07:44PM TIB0.2 MI 1.2
C5-2/OB Gen

FR 31Hz
RS

2D
60%
C 56
P Med
HRes

M3



Bx 11.1cm

JPEG
12 *** bpm

Red Cells for Fetal Transfusion

- Group O Rh D negative, Kell negative (usually!)
- IAT crossmatch compatible with maternal plasma
- Free from clinically significant antibodies
- < 5 days old
- CMV negative, leukocyte depleted
- Irradiated and used within 24 hours of irradiation



BCSH Guidelines 2004

- In CPD not SAG-M
- Free from high titre anti-A and anti-B
- HbS negative
- Haematocrit 0.7-0.85
- Not transfused straight from 4°C storage

Transfusion guidelines for neonates and older children BCSH 2004

Local practice

- Red cells in additive solution
- Hct approximately 0.6
- Matched for extended maternal antigen typing
- Anti-A and Anti-B not tested
- Hb S not tested
- Warmed to 37°C prior to transfusion and transfusion within 4 hours
- Split packs to reduce donor exposure with washing of 2nd segment prior to transfusion

Issues

- Red cell IUT best seen as a rapid, large volume transfusion
- K+ an issue
- Haemolysin testing?
 - Does not seem to be an issue with plasma-poor RBC transfusion in the NNU
- Additive solution?
 - No adverse clinical/biochemical effects for neonatal top-up (Strauss 1996, 2000)
 - Effective for cardiac by-pass surgery in infants (Mou, 2004)

Platelets for Fetal Transfusion

- Group O RhD negative, negative for high-titre anti-A, anti-B or group specific compatible with maternal antibody
- HPA compatible with maternal antibody
- Preferably collected by apheresis
- Irradiated
- Concentrated to a platelet count $>2000 \times 10^9/L$
- Transfused at a rate of 1-5 ml/min

Transfusion guidelines for neonates and older children BCSH 2004

Local Practice

- HPA compatible with maternal antibody
- Standard apheresis components
- CMV negative, leucocyte depleted
- Irradiated
- Not concentrated

Products for Fetal Transfusion

- Red cells
 - Large volume, rapid transfusion
- Platelets
 - Bradycardia ? Mediated, ? PAS
 - Hyperconcentration?

Long term effects of fetal transfusion

- Not well studied
- ? Immunological effects
- Expected 80+ years post transfusion survival