T Polyagglutination detected in a neonate

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Background

Polyagglutination describes a group of conditions characterised by alterations in red blood cell (RBC) membrane glycoprotein structure. This results in, in-vitro agglutination of the RBCs in the presence of most ABO compatible adult antisera.

T activation is the earliest known and most common form of polyagglutination. It was described by Hubener (1925), Thomsen (1927) and Friedenreich (1930). It was Friedenreich however, who defined the underlying mechanism and coined the term T haemagglutination(1).

T activation is caused by the cleavage of the N-acetyl neuraminic acid residues on portions of glycoprotein A and B chains of the MN, SS and other RBC disialylated tetrasaccharides. Bacteria or on occasion viruses may be responsible for this alteration of the red cell surface.

Infants with necrotising enterocolitis (NEC) are especially susceptible to T activation. T activation is reported in 11-27% of infants with NEC and in neonates with bowel-related surgical problems and there were no cases of NEC in infants with polyagglutination(2).

Interestingly a study performed by Borales(3) screened 379 infants for T activation and found that 47 had a variant of T activation and only one had classical T activation.

Furthermore Klein(4) reported that infants with T-activated N-E-OV four times more likely to require surgical intervention.

Clinical Details

This two day old patient was referred to Our Lady’s Children’s Hospital, Crumlin (OLCHC) with a diagnosis of suspected NEC. Patient received one red cell (pedipack) and one unit of plasma prior to a laparotomy.

Past laparotomy the clinical team sought advice from the Consultant Haematologist for the treatment of suspected coagulopathy due to sepsis. Severe haemolysis interfered with laboratory testing. T Activation was suspected and referral to the IBTS for investigation was requested.

Red cells and plasma concentrate were prescribed with plasma, cryoprecipitate and platelets subsequently used due to the patient’s deteriorating condition.

Methods

Sero logical testing was performed in Blood Transfusion Laboratory, OLCHC & Red Cell Immunohaematology Laboratory (RCI) at the IBTS.

OLCHC Methods:


RCI Methods:

• ABO/D typing was performed by direct agglutination technique and Borad gel column technique using monoclonal reagents.
• Rh/k typing was performed by Ortho AutoVue Innova
• DAT was performed by BioRad gel column technique.

The Inverlyde Polyagglutination Kit was utilised to investigate and classify T polyagglutination in the baby’s sample.

Results

OLCHC: Patient grouped as A Rh D Positive with mixed field results due to prior transfusion with O red cells. Antibody Screen: Negative.

DAT: Negative with IgG, and C3d.

As the patient was less than 4 months no further pre transfusion testing was required as per BSH Guidelines(5).

RCI: Patient grouped as an O Rh D Positive due to the transfusion of O red cells.

DAT: Negative with IgG, IgA, IgM, C3d & C3c

Lectin Results: The patient’s red cells was tested against four seed extracts; Arachis hypogaea, Glycine soja, Salvia horminum and Salvia sclarea. These were then classified in polyagglutination conditions.

Transfusion Requirements

There is debate regarding appropriate transfusion management with T activation. Anti-T is found in all normal adult plasma and this should be remembered prior to transfusing patients with T polyagglutination.

A study by Osborn(6) showed that there was no benefit on infant survival following the introduction of screening and the use of low anti-T plasma.

Therefore the presence of activated T cells is not a contraindication to transfusion and patients should be transfused according to clinical need.

The Irish Blood Transfusion Service does not provide blood products with low levels of anti-T. However, the following blood products are known to have low levels of anti-T(7) and are available:

• Red cells in addition to patient in OLCHC
• Washed red cells (discussion with medical staff required)
• Platelets in platelet suspension medium

There is a provision in the BSH Guidelines for patients with classical T activation which details further recommendations(8).

Conclusion

Polyagglutination is seen most commonly in children with bacterial infections. Most patients have no symptoms but occasionally some may present with haemolysis in the absence of transfusion. The condition is usually transient and resolves once the underlying cause has been treated.

In this case the patient was diagnosed with NEC with in vivo haemolysis prior to transfusion. During the course of treatment the patient was transfused with multiple units of red cells in additive solution for neonates, plasma, cryoprecipitate and fibrinogen. Red cell haemolysis resolved post bowel resection. The transfusion requirements are still an issue in patients in OLCHC and remains in ICU. The results obtained with the lecithin kit was consistent with T polyagglutination.

Cases of T activation may be underestimated due to the introduction of monoclonal reagents. Clinicians need to be vigilant in suspecting T activation. However, the presence of T activation is not a contraindication to transfusion and patients should be transfused according to clinical need.

In addition while lectin tests are sensitive, simple and inexpensive they are difficult to standardise and validate.

References


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