Heart Transplant - Antibody Mediated Rejection
Therapeutic Plasma Exchange

1.0 Introduction

This Clinical Practice Guideline (CPG) refers to the therapeutic plasma exchange for an infant/child with evidence of Antibody Mediated Rejection (AMR) after heart transplant. The goal of TPE is to remove donor-specific antibodies and/or inflammatory mediators implicated in AMR. The number of therapeutic plasma exchanges is patient specific and is ordered by the physician responsible for the patient's care. Please see Therapeutic Plasma Exchange under related documents for CPG on procedure.

The target users of this guideline will be Nurses, Physicians within the Nephrology and Cardiology programs.

Indications: This CPG applies to infants/children who have evidence of AMR.

Contraindications: Plasma exchanges should not ordinarily be performed within 24 hours of an operative procedure. If necessary to bypass this recommendation, the Staff M.D. must document the need for the procedure in the patient chart.

2.0 Definitions

- **Total Blood Volume (TBV)** - the amount of blood in the whole body, both cells and fluid. The volume of the patient's blood is based on the patient's weight. The TBV is related to lean body mass. There is a difference between children and adults with newborns having a higher TBV per kg because of their higher packed red cell volume. TBV is calculated using the following formula:
  
  - Neonates (0-1 month): 100 ml/kg
  - Infants/children (1 month-16 years): 80 ml/kg
  - Adolescents (16 years and older): 70 ml/kg

- **Plasma Volume** is the total volume of plasma in the body.
  
  - Plasma Volume = TBV (ml) X (1-hematocrit)

- **Exchange** - patient plasma is replaced by donor plasma. The exchange product can be either Octaplasma, 5% Albumin or a combination of both.
3.0 Clinical Recommendations

Heart Transplant - Antibody Mediated Rejection (AMR) after heart transplant and requires therapeutic plasma exchange to remove donor specific antibodies and/or inflammatory mediators.

Pre-exchange requirements:
1. All mixed post-transplant patients should be connected to cardiac monitor during plasma exchange.
2. Complete following blood work prior to the procedure:
   - DRI and differential
   - Ionized Ca
   - Albumin
   - K, Mg, P, Na
   - TCD
3. Ensure blood work is within acceptable range.
4. Complete the following blood work after the procedures:
   - Ionized Ca
   - K, Mg, P
   - TCD

Order replacement solution
Replacement solution must be compatible with the patient’s serum blood type and the donor blood type. Refer to Blood Group Chart for Blood Products Administered During AMR-Incompatible Heart Transplantation Plasma Exchange Chart:
- 5% Albumin is recommended when the patient does not require daily exchanges. For daily exchanges, refer to the Blood Product Administration Sheet for replacement fluids.
- O neg plasma can be used in cases of reaction to FFP.

Blood prime:
- Patient weight < 50 kg
- Patient weight > 50 kg with low hemoglobin (<70g/l)
- Patient who is hemodynamically unstable.
- 5% Albumin prime is used for stable patients between 15-30 kg as ordered by MRP.

Medications
1. Refer to MRP orders for specific medications.
2. Recommended medications to decrease risk of a reaction to either blood or blood product include:
   - Benadryl (diphenhydramine) 50 mg po, maximum dose 50 mg daily
   - Hydrocortisone 250 mg IV, maximum dose 1000 mg daily
   - Calcium Gluconate, please see Management of Citrate Toxicity
   - ACE inhibitors should be withheld for at least 24 hours prior to plasma exchange. Longer acting drugs of this class, including Enalapril and Lisinopril, should be withheld for 72 hours.

Volumes and number of exchanges
1. Recommended volume of exchange is 1-1.8 times Plasma Volume.
2. Procedure to be performed daily for 5 days then reassessed.
3. Improvement in cardiac function, biopsy findings, and donor specific antibody levels are used to determine timing of discontinuation.

Measurement responses
- ACE-Inhibitor (blood pressure, decreased inotrope requirement in blood.
- HLA sensitized transplant with donor specific antibodies OR non-specific antibody mediated rejection.
- Improvement in allograft function.

4.0 Related Documents:
- Therapeutic Plasma Exchange Procedure
- Management of Citrate Toxicity
- Blood component Infusions

5.0 References
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1. McLeod, B C Apheresis: Principles and Practice. 1997 (409-415)

6.0 Attachments

Heart Transplant care pathway