Heart Transplant - Antibody Mediated Rejection
Therapeutic Plasma Exchange

This guideline is departmental specific and applies only to activities within the Nephrology and Cardiology programs.

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 (1month-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

Therapeutic Plasma Exchange

Pre-exchange requirements:
1. All pre-transplant patients should be connected to cardiac monitor during plasma exchange.

2. Complete following blood work pre-exchange:
   - CRP and differential
   - INR, Pt, PTT
   - Albumin
   - K, Mg, P, Na
   - TCO2

3. Ensure blood work is within acceptable range.

4. Complete the following blood work after the procedures:
   - INR, Pt, PTT
   - Albumin
   - K, Mg, P
   - TCO2

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 Allogeneic During ABO-Incompatible Heart Transplantation Plasma Exchange.

- 5% Albumin is recommended when the patient does not require daily exchanges. For daily exchanges keep last bag FFP to replace clotting factor.
- O-negative can be used in cases of reaction to FFP.

Blood prime:
- Patient PRBC > 200g
- Patient weight > 20kg with low hemoglobin (<10g/dl)
- Patient who is hemodynamically unstable
- 5% Albumin prime is used for stable patients between 10-20kg as ordered by NRP

Medications:
- Refer to NRP orders for specific medications.

Recommended medication to decrease risk of a reaction to either blood or blood product includes:
- Busulfan 1mg/kg IV anti-hyperacute or PRBC and FFP ordered (maximum dose 50mg)
- Hydrocortisone 6mg/kg PRB with an allergic reaction or previous allergic reaction (maximum dose 500 mg every 6-12 hours, 200 mg every 12 hours)
- Calcium gluconate, please use Management of Citrate Toxicity
- ACE inhibitors should be withheld for at least 24 hours prior to start of plasma exchange. Long-term use of these drugs, including Enalapril and Lisinopril, should be withheld for 72 hours.

Volumes and number of exchanges:
1. Recommended volume of exchange in 1-1.5 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:
- ASO-positive or donor positive (decreased in rejection in times)
- HLA sensitized patient with donor specific antibodies. OR non-specific antibody mediated rejection: stabilization or 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