NHS
Blood and Transplant

Therapeutic Plasma Exchange For Neurology Patients

This document has been produced to provide information on the benefits of Therapeutic Plasma Exchange treatment for patients suffering from a variety of Neurological conditions and on the Therapeutic Apheresis Service provided by NHS Blood and Transplant

If you have any questions or queries relating to the content of this document or how to access Therapeutic Plasma Exchange services, please contact your local Therapeutic Unit (contact details are available within section 6 below).

1. Overview

NHS Blood and Transplant's Therapeutic Apheresis Services (TAS) provide life-saving and life-enhancing therapies to adults and children across England. Patients are treated either within an NHS Blood and Transplant (NHSBT) unit or, when clinically appropriate, at the patient's beside.

Apheresis services are delivered across England from eight units based in London, Oxford, Bristol, Birmingham, Leeds, Liverpool, Manchester and Sheffield.

TAS supports a range of clinical specialities including; Neurology, Haematology, Immunology, Oncology, Nephrology, Dermatology and Rheumatology.

We offer:

- Robust, flexible and responsive regional services 365 days per year
- An expert and experienced clinical team and technical service
- First class quality management and regulatory compliance
- Comprehensive range of therapies
- Access to 24/7 emergency apheresis services

This guide has been developed to provide information to Neurology staff on some of the common clinical indications for the use of Plasma Exchange therapy. In addition, the guide gives information on how to refer patients to NHSBT for Plasma Exchange treatment.

2. What is Therapeutic Plasma Exchange?

Plasma Exchange (PEX) is a patient therapy involving the separation and removal of the plasma in the blood using a cell separator machine, in order to remove disease causing substances circulating in the plasma. The red blood cells, white blood cells and platelets are returned to the patient, along with a prescribed replacement fluid.

The patient is normally attached to the machine using peripheral veins, where possible, one for the draw of the blood into the machine and one for the return of the blood back to the patient. The blood in the extra corporeal circuit is anticoagulated using citrate and the administration of this is controlled by the equipment and the operator. The machine separates the blood into its component parts allowing the plasma (containing the disease causing agent) to be drawn off and replacement fluid to be added to the returning red and white blood cells.

Replacement Fluid

The removed plasma must be replaced with fluid during the procedure. Usually Human Albumin 4.5% or 5% is used, unless there is a specific reason to give Fresh Frozen Plasma (FFP).

Clinical teams can liaise with apheresis staff to discuss alternative fluid replacement if needed.

Monitoring of Patient on Apheresis Treatment

As well as removing disease causing substances such as auto antibodies, plasma exchange removes the coagulation factors and this can be a problem with daily exchange. Coagulation including fibrinogen should be tested prior to the first plasma exchange, on day 3 and then alternate days if daily exchanges are being carried out, with FFP and/or cryoprecipitate used for replacement if necessary. FFP may also be needed as replacement fluid if there are abnormal laboratory results e.g. if the patient has a bleeding tendency or has had a recent biopsy.

3. Common Indications for the use of Therapeutic Plasma Exchange

NMDA Receptor Encephalitis

Plasma exchange removes the offending antibody, as an adjunct to immunotherapy for suppressing antibody production, and teratoma excision, if present, for removing the possible antibody stimulus.

Clinical improvement following plasma exchange is not immediate and can take up to approximately 4 weeks.

Approximately 75 – 80% of patients recover or improve (50% within 4 weeks of treatment).

Myasthenia Gravis

Plasma exchange is used to remove circulating auto antibodies, particularly in myasthenic crisis, perioperatively for thymectomy, or as an adjunct to other therapies to maintain an optimal clinical status.

Plasma exchange works rapidly; clinical effects can be apparent within 24 hours but may take up to a week. Plasma exchange may be more effective than IVIG in patients with MuSK-MG and exchanges may be more effective if initiated earlier in the course of the disease. Clinical trials have reported on the use of plasma exchanges prior to thymectomy: most studies have shown improved patient outcome with routine use of exchanges. Other studies have shown equivalent outcome with selective exchange use in patients at high risk for post – procedure prolonged intubation.

Chronic Inflammatory Demyelinating Polyradiculoneuropathy (CIDP)

Plasma exchange is used to remove circulating auto antibodies but therapies need to be initiated early to stop the inflammatory demyelination and prevent secondary axonal degeneration and therefore permanent disability.

Plasma exchange provides short term benefits but rapid deterioration may occur afterwards. This may necessitate maintenance treatment, with exchanges and/or other immunomodulating therapies, which should be tailored to the individual patient. The frequency of maintenance exchanges can range from weekly to monthly as required to control patient's symptoms.

Acute Inflammatory Demyelinating Polyradiculoneuropathy/Guillain Barre Syndrome (GBS)

Plasma exchange is used to remove circulating autoimmune antibodies which are damaging to the peripheral nerve myelin.

The results of several controlled trials comparing plasma exchange to supportive care alone indicated that the use of exchange can

accelerate motor recovery, decrease time on the ventilator, and speed attainment of other clinical milestones. Plasma exchange has beneficial effect in severely and mildly affected individuals, with a significantly increased proportion of patients able to walk after four weeks.

Evidence based guidelines of the American Academy of Neurology report equal strength of evidence to support the use of PEX or IVIG in a treatment of GBS; however the cost of IVIG treatment in GBS may be as high as double the cost of exchange.

Multiple Sclerosis (MS)

Plasma exchange may benefit MS patients by removing auto antibodies and/or immune complexes or modulating immune response. Exchange has also been used for drug removal in MS patients treated with Natalizumab who developed progressive multifocal leukoencephalopathy.

In acute MS relapse unresponsive to steroids, 5-7 exchange procedures have a response rate of approximately 50%. Studies have found that early initiation of therapy, within 14-20 days of onset of symptoms, is a predictor of response. However, response still occurred in patients treated 60 days after onset of symptoms. In chronic progressive MS, plasma exchange could be a long-term therapy with tapering as tolerated.

Stiff-Person Syndrome

Plasma exchange can effectively deplete antibodies of the IgG class when sufficient plasma volumes are exchanged in a brief period of time. If exchange is to be offered to a patient with stiff-person syndrome, the patient should be aware of the paucity of clinical data to support its use and also of the availability of IVIG as an alternative. If IVIG is not available or the patient does not respond to conventional therapy then it may be reasonable to proceed with a course of plasma exchange.

Neuro Myelitis Optica Spectrum Disorders (NMOSD)

A number of case reports have shown plasma exchange benefits in corticosteroid-refractory NMOSD exacerbation. Retrospective case reviews have shown that plasma exchange may also be beneficial as a chronic treatment for the prevention of NMOSD relapse. In case series, 50–70% of patients showed improvement after plasma exchange – all patients received steroids.

Reference – ASFA guidelines – Seventh edition 2016 (see hyperlink overleaf).

4. American Society for Apheresis

The American Society for Apheresis (ASFA) publish a set of guidelines which are evidence based and are reviewed and updated on a 3 yearly basis. These guidelines provide information and recommendations on the frequency of treatments and replacement fluids to be used to treat a variety of clinical conditions using apheresis procedures.

TAS use these guidelines to prioritise patient referrals and to guide treatment plans.

The latest version of the ASFA guidelines is available to view on the ASFA website: Guidelines on the Use of Therapeutic Apheresis in Clinical Practice—Evidence-Based Approach from the Writing Committee of the American Society for Apheresis: The Seventh Special Issue (pages 149–162).

5. Vascular Access

Patients referred for apheresis procedures require good venous access to support the blood flow to and from the apheresis equipment. Peripheral veins can be used where suitable, however where peripheral veins cannot support the blood flow rates required by the equipment during the procedure (or course of procedures) then central venous access will be required.

Please contact your local TAS unit if you are unsure and a member of staff will come and assess the patient's veins for suitability. http://hospital.blood.co.uk/media/27297/vascular-access-info-sheet.pdf

6. How to refer patients for Therapeutic Plasma Exchange treatment

If you wish to refer a patient for Plasma Exchange please complete a Request for Therapeutic Apheresis referral form which can be found using the following link: http://hospital.blood.co.uk/patient-services/therapeutic-apheresis-services/how-to-make-patient-referrals-to-tas/

Once you have completed the form please return via e-mail (securely on nhs.net) to your local TAS Consultant (contact details and email addresses for all TAS units can be found on our webpages under the following link: http://hospital.blood.co.uk/patient-services/therapeutic-apheresis-services/tas-units/

Please contact the TAS unit by phone to confirm availability of treatment dates and confirm receipt of the referral form.

If your Trust does not have a Service Level Agreement with NHSBT for provision of TAS services you will need to complete a one off treatment request form available on the TAS webpages: http://hospital.blood.co.uk/patient-services/therapeutic-apheresis-services/how-to-make-patient-referrals-to-tas/

To discuss the provision of a Service Level Agreement please link with your local Lead Nurse/Consultant.

Please see appendix 1 for a flow diagram of the patient referral process.

Appendix 1: Referral Pathway for Plasma Exchange Therapy

1. Clinical team decide treatment with apheresis plasma exchange is required/ appropriate

2. Contact your local TAS consultant to discuss the patient referral: http://hospital.blood.co.uk/patient-services/therapeutic-apheresis-services/tas-units/

3. Complete a Plasma Exchange treatment referral form and return to your local TAS unit: http://hospital.blood.co.uk/patient-services/therapeutic-apheresis-services

4. Your local TAS team will discuss arrangements for attendance for treatment including notifying the patient of their treatment date