

PLASMA EXCHANGES AT THE BLOOD TRANSFUSION CENTRE OF THE MOHAMED V RABAT MILITARY HOSPITAL

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ABSTRACT

Introduction: Plasma exchanges appear to be an important therapeutic advance for certain serious diseases poorly controlled by conventional treatments. This technique consists of subtracting a large plasma volume in order to remove from the body molecules responsible for pathologies, including antibodies and to restore the figurative elements of the blood. The plasma thus extracted is replaced volume for volume by substitute liquids of variable composition according to the indications or the centers.

Objective: The aim of this work is to focus on the experiment of the Blood Transfusion Center of the Mohammed V Military Training Hospital in Rabat on plasma exchanges.

Material and Method: the study is carried out on 153 plasma exchange sessions were carried out over a period of 4 years from 2003 to 2007 in 38 patients aged between 13 and 50 years. The procedures were carried out with batch flow separators often in the intensive care unit or in the departments with monitoring by monitoring.

Result: The majority of exchanges were carried out for neurologically expressed diseases (77%) followed by kidney diseases (10%), metabolic diseases (5%), vasculitis and system diseases (5%) and hematological diseases (3%).

Conclusion: This therapeutic technique has developed rapidly in recent years thanks to a better control of extracorporeal circulation problems, the performance of cell separators, the accessibility of semi-industrial blood products, a better knowledge of the pathophysiology of a number of conditions in particular in the field of immunology.

Keywords: Plasma exchanges, Apheresis, Indications, Autoimmune diseases.

INTRODUCTION

Plasma exchange is an extracorporeal circulation technique to separate plasma from whole blood, with the aim of removing from the body molecules responsible for several pathologies, including antibodies, and to restore the figurative elements of the blood. The extracted plasma is replaced by substitute liquids of variable composition according to the indications or the centers

[1]. Plasmapheresis is an extraction of plasma without substitution, the volume exchanged is necessarily limited, and therefore the therapeutic effectiveness.

A plasma exchange is a treatment that combines the subtraction of a large volume of plasma, one to two plasma masses, and the infusion of a plasma substitute in sufficient quantity to keep the patient in a

state of normovolemia and also maintain an equivalent oncotic pressure [2]. The goal of treatment is to purify the plasma of molecules responsible for clinical manifestations. The method is a priori very attractive for various autoimmune diseases when plasma contains autoantibodies or circulating immune complexes whose pathogenic role is demonstrated. Other mechanisms may play a role such as improving the function of the mononuclear phagocyte system or in the case of thrombotic thrombocytopenic purpura by replacing deficient factors with the administration of fresh frozen plasma [3]. The place of plasma exchanges is wide, they can provide a real answer to certain clinical problems.

MATERIALS AND METHODS

1.1) Principle

Plasma exchanges, therapeutic for many years, are used occasionally in systemic and autoimmune diseases. Their ability to purify antibodies has given them a major role in the treatment of these diseases.

Here we will review a number of indications of plasma exchange in the treatment of systemic and autoimmune diseases.

The EPs have been performed at theMHMV CTS in routine for more than 9 years. They consist of the removal of a significant amount of plasma replaced concomitantly by alternatives. The goal is to reduce the circulating level of certain normal and excess or pathological substances.

1.2) Indication of plasma exchanges

The main indications concern autoimmune diseases, with neurological, hematological or renal expression and certain hemopathies. Recently and thanks to the multiplication of protocols, the indications have become clearer.

1.3) Equipment

The blood transfusion center of the military hospital in Rabat has discontinuous flow

separators, with an extracorporeal volume between 300 and 400 ml. They are of a usesimple, their implementation is fast (5 to 10 min), easy to move to the patient's bed and require only one venous route.

A sterile, non-pyrogenic single-use kit is used, consisting of a centrifuge bowl and a circuit. The anticoagulant of the extracorporeal circuit was provided by the ACD.

1.4) Method

The puncture of the vessels is carried out under rigorous conditions of asepsis using short catheters. Regarding the tracks first, the central track was used in most cases.

The alternatives used are Albumin (4%), gelatin (Plasmion*, Haemaccel*), and salt serum 9%_O or fresh frozen plasmas in some cases. The frequency and protocols of exchanges vary according to the indications. Classically, it is recommended to purify one and a half plasma masses. The calculation of this plasma mass is carried out by applying the formula: **weight × 70 ml × (1-hematocrit)**. Procedures are most often spaced 48 hours apart.

The majority of PE procedures were performed in the intensive care unit by a doctor and a CTS technician, assisted by a nurse from the care department. Cardiac and blood pressure monitoring, withO₂ saturation, as well as verification of the adequacy of incoming and outgoing assessments, and cardioscopic monitoring are required.

A clinical examination, an ECG and a biological assessment including a blood ionogram, serum calcium, a coagulation test including, a TP, a TCA, and an NFS were requested before and after each procedure. The tentional figures, the flow rate of the sampling and return, and the volume of sampling are noted on a monitoring sheet every 1/2 hours during the procedure.

During the course of the session, the monitoring includes the evaluation of the

clinical condition of the patient, the blood pressure figures, the ECG tracing, the appearance of signs of hypocalcemia, or even disorders of consciousness that sometimes require the cessation of the procedure.

Plasma exchanges are carried out in collaboration with the various care departments of the hospital, most often carried out in the intensive care unit. Recently they are carried out in care departments with a cardiac and blood pressure monitoring system. At the level of the CTS, it is the on-call team that ensures the realization of the PEs in an emergency context.

RESULT

Plasma exchanges were carried out at the training transfusion centre of the military hospital in Rabat in 1999. During a period of 4 years, from 2003 to 2007, 153 Plasma Exchange sessions were performed using

batch flow devices, portant sur 38 patients dont 14 femmes et 24 hommes, avec une moyenne d'âge de 31 ans (tranche d'âge entre 13 et 50 ans).

1) Realization of plasma exchanges according to sex

Over a period of 4 years, from 2003 to 2007, 153 PE sessions were performed using discontinuous flow devices, involving 38 patients including 37% (n=14) women and 63% (n=24) men.

2) Evolution of treatment by plasma exchange

Since 2003, the number of patients treated with PE has increased gradually over the years (Figure 1), with only 4 patients treated in 2003, and 2 patients in 2004, 5 patients in 2005, 12 patients in 2006, and 15 patients in 2007. The growing demand for PEs is only due to the awareness of different services to this therapy, the improvement of devices, as well as the availability of CTS officials.

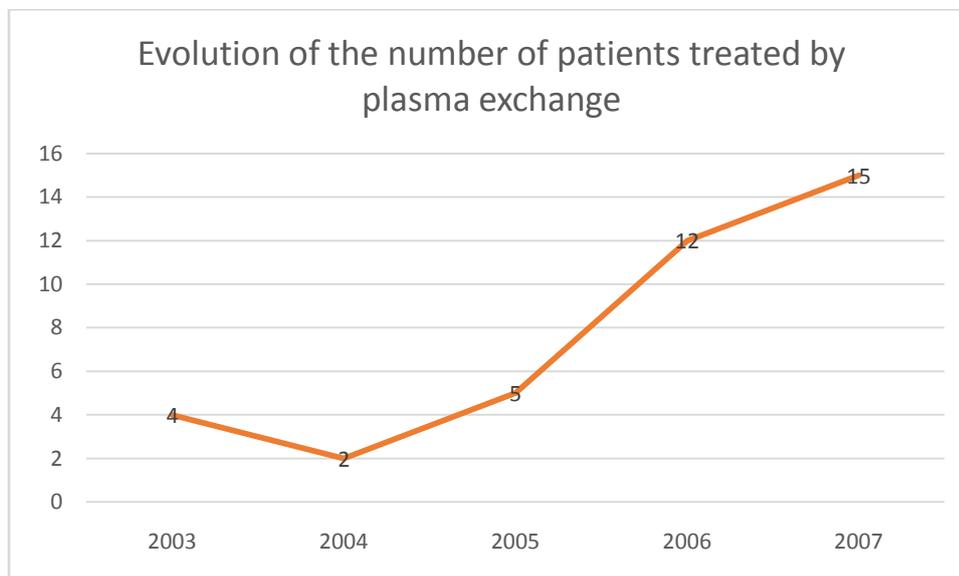


Figure 1: Evolution of the number of patients treated by plasma exchange

3) Realisation of plasma exchange according to hospital services:

Among the 38 patients treated during this period, the majority have a neurological pathology n=29 (77%), followed by

nephrological pathology n=4 (10%), then metabolic diseases n=2 (5%), vasculitis and diseases of system n=2 (5%) and finally hematological diseases n=1(3%) (Fig.2).

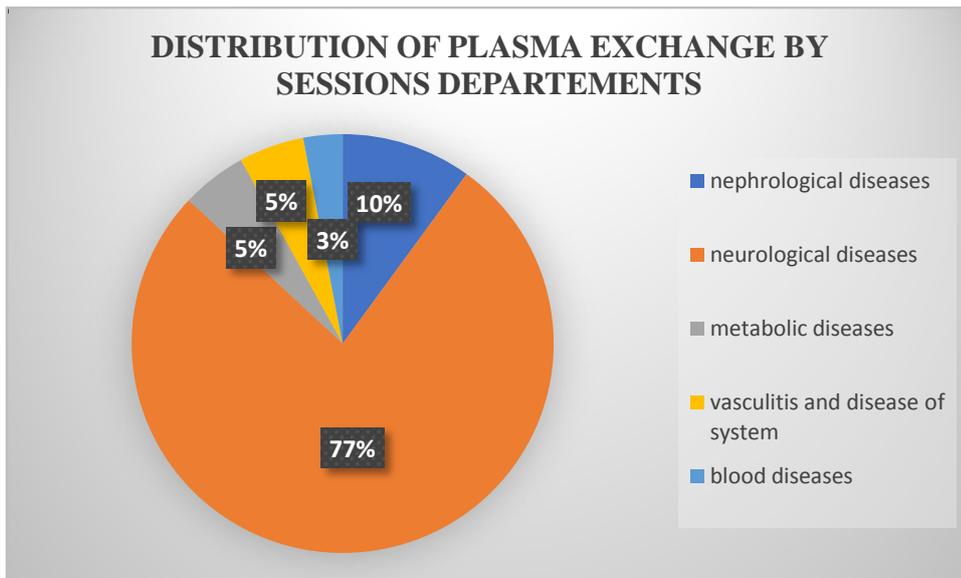


Figure 2: Distribution of Plasma Exchange Sessions by Department

4) Diseases treated by plasma exchange

4.1) Neurological Diseases

In neurological diseases, 66 PE procedures were indicated for 18 patients with Guillain-Barré syndrome, 15 for 5 patients with

chronic polyradiculoneuritis, 3 for a single patient with multiple sclerosis, and 19 procedures for 5 patients with myasthenia gravis with an average volume of 3.3 litre per procedure.

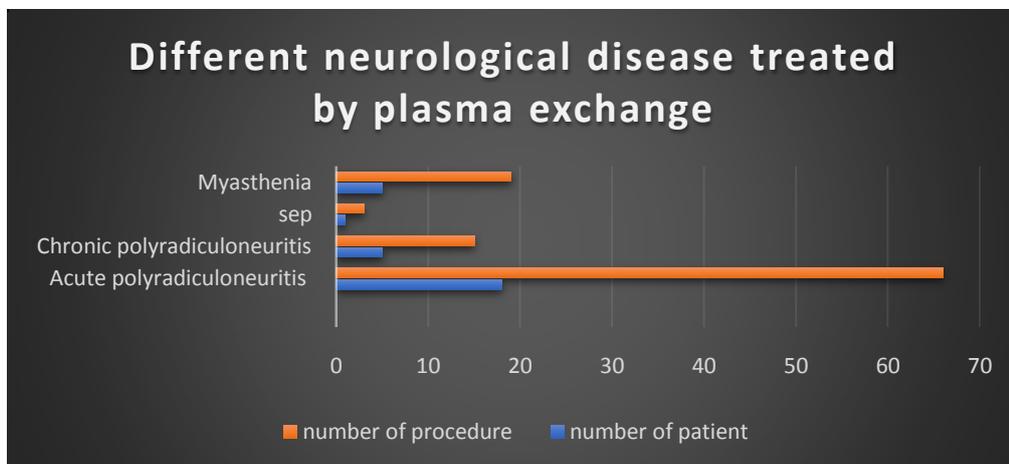


Figure 3: Different neurological disease treated by plasma exchange

4.2) Nephrological Diseases

In nephrological diseases; 27 procedures were performed for 3 patients with Guillain-Barré syndrome and 9 procedures for one patient with Wegener's disease with an average volume of 3.15 liters per procedure.

hypertriglyceridemia, and 2 procedures for a patient with familial hypercholesterolemia, with an average volume of 2.45 l per procedure.

4. 3) Metabolic Diseases

In metabolic diseases; 3 procedures were indicated for a patient with

4.4) Vasculaires and system Disease

In vasculitis and system diseases, 2 PE procedures were performed for a patient with HELLP syndrome, and 4 procedures

for a patient with cryoglobulinemia, with an average volume of 3 l per procedure.

4.5) Haematological Diseases

In hematological diseases, 3 PE procedures were performed for a patient with hemolytic uremic syndrome, with an average volume of 2.70 litre per procedure.

DISCUSSION

In our experience patients with neurological pathology are the most frequent (77%), and represent 67.3% of the PE procedures performed; this is consistent with the series reported by the French, Canadian and Swiss registries of therapeutic apheresis. Patients of nephrology account for 10% of the cases in this series or 23.5% of the procedures performed, this percentage is due to the high number of procedures performed in patients with Goodpasture syndrome.

The number of patients in metabolic diseases represents 5% of the cases in this series, or 4% of the procedures performed. Vasculitis and system diseases also account for 5% of treated cases, or 4% of the procedures performed. While the indications in hematology represent only 3% of the cases in our series, or 1.2% of the procedures performed [4].

1) Plasma exchange in neurology

In our series, 18 patients with Barred Guillain syndrome benefited from plasma exchanges with 14 men and 4 women, 66 plasma exchange procedures were performed, at a rate of about 4 sessions for each patient.

In our patients, the early application of PE made it possible to reduce the duration of hospitalization in intensive care for 3 patients, with their extubation after the 3rd session as well as the decrease in the duration of the acute phase of the disease and the intensity of the motor deficit for all patients.

2) Plasma exchange in nephrology

In Good pasture syndrome, PE results in a decrease in the titer of anti-basement membrane antibodies and complex immunes. In our series, 3 patients including 2 women and one man were treated with PE, 27 PE procedures were performed, at the rate of 9 sessions for each patient. The disappearance of hemoptysis and radiological improvement are observed at from the 3rd session for the 3 patients including a patient who has resumed normal kidney function. this result for kidney disease represents the same percentage when compared with studies already done [5].

3) Plasma exchange in case of vasculitis and diseases of the system

In cryoglobulinemias of types II and III, PE are indicated in case of severe neuropathy, glomerulopathy, extensive arterial ulcers. They are useful in combination with interferon alpha and ribavirin.

In our series, a man benefited from 4 PE sessions, and who showed a slight improvement in kidney function.

4) Plasma exchange in hematology

Hemolytic uremic syndrome is a medical emergency, this pathology is fatal in 90% of cases. Early PE treatment improves the prognosis, this treatment should be daily until a platelet count is obtained above 150,000/ mm^3 .

In our series, a man who had hemolytic anemia with thrombocytopenia and IR, benefited from 3 pe sessions, with the use of PFC as a substitute. The platelet count increased from 74 to 173,000 after the 3rd session.

5) Plasma exchange in case of Metabolic Diseases

PE eliminates lipids and complications from hyperviscosity. Pe treatment is well tolerated, and allows a rapid decrease in the concentration of triglycerides. in our series which includes a girl who had an LDL level of 4 g / l, this girl has

benefited from 2 sessions of PE, but the treatment is stopped because of a problem of the venous tract, the series also includes a man whose plasma concentration of triglycerides was reduced from 20 to 3 g / l after 3 sessions of PE.

CONCLUSION

The blood transfusion service is a vital part of the national health service, while blood and blood products have become indispensable for medical care in recent years [6]. Plasma exchanges appear to be an important therapeutic advance for certain serious diseases poorly controlled by conventional treatments. The improvement of the separators in terms of efficiency, automation and safety makes it possible to improve the tolerance of this type of treatment. The development of selective treatment systems represented a more pathophysiological approach and eliminated the need to transfuse patients with blood drifts such as albumin or PFC.

The opening of a national register of plasma exchanges, managed by a Moroccan hemapheresis company, is an essential prerequisite for the development of transfusion medicine in our country.

POTENTIAL CONFLICT OF INTEREST

None declared.

AUTHORS CONTRIBUTION

All authors have contributed to the conduct of this work. All authors also declare that

they have read and approved the final version of the manuscript.

ETHICAL CONSIDERATION

All the data has been collected anonymously following patient confidentiality.

ABBREVIATION

PE: plasma exchange
ACD: citrate dextrose acid
MS: multiple sclerosis
ECG: electrocardiogram
TP: prothrombin level
TCA activated cephaline time
CTS: Blood Transfusion Centre
PFC: plasma made frozen
MHMV: military hospital mohamed V

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