Therapeutic plasma exchange in Casablanca

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Abstract

Background: Therapeutic plasma exchange (TPE) is an extracorporeal blood purification method for the treatment of diseases in which pathological proteins have to be eliminated. In the aim to demonstrate our single center activity, we analyzed our data since 2 years.

Methods: Between years 2002 and 2005, 104 TPE procedures were performed on 42 patients. Median age and male/female ratio were 32 (range, 17–56) and 24/18, respectively. Departments those referred the majority of the TPE were neurology (n = 32), nephrology (n = 5) and intensive care unit (n = 5). The most common indications were: polyradiculoneuropathies (53%), myasthenia gravis (17%) and Guillain–Barre syndrome (12%).

Results: The median TPE procedure per patient was 2.3 (range, 1–10). In the majority of patients, vascular access was provided by puncture of two large, durable peripheral antecubital veins. The procedures were performed with the “Hemocetic Ultralight” discontinuous flow cell separator devices. Citrate solution was used as an anticoagulant in all cases. The substitution fluids most often used in our unit are Albumin 20% solution (92 times), Albumin 4% (10 times) and fresh frozen plasma (twice). Seventy five percent of the patients showed improvement, 7% remained the same and 18% worsened. Thirteen adverse reactions were recorded.

Conclusion: The creation of a national registry by the local society is a vital move to improve TPE practice in our country.

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Keywords: Therapeutic plasma exchange; Casablanca; Treatment; Outcome

1. Introduction

Apheresis (from the Greek “to take away”) means selectively collecting a blood component from blood. Therapeutic plasma exchange (TPE) is an extracorporeal blood purification method for the treatment of diseases in which pathological proteins have to be eliminated. When TPE became clinically available in the early 1970s, several spectacular treatment results in otherwise deleterious clinical situations were reported. The clinical indications for TPE have been progressively growing [1] although the clinical efficacy of TPE has been documented with randomized controlled studies only in limited numbers of diseases [2,3]. In Casablanca, the use of TPE, particularly for management of patients with neurological, nephrological and hematological disorders, has steadily increased since the early 2000. In this study, we report a 2 years activity of therapeutic plasma exchange in our apheresis unit.
2. Historical considerations

Casablanca is the biggest city in Morocco, with approximately 5 million inhabitants. However, only a single institution of blood transfusion is accredited to practicing apheresis within the city.

In Casablanca, the first apheresis procedures were carried out in the late 1990s for the treatment of Guillain–Barré syndrome using a manual technique.

In our context, the apheresis practice is still reduced or discontinued. Indications for the method are sometimes only symbolic. At present, economic constraints are the major obstacles for the development of this procedure in our country.

3. Materials and methods

This is a retrospective study led in our apheresis unit from December 2002 to May 2005. One hundred and four therapeutic plasma exchange procedures were performed on 42 patients. The patients were hospitalized in the following departments: neurology, nephrology and intensive care. In the majority of patients, vascular access was provided by puncture of two large, durable peripheral antecubital veins. In cases of inadequate peripheral vascular access via veins, we used central venous dual lumen catheters. The procedures were performed with the “Haemonetic Ultralight” discontinuous flow cell separator devices. In a typical TPE procedure, an average of one plasma volume is removed from the patient connected to the apheresis device and the plasma is exchanged with replacement fluid. Citrate solution was used as an anticoagulant in all cases. The substitution fluids most often used in our unit are Albumin 20% solution (92 times), Albumin 4% (10 times) and fresh frozen plasma (twice).

4. Results

Between years 2002 and 2005, 104 therapeutic plasma exchange (TPE) procedures were performed on 42 patients. Median age and male/female ratio were 32 (range, 17–56) and 24/18, respectively. Departments who referred the majority of the TPE procedures were neurology (n=32, 76%), nephrology (n=5, 12%) and intensive care unit (n=5, 12%). The median TPE procedure per patient was 2.3 (range, 1–10). Ten types of diseases were reported (Table 1).

The mean number of procedures was relatively large for TTP (10 procedures per disease), polymyositis (4 procedures) and polyradiculoneuropathies (2.4 procedures) and were relatively small for cryoglobulinemia, POEMS syndrome and glomerulonephritis.

The most common indications were: polyradiculoneuropathies (53%), myasthenia gravis (17%) and Guillain–Barré syndrome (12%).

The reported responses to TPE shown in Table 2 indicated that 75% of the patients showed improvement, 7% remained the same and 18% worsened.

Among the major 10 indications, polyradiculopathies showed the highest rate of improvement (86%, 19/22 patients).

The overall frequency of complications was 12.5% (13/104 cases). The major complications were hypocalcemic symptoms including a tingling sensation, numbness and paresthesia (6.7%) and hypotension (5.7%). Patients respond well to oral calcium supplementation.

Six percent (eight patients) of complications was due to vascular access or mechanical problems.

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Table 1

<table>
<thead>
<tr>
<th>Disease</th>
<th>Number of patients</th>
<th>Number of procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyradiculoneuropathies</td>
<td>22</td>
<td>2.4</td>
</tr>
<tr>
<td>Guillain–Barré syndrome</td>
<td>5</td>
<td>1.2</td>
</tr>
<tr>
<td>Myasthenia gravis</td>
<td>7</td>
<td>1.4</td>
</tr>
<tr>
<td>Goodpasture’s syndrome</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Thrombotic thrombocytopenic purpura (TTP)</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Polymyositis</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Cryoglobulinemia</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>POEMS syndrome</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Glomerulonephritis</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Idiopathic thrombocytopenic purpura (ITP) + pregnancy</td>
<td>1</td>
<td>1</td>
</tr>
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</table>

Table 2

<table>
<thead>
<tr>
<th>Clinical response of therapeutic apheresis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disease</td>
</tr>
<tr>
<td>Polyradiculoneuropathies</td>
</tr>
<tr>
<td>Guillain–Barré syndrome</td>
</tr>
<tr>
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<tr>
<td>Glomerulonephritis</td>
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<tr>
<td>ITP + pregnancy</td>
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</tbody>
</table>
5. Discussion

Therapeutic plasma exchange (TPE) is the procedure of replacing large amounts of patient’s plasma with replacement fluids by using automatic cell separator devices. TPE has been practiced for approximately 25 years. The list of indications for TPE has grown very rapidly and motivated establishment of apheresis units [4]. With TPE it is possible to decrease plasma levels of pathogens and toxins that play a role in disease pathology [5]. Various replacement fluids are used during TPE (5% albumin, fresh frozen plasma, hydroxyethylstarch, HES or combinations of these) [6–8]. The replacement fluid is chosen according to the patient’s serum albumin level, coagulation profile and underlying disease.

Our experience with therapeutic plasma exchange (TPE) is growing. TPE and cytapheresis are methodologies presently available. Other special apheresis techniques for specific disorders such as photopheresis, immunoadsorption, and filtration [9] to mention a few have not been availed of largely due to economic reasons, inadequate insurance coverage, and lack of information regarding the value of TPE as a treatment modality.

In several reports from large study groups like those of Canada [10] and France [11], it is apparent that the most common indications for TPE are for neurologic and hematologic disorders. Although limited in scope, our data indicate a predominance of TPE in neurologic disease.

Only one patient was treated by TPE in hematologic disease group for TTP.

In an update on therapeutic plasma exchange in 1999 by the Canadian Apheresis Group the percentage of plasma exchanges for TTP has quadrupled from 1981 to 1997 [13]. Similarly, in a more recent report by the author describing the activity of TPE in the Philippines represented solely by St. Luke’s Medical Center [14], the percentage of plasma exchange increased from an initial 5% to 20% when an additional seven other hospitals, now included in this report, became operational from 1994 to 2004. This finding supports the generally accepted concept that unlike polyradiculoneuropathies (where we can use other therapeutics like oral steroids or intravenous immunoglobulin [12]), there is no other equally effective alternative treatment so far for TTP except TPE.

Another remark it is that immunoabsorption for the treatment of ITP has not yet been performed in the Casablanca due to unavailability and high cost of affinity columns.

The introduction of TPE to clinical practice has significantly reduced the morbidity and mortality of patients with various diseases, and especially of those with thrombotic thrombocytopenic purpura/hemolytic uremic syndrome (TTP/HUS) and myasthenia gravis. However, the initial enthusiasm with therapeutic results of TPE was in some clinicians soon replaced by fear of the potentially life-threatening complications of the treatment [15,16].

The present study found that polyradiculoneuropathies is the most common indication, as reported previously; however, Guillain–Barré syndrome and myasthenia gravis were found to account for 17% and 12%, respectively, which were higher than those reported in other studies [17–19].

This also seems to be the consensus in other countries, as the use of TPE in Guillain–Barré syndrome is decreasing [20].

The overall response rate to TPE reported by the International Apheresis Registry in 2000 was about 70% [19], and in this study it was 75% among the 104 patients whose clinical outcome was assessable. In this study, an improvement was reported in 29 of 36 patients with neurologic disease.

The anticoagulant used was mainly citrate. The substitution fluids most often used in our unit are Albumin 20% solution (92 times). Fresh frozen plasma (FFP) as a replacement was used less than in other countries. The French registry reported an FFP use in 17.1% [18] and the 2000 International Apheresis Registry found FFP used only in 1/6 of albumin uses [19].

In France, the use of albumin with a plasma expander such as starch is most common [18], because it appeared to give the best result with respect to blood pressure stability, the frequency of fever, and shivering and/or allergic reactions [21]. It may be beneficial to try the combination of substitution fluids also in Casablanca.

For vascular access, the use of the antecubital veins is more common in Japan and Europe, and the use of a central catheter more common in the United States [19]. In the majority of our patients, vascular access was provided by puncture of two large, durable peripheral antecubital veins.

Our results show that TPE carries a low risk of adverse reactions when carried out by experienced personnel. Other studies report on the occurrence of hypocalcemia symptoms in up to 9% of PE treatments [22,23]. Hypocalcemia was the most frequent
complication in a Korean study, complicating 11.1% of procedures [24]. Urticaria, wheezing and hypotension characterized anaphylactoid reactions to replacement fluid. Only one reaction has been observed at the patient treated by FFP.

A significantly higher incidence of allergic reactions was recorded in patients requiring FFP such reported from other studies, where most reactions were limited to rigor or urticaria [22,25].

The practice of TPE in Casablanca still leaves much to be desired. Its progress highly depends on local and regional economics. Other factors that affect its progress are low insurance reimbursements, lack of uniformity in clinical practice patterns, available technology, and the need for information dissemination among doctors and patients on the benefits of the procedure.

The creation of a national registry by the local society is a vital move to improve TPE practice in our country.

6. Conclusion

Therapeutic plasma exchange was tried for many conditions in which a pathogenic antibody or antigen–antibody complex was implicated.

In order to collect accurate and more comprehensive data for all our city, we need a central database system, by which we will be able to standardize all our procedures. The annual total number of TPE procedures per inhabitant in Casablanca is far from that for other apheresis groups. We should collaborate with other departments such as immunology, nephrology and neurology, in order to increase our number of TPE procedures per inhabitant.

References