Tropical Medicine

The treatment of Guillain-Barré syndrome by modified plasma exchange – a cost effective method for developing countries

H.J. De Silva, R. Gamage,¹ H.K.N. Herath,¹ M.G.S. Karunanayake² and J.B. Peiris¹

¹Institute of Neurology and ²Blood Bank, General Hospital, Colombo 8, Sri Lanka.

Summary: Six patients with the Guillain-Barré syndrome were treated by modified plasma exchange. Five of them showed a rapid improvement which was not consistent with the natural history of the disease. The improvement was assessed by monitoring vital capacity and muscle power, grading the ability to perform motor functions and by the duration of the hospital stay. The method of plasma exchange we used was simpler and cheaper than the conventional method. We recommend the use of our method, especially in developing countries with financial constraints and poor facilities.

Introduction

The pathological process of acute inflammatory demyelinating polyradiculopathy or the Guillain-Barré syndrome (GBS) is still only partially understood. Both cell mediated and humoral immune mechanisms have been implicated. These are suggested by the finding of immunoglobulin in nerves, circulating IgG and IgM antibodies, immune complexes, complement fixing antibodies against nerve tissue and increased numbers of activated lymphocytes in the peripheral blood.^{1–6} On the basis of these immunological abnormalities plasma exchange (PE) has been used in its treatment.^{1–4,7} Two recent trials have established that PE is of significant benefit in the treatment of patients with GBS.^{8,9}

Plasma exchange is usually performed using continuous flow cell separators (Haemonetic or Celltrifuge), exchanging large amounts of plasma (10–30 litres per patient) over a short period of time (7–14 days, usually on an alternate day basis)^{2–4} and replacing the removed plasma with 5% purified protein fraction or 5% normal serum albumin.^{3,4} This is both a complex and expensive procedure¹ and is therefore of questionable suitability for poor, developing countries.

We report the results of a simpler form of PE, which does not require cell separators or expensive replacement fluids in the treatment of patients with GBS.

Materials and methods

Six consecutive patients who were admitted to the Institute of Neurology, General Hospital, Colombo with progressive weakness of all four limbs were further studied.

The criteria used for the diagnosis of GBS were a modification of those recommended by the National Institute of Neurological and Communicative Disorders and Stroke.¹ PE, using a modified technique, was commenced on all the patients when they reached grade 4 or 5 on the clinical scale. Two of them required tracheostomy and ventilatory support.

Plasma exchange technique

A 17 gauge needle was inserted into an ante-cubital vein and 0.5 litres of blood was removed into a blood collecting pack (Fenwal or Terumo). After venesection, a unit (0.25 litres) of fresh frozen plasma (FFP) was infused. The blood pack was centrifuged in a Sorvall centrifuge, the supernatant plasma discarded and the patients' own blood cells were reinfused. The cells and FFP were transfused through an intravenous cannula inserted into a vein in the other arm. This procedure was carried out twice a day for 7–13 consecutive days (mean 10.3 days).

The patients' response to plasmapheresis was assessed by daily monitoring of muscle power using the standard MRC 0–5 scale, vital capacity (VC) and frequent clinical grading according to the following

Correspondence: H.J. De Silva, M.B., B.S., M.D. 6, Green Path, Kohuwela, Sri Lanka
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scale:² grade 0-healthy, grade 1-minor symptoms and signs of neuropathy, grade 2-able to walk 5 m without assistance, grade 3-able to walk 5 m with assistance or stick, grade 4-confined to bed or chairbound, grade 5-requiring assisted ventilation.

No patient was given steroids or other immunosuppressive drugs.

Results

Our findings are summarized in Table I. Plasma exchange was started within 20 days of the illness in every patient (mean 10.5 days). Only 2 patients needed assisted ventilation despite the fact that 5 had difficulty in breathing and VC falling to below 0.3 litres. In the 2 patients needing it, assisted ventilation was necessary only for 12 and 10 days for cases 1 and 3, respectively.

Five of our six patients showed a marked improvement in respect to their vital capacity (Figure 1), muscle power, facial weakness and clinical grade. In the other patient (case 2) the response was slower. However, though his VC fell below 0.3 litres, assisted ventilation was avoided. On discharge the 5 patients with a good response were all able to walk without help (grade 2). Case 2 was grade 4 throughout his hospital stay. This patient was lost to follow-up. None of the others had a relapse, over a follow-up period of 2–6 months.

Discussion

This is a very small, uncontrolled study and as such the comparison of our results with other published series is of doubtful validity. The hospital stay in our patients (excluding case 2) was 21–36 days (mean 28.6 days). This was much less than the average hospital stay of patients with GBS which is 61 days.³ Of the patients

Figure 1 Improvement of vital capacity with plasma exchange. ▲-denotes day on which PE was commenced.

who need respiratory support, the average time on a ventilator is 49 days.³ In the 2 patients in our series who required it, the assisted ventilation was only required for 12 and 10 days for cases 1 and 3. With the exception of case 2 the time to improvement of one grade in our patients (mean 14 days) was also less than that reported in patients not treated with PE (31 days).³

PE seems to have played a part in the recovery shown by 5 of our patients as this was too rapid to be explained by remyelination alone.

The interesting aspect of this study is that despite modifying the method of PE to a cheaper and simpler one, our results may be comparable to those employing conventional PE.^{2–4,8,9} The modified method of PE used by us may suit conditions in most developing countries, where the availability and cost of cell separators and expensive replacement fluids are prohibitive.

Our method required that phlebotomy be carried

Table I Details of patients' response to plasmapheresis

Case	Age	Sex	Day of illness on which plasma exchange was started	Time on assisted ventilation (days)	Amount of plasma exchanged (litres)	Time to improvement of one grade (days)	Duration of illness (up to reaching grade 2) (days)	Hospital stay (days)
1	29	Male	8	12	11 × 0.5	18	39	36
2	57	Male	9	—	13 × 0.5	—	(48)	(44)
							(Reached grade 4 only)	
3	32	Male	18	10	8 × 0.5	8	41	28
4	33	Male	12	—	10 × 0.5	16	43	33
5	34	Male	8	—	13 × 0.5	20	30	25
6	29	Male	8	—	7 × 0.5	8	26	21

out in the morning and afternoon. The average amount of plasma exchanged per patient was 5.2 litres. This was much less than when cell separators are used where 10–30 litres of plasma are exchanged per patient.^{2–4} It is known that patients with GBS may have severe autonomic dysfunction,^{1,10,11} abnormalities of osmoregulation¹ and hyponatraemia.¹² It is therefore logical to assume that patients with GBS may tolerate large volume shifts poorly. Hypotensive episodes particularly, have been described in patients where PE was carried out using cell separators.² None of these problems was encountered in our patients.

About 20 venepunctures had to be performed on each of our patients for removal of blood. This no doubt caused some discomfort to the patients. We

utilized only 1 or 2 veins in the antecubital fossa for all venepunctures, by ensuring that there was no extravasation of blood to surrounding tissues after venepuncture.

This modified method of PE could be performed in a hospital equipped with a blood bank. Intensive care beds may be spared, as early PE may reduce the need for ventilatory assistance. The method is also economical. We only required blood collection packs, a centrifuge and a relatively small amount of FFP (about 20 units per patient). We would therefore like to recommend the use of our method when PE is used in the treatment of GBS, especially in developing countries with financial constraints and poor facilities.

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