

SEMI-CONTROLLED MULTICENTRE STUDY OF DOUBLE FILTRATION PLASMAPHERESIS IN SYSTEMIC LUPUS ERYTHEMATOSUS

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Summary

Double filtration plasmapheresis (DFPP) applying the differential filtration principle has been clinically performed with therapeutic effectiveness and successful reduction of replacement fluid in various clinical situations. Twenty-two patients with systemic lupus erythematosus (SLE) were treated by DFPP in a semi-controlled manner in three collaborative institutions. Results showed that DFPP significantly improved clinical symptoms in SLE patients concurrently with improvements of the laboratory immunological data.

Introduction

Although plasma exchange has been proven to be medically beneficial in certain pathological conditions, its efficacy in systemic lupus erythematosus (SLE) still remains controversial. It is of interest to evaluate whether SLE can be successfully treated by double filtration plasmapheresis, originally devised in Japan, in an attempt to save human blood products for substitution applying the differential filtration principle [1-4] (Figure 1). A multicentre collaborative clinical trial of DFPP in SLE patients was performed in a semi-controlled manner.

Systemic lupus erythematosus patients

Twenty-two SLE patients, who fit the diagnostic criteria according to the American Rheumatism Association and show not only either one of high anti-DS DNA antibody, low complement or high immune complex level, but also the clinicopathological conditions such as 1) progressive deterioration of kidney function, nephrotic syndrome or other serious symptoms such as pericarditis, pleurisy, central nervous disturbance, peripheral circulatory disturbance resistant to conventional therapies, or 2) difficulty in the administration of steroids or

immunosuppressive drugs because of side effects, were indicated for double filtration plasmapheresis treatment.

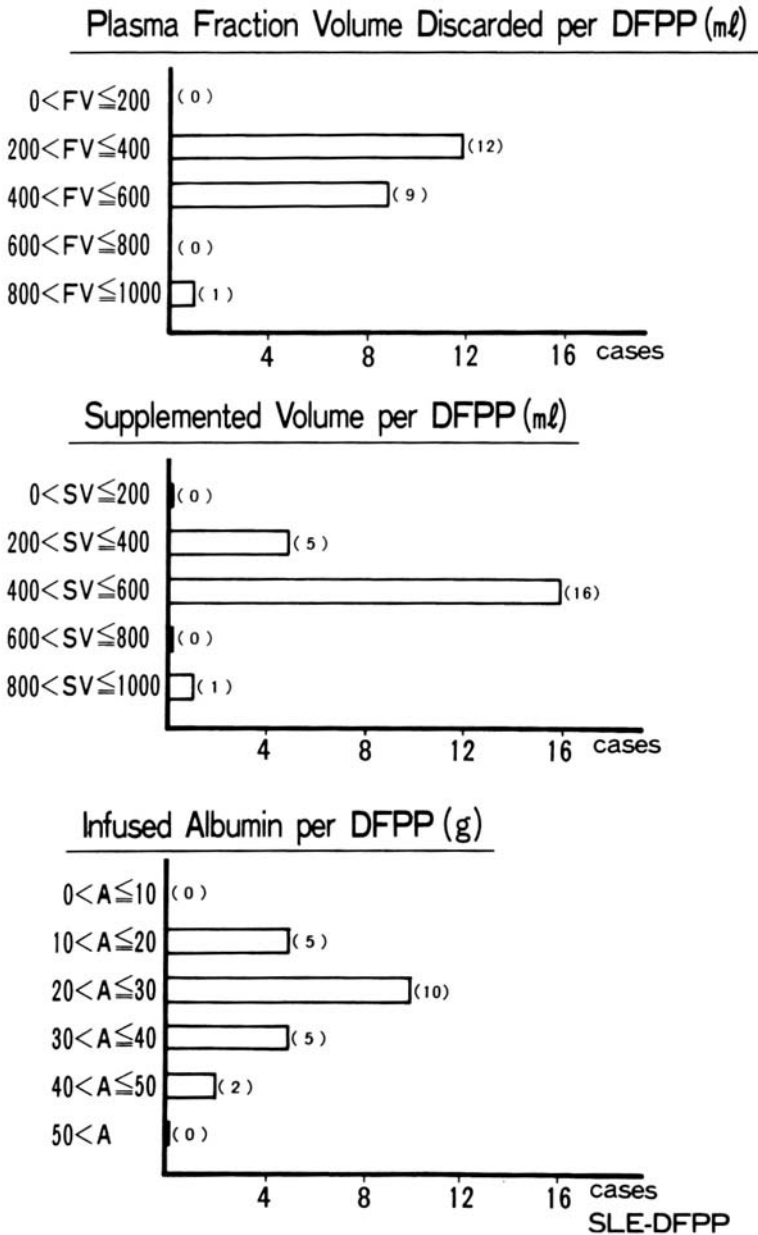


Figure 1. Plasma exchange by DFPP

Double filtration plasmapheresis regimen proposed

Filters Plasma separator (first filter) = Plasmacure (Kuraray Co, Japan). Plasma fractionator (second filter) = Evafux 2A or 4A (Kuraray Co).

Frequency Two to six times for two to four weeks.

Processed plasma volume by a plasma separator 2,000–3,000ml/DFPP.

Discarded volume One-fifth to one-tenth of the processed plasma volume.

Replacement Equal volume of albumin-containing Hartman's solution to the discarded fraction.

Result

Double filtration plasmapheresis

Double filtration plasmapheresis was performed one to four times as a series in 21 patients. The plasma volume processed by the plasma separator was 1,000 to 2,000ml in nine patients, and 2,000 to 3,000ml in 13 patients respectively. While the plasma fraction volume discarded per double filtration plasmapheresis was 200 to 400ml in 12 patients and 400 to 600ml in nine patients, respectively, the replaced volume per double filtration plasmapheresis was 200 to 400 in five patients and 400 to 600ml in 16 patients, respectively. As a result, the amount of albumin infused for replacement was 10 to 20g in five patients, 20 to 30g in 10 patients and 30 to 40g in five patients, respectively (Figure 1).

Clinical responses

Improvement in clinical signs varied in individual patients. Improvements in some of the typical symptoms are detailed in Figure 2. Facial erythema markedly faded in 10 of 13 patients (77%). Raynaud's phenomenon conspicuously ameliorated in four of five patients (80%). Hair loss seen in eight patients ceased in six patients (75%). Arthritis present in 11 patients improved in 10 patients (91%). Serositis found as pleurisy in two and pericarditis in two disappeared in all patients (100%). Central nervous disturbances observed as mental disorder in one and generalized cramp in one subsided in both patients.

Some of the laboratory data are presented in Figure 3. Immunoglobulin G decreased from $1,552 \pm 299$ mg/dl to 936 ± 170 mg/dl on average in 12 patients ($p < 0.001$). Anti-DNA antibody titre decreased from 66.8 ± 18.9 U/ml to 36.9 ± 12.8 U/ml in an average of 14 patients examined ($p < 0.001$). Immune complexes decreased from a pre-treatment value of 13.6 ± 5.2 μ g/ml to a post-treatment value of 4.4 ± 1.0 μ g/ml in an average of six patients ($p < 0.001$).

However, no significant improvement in kidney function evaluated by blood urea, serum creatinine and creatinine clearance was observed immediately after a series of double filtration plasmapheresis treatments (Figure 4).

Discussion

Double filtration plasmapheresis, which is called cascade filtration in European countries [5] has been clinically applied in various clinical diseases since 1978

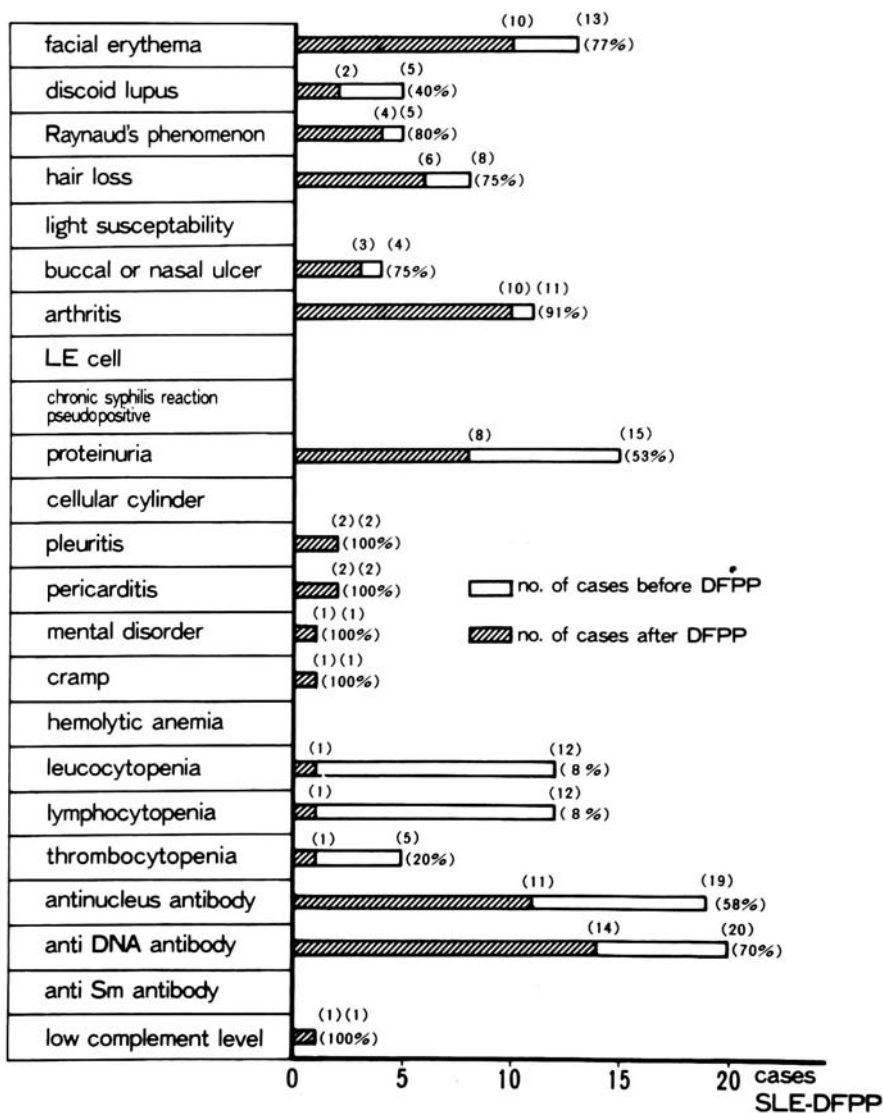


Figure 2. Clinical improvements after a series of DFPP

and is presently very popular in Japan. However, as reports on SLE patients had been only sporadically made, the clinical value of this technique has not been ascertained in a controlled manner in a large series of patients. The results presented here support the efficacy of double filtration plasmapheresis on SLE in terms of acute and direct effectiveness observed immediately after a series

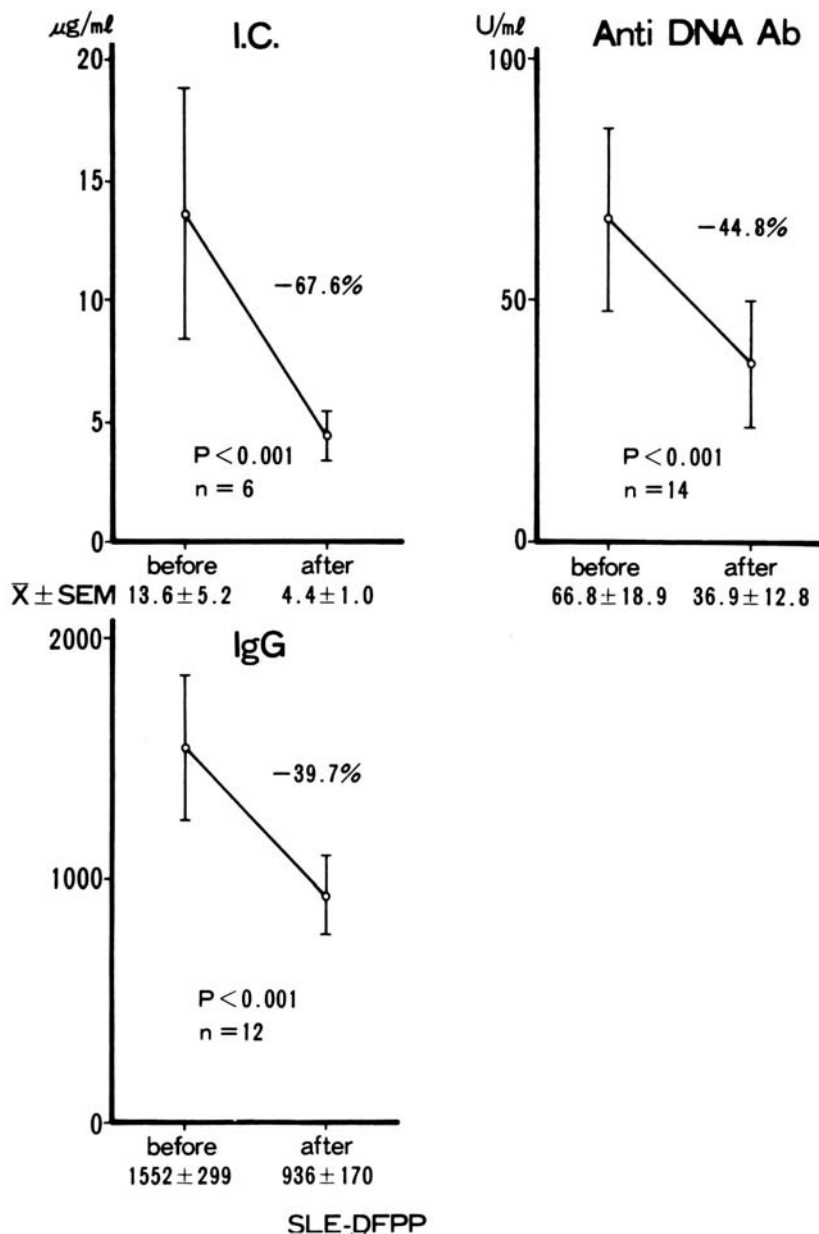


Figure 3. Improvements in laboratory data

of the treatments, while the amount of human blood products required is reduced from one-tenth to one-fifth compared to the standard plasma exchange techniques.

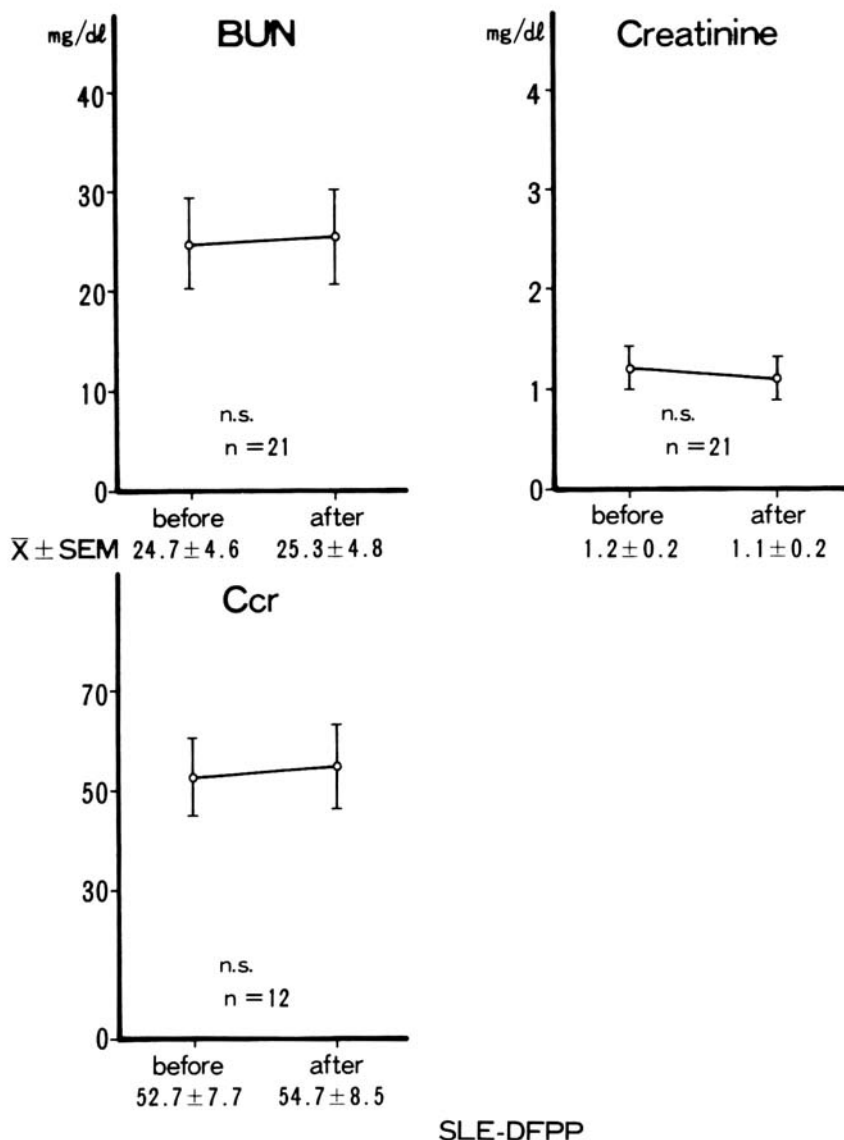


Figure 4. Kidney function profiles immediately after DFPP series

References

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