Effect of Immunoglobulin Substitution during Plasmapheresis on Serum Immunoglobulin and Complement Concentrations

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Dear Sir,

Plasma exchange is being used increasingly as a therapeutic intervention in various immune-mediated disorders [1]. The method is hampered, however, not only by numerous difficulties in assessing its efficacy [2], but also by technical problems, such as the depletion of serum-proteins [3]. When human albumen is used as plasma substituent, the patient receives only this plasma component back, while serum immunoglobulins, complement components, coagulation factors etc. remain reduced. Although infection occurs rather seldom in patients on plasmapheresis (PP), it can constitute a major threat in

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immunosuppressed patients who undergo PP for therapeutic reasons. We have therefore attempted to substitute immunoglobulin in patients on plasma exchange where human albumen was used as plasma substituent.

PP was performed on 4 patients on a continuous IBM 2997 blood cell separator with 5% human albumen (Immuno, Vienna) as plasma substitution fluid, and ACD-B as anticoagulant. A mean plasma volume of $80.4 \pm 3.4\%$ (SEM) of total plasma were exchanged by a total of 17 PPs. At 7 randomly selected procedures 5g immunoglobulin (Endobulin®, Immuno, Vienna) were infused together with human albumen back to the patient (a mean plasma volume of $79.4 \pm 5.8\%$ of total plasma being exchanged during these procedures), while at 10 other plasma exchange procedures performed on the same patients no immunoglobulin was substituted (mean

Table I. Effect of immunoglobulin substitution during plasmapheresis upon serum concentrations of IgG, IgA and IgM, and complement components C3 and C4

IgG

%A

%M

C3

C4

Without immunoglobulin substitution Before plasmapheresis

After plasmapheresis

Significance1
 With immunoglobulin substitution Before plasmapheresis
 After plasmapheresis
 Significance1

1,074.2 ±

168.6 ±

103.1 ±

163.4 ±

27 ±

338.7

65.1

90.5

60.7

8.9

412.0 ±

70 ±

52.9 ±

68.6 ±

12.2 ±

198.8

31.6

59.7

24.4

4.9

p < 0.001

p < 0.001

p < 0.001

p < 0.005

p < 0.002

1,210.3 ±

247.6 ±

102.9 ±

171.3 ±

26.4 ±

413.9

162.2

104.4

68.1

10

868.9 ±

159.4 ±

81.2 ±

127 ±

19.7 ±

412.6

107.8

101.3

71

8.6

$p > 0.1$

$p > 0.2$

$p > 0.5$

$p > 0.2$

$p > 0.2$

Data are given in mg/100 ml (mean $\pm$ SD). 1 As assessed by Student's t test.

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plasma volume exchanged: $80.7 \pm 4.9\%$ of total plasma). Blood was drawn before and after each PP, and immunoglobulin (IgG, IgA and IgM) and complement component (C3, C4) levels were assessed by nephelometry.

Table I shows that PPs performed without the addition of immunoglobulin led to a significant decrease of serum levels of IgG, IgA ($p < 0.001$) as well as of C3 and C4 concentrations.

However, when patients were substituted with immunoglobulin, the depletion of IgG and IgA was reduced significantly. Surprisingly, also the concentrations of C3 and C4 did not drop when the patients were substituted with immunoglobulin during the respective PP. While the effect on immunoglobulin levels clearly is the result of substitution, the lack of reduction of complement levels cannot be interpreted in such a way. Rather, the complement activation which is known to occur during PP [4] might be reduced by the administration of immunoglobulin concentrates. Further studies are underway to prove this assumption which could lead to the clinical use of immunoglobulin concentrates in diseases in which complement activation could be involved in the pathogenesis and perpetuation of the process.

References

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