THE INFLUENCE OF PERITONEAL DIALYSIS ON PLASMA FIBRINOLYTIC ACTIVITY OF CHRONIC UREAEMICS

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A decrease of fibrinolytic activity in plasma and tissues can be frequently found in chronic uraemias (MacLeod, Stalker and Ogston, 1962; Edward, Young and MacLeod, 1964; McNicol, Barakat and Douglas, 1965; our unpublished data). It has been implied that a defect of the fibrinolytic activity could be important in the pathogenesis of fibrinous exudates which can occur in these patients (McLeod et al.). It has been also found that haemodialysis has no influence on plasma fibrinolytic activity (McNicol et al.).

We observed that impaired plasma fibrinolytic activity as measured by euglobulin lysis time improves after peritoneal dialysis. This finding prompted the investigation of the effect of peritoneal dialysis on plasma fibrinolytic activity, an account of which is presented in this preliminary communication.

MATERIAL AND METHODS

Twelve patients in the end stage of chronic uraemia were studied. All of them were submitted to peritoneal dialysis lasting in every instance at least 24 hours.

Blood samples were collected before starting the dialysis and 2, 4, 8, and 24 hours afterwards.

Plasma fibrinolytic system was studied by the following techniques:

Euglobulin lysis time, by the method of Nillson and Olow (1962). This test is said to be chiefly an index of plasma fibrinolysis activators when the plasminogen and fibrinogen levels are normal. The euglobulin lysis time was 330 ± 87 min in 35 normal adult persons.

Plasma fibrinogen concentration was determined with the method of Ratnoff and Menzie using the modification of Astrup, Brakman and Nissen (1965) for the development of colour.

Plasminogen plasma level was assessed from the amount of casein digested by plasma samples the fibrinolytic power of which had been activated with streptokinase (Norman, 1957).

Overall fibrinolytic activity was estimated according to the method of Perkins and Rolfs (1963). This assay depends on the percentage of native fibrin which is digested after 4 hours of incubation at 37 °C. In normal conditions no fibrinolytic activity is detectable in plasma since physiological fibrinolysis is counteracted by the inhibitors. Due to the error of the method the presence of fibrinolytic activity is considered to be significant when the percentage of fibrin digested is higher than 20%.

Plasma inhibitor overall activity was assessed from the time required by a fixed concentration of streptokinase activated plasminogen preparation (Fibrinolysin Merk) to dissolve a standard fibrin clot in the presence of serum sample. The inhibitor activity of the test serum

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was expressed as per cent of the value obtained with pooled serum sample derived from a control group of 25 normal adults.

The results of the first three tests were statistically tested with the analysis of the variance on randomized blocks.

RESULTS

Euglobulin lysis time. A marked reduction of euglobulin lysis time to about one half of the initial value was observed on the average early in the peritoneal dialysis in every patient.
whether the control value was normal or not. This effect was already evident 2 hours after
the start of the dialysis and was still significant after 8 hours (p < 0.01), while after 24
hours the lysis time approximated the initial level (Fig. 1). However, in the 4 patients who
initially had a very prolonged time, the effect was still evident after 24 hours.

Fig. 2 gives an example of a case in which a reduction of euglobulin lysis time persisted for
several days after the end of the peritoneal dialysis.

In order to exclude the possibility that the observed modifications were due to the intro-
duction of the cannula in peritoneum, per se, euglobulin lysis time was assessed in 4 patients
after the introduction of the cannula and no significant modification was observed.

Plasma fibrinogen concentration showed the tendency to increase during peritoneal dialysis
being significantly higher (p < 0.05) than the control value after 24 hours (Fig. 1).

Plasminogen plasma level did not vary significantly during peritoneal dialysis (Fig. 1).
Overall fibrinolytic activity increased very markedly in only one case, while it presented a slight increase in a few others (Fig. 3).

Serum inhibitor activity was increased in 5 patients before the dialysis. In all of them a 24 hours peritoneal dialysis resulted in a marked decrease of inhibitor activity (Fig. 4).

COMMENT

It is apparent from the results of the eglobulin lysis time, that peritoneal dialysis increases the fibrinolytic activity of uraemic plasma. This effect lasts at least 8 hours, but its duration may be much more prolonged in cases with grossly impaired plasma fibrinolytic activity.

The effect itself could not be related to variation of plasminogen level which remained nearly constant, nor to reduction of the substrate, i.e., fibrinogen concentration, which on the contrary tended to increase.

Therefore the shortening of the eglobulin lysis time during peritoneal lavage appears ascribable to the release of activators. Owing to the early modification of the test after the start of the dialysis, it seems reasonable to conclude that the effect may result from the stimulation of peritoneal membrane by the rinsing fluid. On the contrary serum inhibitor activity resulted most markedly affected after 24 hours and it may be inferred that this effect is due to the removal of the inhibiting substances with dialysis; however, definite proof of this hypothesis requires the demonstration of the inhibitor activity in the rinsing fluid.

In conclusion, it appears that peritoneal dialysis stimulates fibrinolytic activity of plasma and corrects the fibrinolytic deficit which may occur in chronic uraemia. This property is not shared by haemodialysis as it has been found by McNicol et al. and as it has been confirmed by ourselves (unpublished data).

The role played by the stimulation of fibrinolytic activity during peritoneal dialysis in removing fibrinous exudates from the tissues can be only matter of speculation.

REFERENCES


