SECOND VIENNA SHOCK FORUM

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Heinz Redl

First Vienna Shock Forum
Part A: Pathophysiological Role of Mediators and
Mediator Inhibitors in Shock

First Vienna Shock Forum
Part B: Monitoring and Treatment of Shock

Second Vienna Shock Forum

SECOND VIENNA SHOCK FORUM

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Heinz Redl

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THE PFI-INDEX ACCORDING TO AASEN FOR PROGNOSIS AND COURSE OF POLYTRAUMATIZED PATIENTS

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AASEN (1986) suggested the PFI-Index as a prognostic parameter for evaluation of the course of the disease in septic and polytraumatized patients. The index is defined as the sum of the deviations from controls of proenzyme and inhibitory activities of destinat factors of the coagulation, fibrinolytic and kallikrein-kinin systems. In a prospective clinical study which has been carried out since 1986 we were especially interested to evaluate the significance of the PFI-Index as a prognostic and diagnostic aid. The results obtained are compared with those seen for PMN elastase release. The clinical relevance of the measurement of the granulocytic (PMN) elastase was published repeatedly (DITTMER 1985, DUSWALD 1985).

During the first 2 years 57 polytraumatized patients (mean Injury Severity Score (BAKER 1974): 39 points) were included in the study. The patients were subdivided into 4 groups (table 1):

Table 1: Patients 1986 - 1987, n = 57

Group 1: early deceased, n = 8, mean ISS: 59 points (range: 34 - 75)
Group 2: secodarily deceased, n = 8 , mean ISS: 42 points (range: 25 - 59)
Group 3: survived with organ failure, n = 17, mean ISS: 37 points (range: 17 - 57)
Group 4: survived without complications, n = 24 , mean ISS: 32 points (range: 18 - 50)

Among the 49 patients who survived the primary phase in the shock room, 25 developed defined organ complications, 16 of them a multiorgan failure. The individual organ dysfunctions were distributed as follows: liver failure (43%), lung failure (35%), kidney failure (18%), DIC (8%), gastrointestinal disturbances (8%). The values for the PFI-Index and PMN elastase obtained upon hospital admission and after an intensive-care stabilization phase at day 4 are given in table 2:

Table 2: Mean values (±SEM) of PFI-Index (%) and PMN elastase (ng/ml) upon hospital admission and on day 4

	Hospital admission		Day 4 after trauma	
	PFI-Index	Elastase	PFI-Index	Elastase
Group 1	-369 (±30)	1334 (±630)	-	-
Group 2	-205 (±38)	325 (± 61)	-102 (±34)	769 (±229)
Group 3	-189 (±19)	361 (± 43)	-28 (±15)	295 (± 28)
Group 4	-167 (±24)	336 (± 40)	-46 (±14)	210 (± 14)

Upon hospital admission PFI-Index (%) and PMN elastase (ng/ml) show the same pattern: Patients of group 1, who died primarily, differ significantly from those of the other 3 groups which cannot be discriminated by these parameters.

On day 4 after trauma the result is as follows: The difference between those patients who deceased secondarily (group 2) and those who survived (group 3 and 4) is significant for the PFI-Index with a p-value of only 0.033. No distinction can be made between group 3 and 4. PMN elastase behaves quite differently: The differences of all 3 groups among each other and of group 3 plus 4 patients (survivors) as compared to those of group 2 (non-survivors) and group 2 plus 3 patients (with complications) as compared to group 4 (no complications) proved to be significant with $p \leq 0.01$.

To evaluate the prognostic relevance we checked how the different groups behave in view of a pathological PFI-Index (<-50%) or PMN elastase value (>250 ng/ml).

Table 3: Prognostic relevance of the PFI-Index and PMN elastase at day 4 after trauma regarding further development of complications

	PFI-Index	Elastase
Sensitivity	44%	68%
Specificity	54%	83%
Pos.Predictive Value	50%	81%
Neg.Predictive Value	48%	71%

In table 3 the prognostic relevance of the PFI-Index and PMN elastase for the development of further complications are shown at day 4 after trauma. With a positive predictive value (PPV) of 81% PMN elastase allows a good prediction of the development of complications in the further disease course. The negative predictive value (NPV) for PMN elastase is slightly lower. On the other hand the PFI-Index does not have prognostic relevance regarding further complications with a PPV of 50% and a NPV of 48%.

Table 4: Prognostic relevance of the PFI-Index and PMN elastase at day 4 for survival and non survival

	PFI-Index	Elastase
Sensitivity	75%	88%
Specificity	61%	66%
Pos.Predictive Value	27%	33%
Neg.Predictive Value	93%	96%

For the prediction of survival both PMN elastase as well as the PFI-Index are suitable. The NPV is 96% and 93%, respectively. In contrast, a reliable prediction of lethal outcome is not possible: Only 33% or 27% of patients with pathological PMN elastase or PFI-Index values at day 4 after trauma died.

Finally we checked to which extent the profile of the patterns of the compared parameters reflects the actual course of the disease (Figs. 1 and 2).

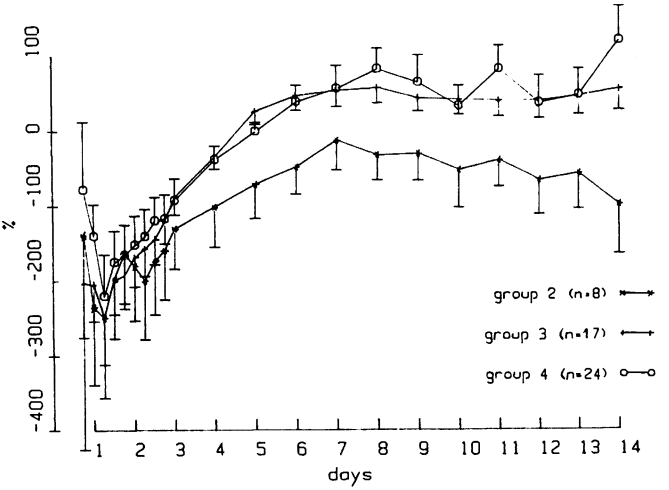

Fig.1: Mean values (±SEM) of PFI-Index for group 2, 3 and 4

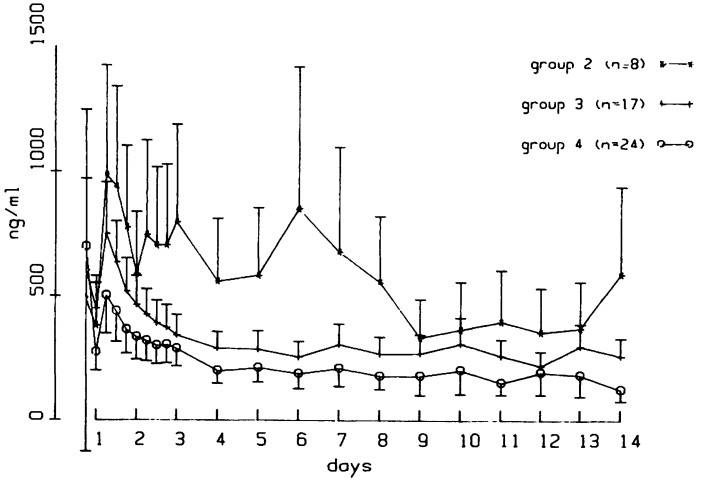

Fig. 2: Mean values (±SEM) of PMN elastase for groups 2, 3 and 4

At day 3, a difference between the later deceased and the surviving patients can be seen in the PFI-Index. Thereafter for the deceased patients the PFI-Index remains in the negative, pathological range, while the profile of the curve for the surviving patients rises to normal and remains there. The PMN elastase behaves accordingly and, in addition group differences can be already recognized at day 2. Also a trend for difference between the survivors with and without organ complications can be recognized.

Conclusions:

The PFI-Index does not allow any discrimination of the patients` state in the early phase of the trauma. Obviously the PFI-Index represents only the loss in blood-volume at this time. Upon admission to the hospital a good correlation between the PFI-Index and total plasma protein (coefficient of correlation: 0.80) is evident but after intensive care stabilization and balance of volume losses correlation is lost (coefficient of correlation: 0.31). Obviously in this phase the PFI-Index represents the actual consumption of factors of the plasmatic cascade systems.
The PFI-Index has no prognostic value concerning the development of complications. However its sensitivity to predict fatal outcome of 75% is relatively high. The low PPV (27%) does not allow to predict outcome in patients with elevated PFI-Index. Normal PFI-Index values indicate survival. The same is true for normal PMN elastase levels. Elevated PMN elastase levels do also not allow prediction of fatal outcome, but in contrast to pathological PFI-Index values, indicate imminent complications.

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