

# Disorders of Renal Function in Hepatic Coma

Pages with reference to book, From 28 To 30

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## Abstract

Renal function tests were done in 34 patients with hepatic coma. Serum urea, creatinine and uric acid were significantly elevated, serum calcium levels were low and creatinine clearance was also impaired (JPMA 34: 28, 1984).

## Introduction

Renal failure is a frequent complication in advanced liver disease (Conn, 1973; Papper, 1978). Gastrointestinal bleeding and forced diuresis may be the causes in fulminant hepatic failure and cirrhosis (Hecker and Sherlock, 1956; Shear et al., 1965). Hepatic coma or an associated metabolic abnormality may affect renal function or aggravate pre-existing renal abnormalities in severe liver disease (Shear et al., 1965). Reduction in glomerular filtration rate (GFR), raised serum urea and creatinine concentration indicate renal impairment in coma due to hepatitis and cirrhosis (Wilkinson et al., 1975; Shear et al., 1965).

Abnormalities of renal function occur at all stages of liver disease and get more pronounced in liver failure. Pattern of impairment observed in patients with hepatic coma is reported here.

## Material and Methods

Serum and urinary urea, creatinine, uric acid, calcium, inorganic phosphorus and creatinine clearance were estimated in 34 patients with hepatic coma and 100 control subjects. In 11 cases, coma was due to hepatitis (group I) and in 23 due to cirrhosis (Group II).

Urea was determined by diacetyl method using thiosemicarbazide (Wooton, 1974); creatinine by the method of Brod and Sirota (1948); uric acid by Caraway (1955) method; calcium by a direct method based on cresolphthalein complexone color reaction (Sigma kit) and inorganic phosphorus by the Gomori (1942) method.

## Results

Table 1

## Renal Function Tests in Hepatic Coma.

Serum	Controls		Coma (Hepatitis)	Coma (Cirrhosis)	
	No.	100		No. of cases	Mean $\pm$ S.E. (Range)
Urea (mg%)	25.46 $\pm$ 0.53 (10.7 - 33.2)	11	*104.3 $\pm$ 31 (16 - 364)	23	***72.3 $\pm$ 11.53 (12 - 214)
Creatinine (mg%)	0.74 $\pm$ 0.02 (0.3 - 1.4)	11	**3.10 $\pm$ 0.79 (1.0 - 10.5)	23	***1.67 $\pm$ 0.15 (0.7 - 3.45)
Uric Acid (mg%)	4.2 $\pm$ 0.11 (2.0 - 7.0)	7	*18.13 $\pm$ 5.10 (3.93 - 41.5)	19	**11.65 $\pm$ 2.27 (1.8 - 34.6)
Calcium (meq/L)	4.76 $\pm$ 0.03 (4.0 - 5.8)	8	***3.65 $\pm$ 0.23 (2.5 - 4.4)	21	***3.64 $\pm$ 0.10 (2.7 - 4.6)
Inorganic Phosphorus (mg%)	3.42 $\pm$ 0.11 (0.32 - 6.6)	6	4.70 $\pm$ 0.96 (1.5 - 8.96)	20	3.6 $\pm$ 0.29 (2.2 - 7.0)
Creatinine clearance (ml/min)	112.5 $\pm$ 4.06 (43 - 205)	8	***20.3 $\pm$ 5.66 (0.18 - 45)	18	***27 $\pm$ 4.66 (1.7 - 63.3)

\*P &lt; 0.05 as compared to controls.

\*\*P &lt; 0.01 as compared to controls.

\*\*\*P &lt; 0.001 as compared to controls.

Table II

## Renal Function Tests in Hepatic Coma.

Urine	Controls		Coma (Hepatitis)		Coma (Cirrhosis)	
	No.	100	No. of cases	No. of cases	Mean $\pm$ S.E. (Range)	Mean $\pm$ S.E. (Range)
Volume (ml/24 hrs)	1142.0 $\pm$ 52.3 (300 - 2600)	8	1002.5 $\pm$ 372.14 (150 - 3500)	19	1549.5 $\pm$ 269.3 (60 - 4500)	
Creatinine (gms/24 hrs)	1.31 $\pm$ 0.07 (0.32 - 4.08)	8	0.52 $\pm$ 0.10 (0.03 - 0.95)	18	0.53 $\pm$ 0.10 (0.02 - 1.55)	
Uric Acid (gms/24 hrs)	0.51 $\pm$ 0.01 (0.1 - 0.7)	6	0.49 $\pm$ 0.17 (0.06 - 1.2)	18	0.64 $\pm$ 0.10 (0.03 - 1.6)	
Calcium (meq/24 hrs)	(8.0 $\pm$ 0.49) (1.4 - 20)	6	(3.8 $\pm$ 1.5) (0.5 - 10)	18	(12.5 $\pm$ 3.5) (0.15-62)	
Inorganic Phosphorus (gms/24 hrs)	0.47 $\pm$ 0.02 (0.1 - 0.93)	6	0.31 $\pm$ 0.14 (0.02 - 0.83)	18	0.43 $\pm$ 0.08 (0.05 - 1.5)	

Table I and II show renal function tests in patients with hepatic coma and control subjects. Serum urea was raised in 64% cases with coma due to hepatitis and 50% with coma due to cirrhosis and serum creatinine was high in 73% of the former and 69.5% of the latter group. Hyperuricaemia was found in 57% cases of group I and 53% of group II coma whereas hypocalcaemia was marked in 100% and 91% cases of coma due to hepatitis and cirrhosis respectively. Serum inorganic phosphorus values were normal in both groups. Creatinine clearance was significantly impaired (P L 0.00 1) in all patients of both groups. Urinary output was low in 50% and 42% cases of coma due to hepatitis and cirrhosis respectively. Urinary uric acid and inorganic phosphorus were normal in both types. Urinary creatinine was low in 37.5% and 44.4% cases of group I and II coma whereas calcium excretion was low in 66.6% of the former and 22% cases of the latter group:

## Discussion

Renal failure in advanced liver disease appears to develop either spontaneously or in response to minor changes in circulating blood volume (Kew, 1972). Shear et al. (1965) in a retrospective study reported that a high percentage of the patients who die of hepatic coma have impaired renal function. Fulminant hepatic failure may be worsened by renal insufficiency. Serum urea, creatinine and uric acid were markedly elevated in patients with coma due to hepatitis indicating impaired renal function. Creatinine clearance was reduced reflecting decreased glomerular filtration rate whereas low serum calcium may be due to inadequate intake. Wilkinson et al. (1975) had similar observations.

The development of renal failure was associated with a poor prognosis and a high mortality rate has been observed which confirms the previous findings (Ring-Larsen and Palazzo, 1981; Wilkinson et al., 1975).

Renal failure is common in advanced cirrhosis and is characterized by progressive azotemia which reflects altered renal circulation rather than an; lesion of the parenchyma (Kew et al., 1971). The blood urea concentration is usually elevated to a greater degree than the serum creatinine level, although in some cases the reverse is true (Kew, 1972). Azotemia along with serum electrolyte abnormality indicates a very poor prognosis and probably reflects the severity of the underlying liver disease (Sherlock, 1981). Cirrhotics in the present study had raised serum urea in 50% whereas serum ,creatinine was high in 69.5%. Serum uric acid also showed a significant elevation. The levels are considerably high in patients with hepatic coma than reported earlier in patients with hepatitis and cirrhosis (Shahid et al., 1984). Calcium was 19w in several patients and reflects hypoalbuminaemia. Creatinine clearance was impaired in all cirrhotics and a value as low as 1.7ml/min was found. It is widely considered that the mortality in renal failure in cirrhosis is close to 100% (Shear et al., 1965; Papper et al., 1959), however in the recent studies a mortality rate as high as 90% has been observed.

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