

## PREGNANCY RELATED ACUTE RENAL FAILURE : AN ANALYSIS OF 100 PATIENTS

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### SUMMARY

Pregnancy related acute renal failure (ARF) was studied in 100 patients admitted to the Nephrology Unit of Dayanand Medical College & Hospital, Ludhiana (Punjab), who constituted 16.9% of 590 patients of Acute renal failure. One third of the patients developed ARF related to abortion while remaining two-thirds (67) in the later half of Pregnancy and puerperium (Eclampsia-22, Antepartum Hemorrhage-7, Postpartum hemorrhage-9 and Puerperal sepsis-29). The leading pathogenetic factor in the causation of ARF was septicemia (66%) followed by excessive bleeding (37%), hypotension (24%) and DIC(8%). Only 6% of patients showed clinical course like Acute cortical necrosis(ACN) while rest of the patients had course like Acute Tubular Necrosis(ATN). The mortality rate was 33%. Septicemia was the leading cause of death (78.8%).

### INTRODUCTION

The incidence of Acute Renal Failure (ARF) in pregnancy has declined more than four-fold from the figures reported two decades ago, and is now less than 0.01% (Per-tuiset et al,1984). More recently, a striking

decrease in the hospital admissions due to ARF complicating gestation has occurred mainly in the developed nations, owing primarily to liberalised abortion laws and improved perinatal care (Lindheimer et al,1983). In contrast to this, the incidence continues to be high in the developing nations due to poor socio-economic conditions and limited medical resources. The present study of 100 patients of pregnancy related acute renal failure

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has been conducted in a referral Nephrology Unit of North India and is representative of the proportions of the problems in the developing countries.

### PATIENTS AND METHODS

This study includes 100 consecutive patients admitted to the Nephrology Unit of Dayanand Medical College and Hospital, Ludhiana, Punjab, with the diagnosis of pregnancy related acute renal failure. This constituted 16.9% of the total 590 patients of diverse etiologies of ARF who admitted. The population catered by the hospital is the homogeneous North Indian Race.

A record of the precipitating factors for the ARF and the clinical profile was kept. The various investigations included the Blood urea, Serum creatinine, Serum electrolytes, Urinary sodium, Renal failure index, ultrasound examination of the kidney and the kidney biopsy wherever possible. Patients were examined for evidence of local sepsis by the Gynaecologist and all the patients were screened for infections by bacteriologic examination. The investigations for disseminated intravascular coagulation included bleeding time, clotting time, platelet count and urinary and serum fibrin degradation products(FDP) levels, As a part of the therapeutic modalities, patients were given dialytic support either as hemodialysis or peritoneal dialysis.

### OBSERVATIONS

One hundred patients of pregnancy related acute renal failure were studied. This constituted 16.9% of the total 590 patients of diverse etiologies of acute renal failure, admit-

ted over the same period.

One-third of the patients (33%) developed ARF related to the abortion, that is, in the early pregnancy, while two-thirds (67%) developed it in the later half of the pregnancy and puerperium (Table 1). ARF due to abortions were mainly due to interventions by the general practitioners or untrained personnel. Six abortions were spontaneous but had some interventions by personnel outside the hospital. In the later half of the pregnancy leading cause was puerperal sepsis (29%) followed by eclampsia (22%); Antepartum Hemorrhage and postpartum hemorrhage occupied minor fractions.

The various pathogenetic factors for ARF, playing a role either singly or in combination were analysed (Table 2). The major pathogenetic factor for the renal failure was septicemia (66%). The diagnosis of septicemia was based on clinical features of high fever and/or hypotension with supportive history. The positive blood cultures were seen in only six patients and positive urine/vaginal cultures were found in twenty one patients. Although history of bleeding was present in many, but judging from the history excessive bleeding was present in 37% of the patients. Hypotension was present in 24% of the patients and DIC was documented in 8%.

Only 5% of the patients presented to us in the non-oliguric ARF, whereas the rest (95%) had oliguric ARF. The oliguric phase ranged from 1-24 days. The mean blood urea and serum creatinine were 189.22 mg/dl and 7.98 mg/dl respectively (Table 3). 89 patients were given dialytic support.

Ninety-four patients had a classical course like acute tubular necrosis, that is, an oliguric phase followed by a diuretic phase

TABLE 1  
ETIOLOGICAL GROUPS

|   |    | No. of patients |
|---|----|-----------------|
| First half of pregnancy                 |    | 33              |
| Spontaneous abortion                    | 6  |                 |
| Induced abortion                        | 27 |                 |
| Second half of pregnancy and puerperium |    | 67              |
| Eclampsia                               | 22 |                 |
| APH                                     | 7  |                 |
| PPH                                     | 9  |                 |
| Puerperal sepsis                        | 29 |                 |

TABLE 2  
PATHOGENETIC FACTORS

| Group                 | No. of patients | Excessive bleeding | Septicemia | DIC      | Hypotension | Survival  |
|-----------------------|-----------------|--------------------|------------|----------|-------------|-----------|
| Spontaneous abortions | 6               | 6(50%)             | 3(50%)     | -        | 1(16.6%)    | 6(100%)   |
| Induced abortions     | 27              | 5(18.5%)           | 21(77.7%)  | 3(11.1%) | 8(29.6%)    | 16(16.6%) |
| Eclampsia             | 22              | 2(9.1%)            | 9(40.9%)   | 1(4.5%)  | 2(9.1%)     | 16(72.7%) |
| APH                   | 7               | 7(100%)            | 1(14.2%)   | -        | 1(14.2)     | 6(85.7%)  |
| PPH                   | 9               | 9(100%)            | 4(44.4%)   | -        | 4(44.4%)    | 4(44.4%)  |
| Puerperal sepsis      | 29              | 8(27.6%)           | 29(100%)   | 4(13.8%) | 8(27.6%)    | 17(58.6%) |
| Total:                | 100             | 37(37%)            | 66(66%)    | 8(8%)    | 24(24%)     | 67(67%)   |

and then normal urinary output and normal renal functions. The urinary sodium and renal failure indices were calculated in sixty four patients. The urinary sodium (first spot sample) was greater than 40 mEq/L in all patients and none of the patients showed a fractional excretion of sodium less than one (Table 3). Six patients had clinical course like acute cortical necrosis that is oliguric or anuric

phase lasting for more than 21 days. Two of these are on our follow up in end stage renal disease, whereas the rest four died during the acute phase.

The overall mortality rate was 33. Septicemia was the major cause of death (78.8%). Uncontrolled renal failure and hyperkalemia accounted for the rest of the deaths as shown in Table 4.

**TABLE 3**  
**BIOCHEMICAL PARAMETERS**

|  | Mean $\pm$ SD | ( Range )       |
|--|---------------|-----------------|
| S urea<br>(mg/dl)                          | 189.22+62.28  | (92 - 396.0)    |
| S. Creat<br>(mg/dl)                        | 7.98+3.36     | (48 - 14.5)     |
| S. Sodium<br>(m Eq/L)                      | 127.6+16.39   | (121.0- 132.0)  |
| S. Potassium<br>(m Eq/L)                   | 4.77+0.871    | (3.1 - 7.6)     |
| Urinary Sodium<br>(m Eq/L)<br>(n = 64)     | 52.0+4.74     | (43 - 74.0)     |
| Urinary/Serum creatinine<br>(n = 64)       | 12.72+3.27    | (5.7 - 24.74)   |
| Fractional excretion of sodium<br>(n = 64) | 8.64+5.73     | (1.4 - 21 - 24) |

**TABLE 5**  
**CAUSES OF DEATH**

|                            | No. of patients (%) |
|----------------------------|---------------------|
| SEPTICEMIA                 | 26 (78.8%)          |
| Endotoxic shock            | 14 (42.4%)          |
| DIC                        | 8 (42.4%)           |
| Bronchopneumonia           | 4 (12.1%)           |
| UNCONTROLLED RENAL FAILURE | 4 (12.1%)           |
| HYPERKALEMIA               | 3 (9.1%)            |

### DISCUSSION

The complication of acute renal failure during pregnancy is uncommon, the occurrence shown in isolated surveys being 1 in 1400 to 1 in 5000 as reported by Knapp et al (1959)

and Kerr et al (1963). The occurrence of acute renal failure of obstetric origin in the present series was 16.95% of all the patients of ARF of different etiological origins. The incidence reported from the various dialysis centres of the World varies from 7% to 28.4% and even

lower (Table 5).

The frequency of acute renal failure in pregnancy was previously bimodal; an initial peak early in the gestation comprising most of

tory insufficiency and renal lesions of both acute tubular necrosis and acute cortical necrosis due to poor perfusion of renal tissue.

Vassali and Richet (1960) ascribed the

**TABLE 5**  
**COMPARISON OF INCIDENCE OF PREGNANCY RELATED**  
**ACUTE RENAL FAILURE**

| Country       | Year | ARF (%) | Reference                |
|---------------|------|---------|--------------------------|
| United States | 1970 | 7.0     | Hall et al (1970)        |
| France        | 1972 | 28.4    | Kleinknecht et al (1972) |
| U. K.         | 1973 | 24.7    | Kennedy et al (1973)     |
| Thailand      | 1975 | 15.0    | Sitprija et al (1975)    |
| Argentina     | 1975 | 27.2    | Firmat et al (1975)      |
| India         | 1976 | 22.1    | Chugh et al (1976)       |
| India         | 1990 | 16.95   | Present series           |

the cases associated with septic abortions, and a second peak during late pregnancy and puerperium. Where liberalised abortion laws exist, the initial peak has diminished markedly or disappeared (Lindheimer et al, 1983). In the present series, a bimodal frequency of distribution of ARF in pregnancy was observed, one-third due to abortion, mainly septic; while two-thirds during the later part of pregnancy or puerperium. Comparing the present series with another series from India (Chugh K.S. et al, 1976), where 59.7% of the patients developed ARF in the early pregnancy, the incidence of abortion related ARF in North India seems to be on the decline (33% in our series).

Septicemia is still a major pathogenetic factor for ARF in the developing nations as is shown in our study. DIC was present in 8% of the patients, mainly in patients of abortions and puerperal sepsis. Hemorrhage and septicemic shock are known to produce circula-

renal lesions of acute cortical necrosis in obstetric patients to the frequent occurrence of DIC but well documented evidence of DIC has been reported in only a few patients (Mookerjee et al, 1968 and Straub et al, 1969). Whereas DIC has been regarded as a prominent feature of post partum hemorrhage (Rosenmann et al, 1969), preeclamptic and eclamptic toxemia have been considered as chronic stage of DIC (Vassali et al, 1963).

Only six patients of this series showed clinical course like ACN while rest had clinical course like ATN. One of the patients of abortion related ARF had ACN. Smith et al (1968) and Kleinknecht et al (1972) also observed that ACN following abortion was rare as is shown in the present series, although Chugh et al (1976) observed a strikingly high incidence of ACN both in early (18.6) and late (37.8%) pregnancy. Some of the difference may be due to the lack of complete histopathological data.

The overall mortality rate was 33% compared to the 44.6% in the total 590 patients of ARF of different etiological groups.

Late referral and alarmingly high incidence of infection were the major factors for the high mortality in this series, although, this is less as compared to 53.3% in another series from a dialysis centre in north India (Chugh et al, 1976).

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