

ACUTE RENAL FAILURE IN PREGNANCY

by

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SUMMARY

Out of 20 cases, 10 gravidas had developed renal failure following abortion and 10 cases were due to complication of late pregnancy.

Renal histopathology revealed acute tubular necrosis in 15 (75%), diffuse cortical necrosis in 4 (20%) and patchy cortical necrosis in 1. The interesting feature of this study was a equal incidence of cortical necrosis in early (25%) as well as late pregnancy (26.57%). Overall incidence of cortical necrosis was 25%. The observed etiopathogenetic factors which contributed to the development of renal failure either singly or in combination were septicemia (25%), hemorrhagic shock (30%), septicemic shock (15%), eclamptic toxemia (15%), disseminated intravascular coagulation (25%) and adult haemolytic uraemic syndrome (15%). Overall survival and mortality was 50% respectively, while all patients with cortical necrosis died.

Introduction

The spectrum and prevalence of acute renal failure in pregnancy varies widely. Of the many emergencies which come to obstetricians, none can be more difficult to manage than acute renal failure. Despite legalisation of abortion in many

countries, a good number of pregnant women seek abortion from untrained abortionist, particularly in less developed countries with poor economic conditions (Huldt, 1969; and Malhotra and Deve, 1979). Acute renal failure in early pregnancy is usually always due to induced abortion and its complications. Hence, its prevalence in developing countries continues to be high. In the present study we have reported the outcome in 20 gravidas, who underwent

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Accepted for publication on 19-12-84.

dialysis for acute renal failure. It reveals that acute tubular necrosis is the predominant lesion in acute renal failure of obstetric origin. The cortical necrosis is equally common in both early and late pregnancy.

Material and Methods

The patients undertaken in the present study are those gravidas, who satisfied the criteria of acute renal failure as given below and had no account of renal disease before the gestational period:

(i) Oliguria/Anuria (urinary output < 400 ml/day).

(ii) Mounting azotemia with normal or high urinary output (non-oliguric ARF).

(iii) Patients with oliguria more than 3 days.

(iv) Severity of renal failure and justified institution of dialysis therapy (i.e. hyperkalemia, convulsion, coma, pulmonary oedema and bleeding diathesis).

Twenty patients met these criteria and constituted 15.38% of 130 patients with A.R.F. of diverse etiology who underwent dialysis in the Nephrology unit of University Hospital, B.H.U., Varanasi from January 1982 to July 1983. 72.3% of patients presented in second to third decade of life, where anuria/oliguria of < 1 week duration was the dominant mode of presentation.

Patients were dialysed peritoneally or with a parallel flow kill dialyser, thrice a week (or more frequently if required) until they passed into the diuretic phase or died. Vein to vein catheterization and arteriovenous shunt was used for access to circulations.

Pre and post-dialysis biochemical investigations included estimation of urea, serum creatinine, uric acid, sodium and potassium. Routine hematologic and

coagulation studies were done by standard techniques to rule out disseminated intravascular coagulations (DIC).

The screening for evidence of local and systemic infection was done in all patients by bacteriologic cultures. Serial electrocardiograms were recorded for evidence of hyperkalemia. Renal histology was studied by percutaneous biopsy and light microscopic with H and E, PAS PASM and Masson's trichome staining were performed in all the cases.

Observations

Obstetric Problem: Ten patients (50%) developed ARF in early pregnancy and 10 (50%) in late pregnancy. In early pregnancy it followed induced abortion in 9 and spontaneous abortion in 1 patient. As a complication of late pregnancy, ARF occurred in association with puerperal sepsis in 4, toxemia in 4, postpartum hemorrhage in 2 and retained placental fragments in one who also had puerperal sepsis.

Method of Termination

The abortions were conducted by self-trained and legally unauthorized midwives under unhygienic conditions in 40% patients. Pregnancy had been terminated by the insertion of abortifacient chemicals in 2 (20%), use of sticks in 4 (40%), dilation and curettage in 1 (10%) and multiple methods such as stick soap solution and oral drugs in 3 (30%) patients. In few cases dilation and curettage was done in hospital when local methods failed to achieve the desired result.

Etiopathogenetic Factors

The etiopathogenetic factors, which contributed to the development of renal failure in the present series are given in Table 1. Exact loss of blood could not

TABLE I
Pathogenetic Factors

Factors	No. of Patients	Percentage
Blood loss	13	65.0
Septicemia	5	25.0
Hypotension	9	45.0
Toxicemia of Pregnancy	3	15.0
Disseminated intravascular coagulation	5	25.0
Adult haemolytic uremic syndrome	3	15.0

be assessed in most of the patients, since they were referred to the dialysis centre only after they had developed renal failure. Blood loss appeared to have been significant in 65% patients as judged from the referral slips and evaluation at the time of admission. Local sepsis was present in 70%, septicemia could be documented from the positive culture in 25% of patients. Septicemia was more frequent in patients with procured abortion (60%) than in others. The organism isolated from blood cultured were *Klebsiella*, *pseudomonas pyocyaneus*, *staphylococcus pyogens* and *Escherichia coli*. Hypotension resulting from haemorrhagic and/or septicemic shock was present in 45% of patients at the time of admission. Adult haemolytic uremic syndrome was observed in 3 patients. While disseminated intravascular coagulation as indicated by low platelet count, increased thrombin time and fibrin thrombi in capillary loop was ob-

served in 5 (25%) patients and eclamptic toxemia was seen in 15%.

Course of Renal Failure

Six (30%) patients were totally anuric (output < 50 ml/24 hrs.), 12 (60%) were oliguric and 2 patients (10%) had presented with non-oliguric type of ARF. The interval between the onset of renal failure and referral to the centre varied from 2 to 16 days. Fluid overload, coma, bleeding diathesis and pulmonary edema were observed in 4, 2, 1 and 4 patients respectively. Pre-dialysis blood urea ranged from 130 to 400 mg% and serum creatinine from 4.8 to 18.96 mg%, serum potassium levels varied from 3.0 to 8.6 meq/liter and electrocardiographic evidence of hyperkalaemia was observed in 3 cases. Serum uric acid was very high in patients with toxemia ranging from 12 to 18 mg%. The duration of oliguria/anuria before the onset of diuretic phase or death varied from 7 to 35 days (Table II).

TABLE II
Severity of Renal Failure

Date	Range	Mean
Days of referral	2-16	6.3
Peak predialysis blood urea (mg%)	130-400	250.50
Peak predialysis creatinine (mg%)	4.8-18.96	10.11
Peak predialysis creatinine (mg%)	3-8.6	5.36
Duration of oliguria phase (days)	7-35	14.36
Dialysis per patient (No.)	2-8	3.85

All patients received intensive medical therapy for uremia and infection in addition to dialysis. The number of dialysis per patient varied from 2-8. Five patients were treated by hemodialysis, 11 by peritoneal dialysis and 4 received both types of dialysis therapy.

Final Outcome

Overall survival and mortality was (50%) respectively. Septicemia, hyperkalemia, uncontrolled renal failure and pulmonary oedema, were responsible for death in four, one, three and one patients, respectively (Table III). All patients with cortical necrosis died (100% mortality). Among 15 patients of tubular necrosis, 10 (66.66%) survived and 5 (33.33%) died. Thus, cortical necrosis is grave and fatal (Table IV).

Renal Histology

Based on light microscopy, acute tubular necrosis (ATN) in 15 patients, patchy cortical necrosis in 1, and diffuse cortical necrosis in 4 patients were ob-

served. Histological evidence of DIC in the form of fibrin thrombi in afferent arterioles and glomerular capillary loop was observed in 5 patients. One patient showed mesangial hypercellularity in the glomeruli in addition to the changes of ATN.

Discussion

Isolated surveys have shown the occurrence of this complication in 1 in 1400 to 1 in 5000 pregnancies (Knapp and Hellman, 1959; and Kerr and Elliott, 1963). Obstetrical patients constitute Hall et al 1973; Balslow and Jorgevsen 1969) 10 to 25% of all patients with acute renal failure in the dialysis centres, though individual obstetricians see a limited number of such patients. The incidence of pregnancy associated renal failure in our series was 15.38%. The frequency distribution of ARF among our patients was bimodal in terms of duration of pregnancy as seen by previous worker also (Smith et al 1968). One peak occurred

TABLE III
Cause of Death in 10 Patients

Causes	No. of patients	Percentage
Septicemia	4	40.0
Hyperkalemic	1	10.0
Uncontrolled renal failure	3	30.0
Pulmonary oedema	1	10.0
Unknown	1	10.0
Total	10	100.0

TABLE IV
Mortality Based on Histology

Types of lesion	Total patients		Survival		Mortality	
	No.	%	No.	%	No.	%
Acute tubular necrosis	15	75.0	10	66.66	5	33.33
Acute cortical necrosis	5	25.0	—	—	5	100.0

between 6-8 weeks and the second between 34 and 36 weeks.

Based on the stage of the pregnancy; ARF in pregnancy is divided in three groups viz. first half, second half and postpartum acute renal failure. Unskilled and septic abortion is the most common cause of ARF during the first half of pregnancy (Bartlett and Yabia, 1969). Renal damage results from one or more of the following factors; nephrotoxic abortifacients, intravascular hemolysis, uterine hemorrhage, sepsis or disseminated intravascular coagulation (Chugh et al, 1976). During the second half of pregnancy acute renal failure is most often associated with toxemia or intrauterine hemorrhage. Post partum renal failure is a specific entity and may be considered a form of hemolytic uraemic syndrome occurring in the postpartum period (Wong, 1962; Churg et al, 1970 and Segonds et al, 1979).

The most common mode of interference for terminating pregnancy in our patients was the use of a stick and chemical abortifacients and abortion was conducted under unhygienic conditions. Most of the patients had been managed poorly during the initial course of their illness. Analysis of the data on these patients revealed that more than one factors was present in each patients which might have contributed to the development of ARF. Significant among these were blood loss (65%), septicemia (25%), hypotension due to hemorrhagic and endotoxic shock (45%), toxemia (15%), DIC (25%) and adult HUS (15%).

Hemorrhagic and septicemic shock are known to produce circulatory insufficiency and renal lesions of both ATN and AGN due to poor perfusion of renal tissue. Disseminated intravascular coagulation has been reported in obstetric pati-

ents (Yoshikawa et al, 1971 and Chugh et al, 1976). The prevalence of DIC in our series was 25%. In 3 patients (15%) laboratory evidence of adult hemolytic uremic syndrome was also documented; one following septic abortion and two with puerperal sepsis. The stimuli which have been incriminated in the development of DIC are release of tissue thromboplastin in case of endotoxic shock and catecholamines in hemorrhagic shock (Whitaker et al, 1969).

Acute tubular necrosis (ATN) is the predominant renal lesion in obstetric renal failure as compared to acute cortical necrosis. In our series, 75% of patients had ATN as compared to ACN in only 25%. Previous workers reported that ACN is rare following abortion (Sheehan and Moore, 1952; Smith et al, 1968 and Kleinknecht et al, 1973). However, recent workers have shown that incidence of ACN is equal, both in early (18.6%) and late (37.8%) pregnancy (Chugh et al, 1976). This observation is consistent with that in our patients also. However, there is no way to predict as to which patients will develop cortical necrosis. The higher incidence of hypotensive shock and septicemia were observed in patients with ACN as compared to ATN. All patients who were proven subsequently to have cortical necrosis had been totally anuric as opposed to 2 (3.33%) of 15 who showed tubular necrosis. Presence of total anuria therefore, in the clinical condition of obstetric renal failure can be regarded as suggestive of ACN, but confirmatory evidence can only be obtained on renal biopsy. Most patients were severely uremic at the time of admission as indicated by mean peak predialysis figures of blood urea (250.50 mg%) and creatinine (10.11 mg%).

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