

ORIGINAL ARTICLE

OBSTETRICAL ASSOCIATED RENAL, CORTICAL NECROSIS:
THOUGH UNCOMMON BUT NOT RARE!

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Background: Renal cortical necrosis (RCN) carries high morbidity and mortality in South East Asia. The purpose of this study was to look specifically at the incidence of obstetrical related RCN in renal biopsies and to evaluate its precipitating factors. In addition, prognosis, impact of aetiology and outcomes on discharge were also considered. **Methods:** The study was conducted in the Department of Nephrology, Lady Reading Hospital Peshawar, Pakistan. Renal biopsies of 1,670 patients were analysed during the study period of 1998 to 2008. All the patients with obstetrical related RCN were included. Patient records, demographic data, urine output on admission and preceding history of ante-partum haemorrhage (APH), post-partum haemorrhage (PPH), septicaemia, operative interventions and retained product of conception (ROPC) was noted and need for dialysis was considered. **Results:** Out of 1670 kidney biopsies analysed, 48 turned out to be RCN. Among them 39 patients (81.3%) had diffuse cortical necrosis, 6 patients (12.5%) had patchy cortical necrosis with ATN while 3 patients (6.3%) had predominant ATN with partial patchy cortical necrosis. Out of 48 patients, 25 (52.1%) were oliguric, 18 (37.5%) were anuric while 5 (10.4%) had urine output >800 ml 24 hr. Operative interventions were found in 29 patients while 19 patients had normal vaginal delivery (NVD). 16 (55.2%) patients with operative intervention had PPH. Thus the association proved to be significant ($p=0.037$). **Conclusion:** Overall incidence of RCN was 2.9%. Oliguria/anuria on admission and dialysis dependency are associated with RCN. PPH and history of operative intervention have significant association and are contributing factors to development of RCN.

Keywords: Renal cortical necrosis (RCN), post-partum haemorrhage (PPH), ante-partum haemorrhage (APH), acute renal failure (ARF), dialysis

INTRODUCTION

Incidence of obstetrical related acute renal failure has reduced in recent years.¹⁻³ Data from our own department has shown a reduction in obstetrical related mortality from 18–7% in two study periods 1998 to 2000, 2007 to 2009.^{4,5} Renal cortical necrosis (RCN) remains a dreaded complication of obstetrical related acute renal failure (ARF). It carries high morbidity and mortality in South East Asia, ranging from 23% and 26%^{6,7} to 93.3%⁸. Its diagnosis can be suspected from history, clinical presentation, persistent oliguria/anuria on admission and dialysis dependency. However renal biopsy remains the diagnostic tool, as it not only confirms renal cortical necrosis but also differentiates it from acute tubular necrosis (ATN), which carries a better prognosis. There is limited data on subject of obstetrical related renal cortical necrosis from our part of the world. The largest study in this regard involved an analysis of 158 renal biopsies of acute renal failure of varied aetiology, showing renal cortical necrosis in 22.7%.⁷ The purpose of this study was to look specifically at the incidence of obstetrical related renal cortical necrosis in our renal biopsies performed in last one decade and to evaluate precipitating factors responsible for renal cortical necrosis. In addition, prognosis, impact of aetiology and outcomes on discharge of these patients were also evaluated.

MATERIAL AND METHODS

Renal biopsies of 1,670 patients performed at Department of Nephrology & Hypertension, Lady Reading Hospital, Peshawar, Pakistan, during 1998–2008 were analysed. Patients' records and renal biopsies done over a decade were analysed for obstetrical related acute renal failure. Among them, only with renal cortical necrosis were included in the study. Obstetrical patients who had renal biopsies for non-obstetrical reasons such as glomerulonephritis, systemic lupus erythematosus (SLE) or hereditary nephritis were excluded. Patient records, demographic data on entry, urinary output on admission and preceding history of ante-partum haemorrhage (APH), post-partum haemorrhage (PPH), septicaemia, operative intervention and retained product of contraception (ROPC) were noted. Need for dialysis and dialysis dependency was also recorded.

All patients with oliguria/anuria persisting more than four weeks underwent renal biopsy. The acute renal failure patients with biopsy proven RCN were included in this study. RCN was further evaluated histologically as: acute diffuse cortical necrosis, patchy cortical necrosis and cortical necrosis with ATN. The data was analysed for incidence, impact of aetiology, presenting features and co morbidity to the outcomes in obstetrical related renal cortical necrosis (RCN). Chi-

square test of Independence was used for statistical analysis. Results were considered significant with $p < 0.05$.

RESULTS

Out of 1,670 renal biopsies done over a ten year period, 48 turned out to be obstetrical related RCN (2.9%). Not a single case of non-obstetrical RCN was noted. The patient age ranged from 18 to 50 years, with a mean age of 30.14 years. Among these 48 cases; 15 patients had hospital deliveries, 18 patients delivered at private clinics, 15 delivered at home and out of which 4 deliveries were assisted by lady health visitors (LHVs) or traditional birth attendants (TBAs) (Table-1).

Table-1: Assistance offered during deliveries

Delivery	Patients n (%)
Doctor (Maternity homes)	18 (37.5%)
Hospital	15 (31.3%)
Home	11 (22.9%)
Dai	3 (6.3%)
Lady Health Visitor (LHVs)	1 (2%)
Total	48 (100%)

Overall, 39 patients (81.3%) had diffuse cortical necrosis, 6 patients (12.5%) had patchy cortical necrosis with ATN and 3 patients (6.3%) had predominant ATN with partial patchy cortical necrosis. All patients with diffuse cortical necrosis had oliguria/anuria on admission and remained dialysis dependent during the hospital stay. Out of 48 patients, 18 patients (37.5%) were anuric, 25 patients (52.1%) were oliguria at presentation and 5 patients (10.4%) had urine out >800 ml/24 hour.

Operative interventions were present in 29 patients (60.4%). Among them; 15 patients (51.7%) had Caesarean section (C Section), 7 patients (24.1%) had hysterectomy and 7 patients (24.1%) had hysterectomy following C section. Similarly among these 29 patients; 9 patients (31%) had APH, and 16 patients (55.2%) had history of PPH and 4 patients (13.8%) had placenta previa. Apart from these 29 patients with operative interventions, 19 patients had normal vaginal delivery (NVD). Among these 19 patients, 16 patients had PPH while only 3 patients had other complications (Table-2). Thus there was significant association among patients having operative intervention and development of PPH ($p = 0.037$).

Presenting features included severe azotemia in 34 patients (70.8%), shock in 7 patients, unconsciousness in 5 patients, septicaemia in 12 patients and septic abortion in 1 patient. Mean blood urea and creatinine on admission was 230 mg/dl and 11.8 mg/dl, respectively. Mean blood urea and creatinine on discharge was 96.7 mg/dl and 5.79 mg/dl respectively. Haemodialysis was required by all the patients during the hospital stay. Only 6 patients (12.5%) were dialysis independent on discharge with some degree of renal

impairment whereas 42 patients (87.5%) were dialysis dependent on discharge.

Table-2: Complications across modes of delivery

Complications	NVD n (%)	Operative Interventions n (%)	Total n (%)
PPH	16 (33.3%)	16 (33.3%)	32 (66.7)
APH	2 (4.2%)	9 (6.3%)	11 (22.9)
Placenta previa	1 (2.1%)	4 (8.3%)	5 (10.4)
Total	19 (39.6%)	29 (60.4%)	48 (100)

NVD=Normal Vaginal Delivery

DISCUSSION

In contrast to the Western world where RCN is rarely seen, contributing less than 2% of all cases of ARF⁹⁻¹¹, RCN is still not uncommon in South East Asia. Acute diffuse bilateral RCN represents very severe injury to renal parenchyma, especially seen in obstetrical population.¹²⁻¹⁴

Infarcted renal parenchyma cannot be made viable, hence majority of these patients are dialysis dependent. Those with patchy cortical necrosis and a component of ATN may regain some renal function to remain dialysis independent for a while. Blood loss secondary to abruption placenta, APH, PPH, associated HELLP syndrome and DIC sets up the stage for injury at micro level involving a combination of hypercoagulable state, vasoconstriction, impaired release of nitrous oxide (NO) and intravascular thrombosis.¹⁵⁻²⁰

Overall incidence of obstetrical related RCN in our data was 2.9%. We did not see a single case of non-obstetrical RCN. Studies from India have shown an incidence of 6.3%²¹ and 7.1% in Chandigarh study.^{22,23} There is a declining trend towards RCN in Indian patients with ARF from 4.6% to 3.8%.^{3,24} Our results of 2.9% RCN in 10 year period is in good agreement with a study showing incidence of 3.12% over 22 year period from eastern India.²⁵

Data from Pakistan shows a high percentage of RCN. Analysis of 158 ARF kidney biopsies over a seven year period from SIUT²⁶ have shown 22.7% (36 cases) of acute cortical necrosis of varied aetiology. Study from SIUT⁶ in 1994, over a one year period has shown 43 (18%) out of 238 cases had obstetrical ARF. Nine (20.9%) out of 43 had biopsy confirmed RCN. Analysis of the data of pregnancy related ARF from Sindh^{7,27} over one year period showed 11 out of 42 patients (26.2%), 10 out of 43 patients (23.3%) had biopsy proven renal cortical necrosis. No doubt this high prevalence of RCN resulted in mortality of 26% and 16.2% respectively.

In our series, obstetrical complications are the sole cause of RCN. Surprisingly, our renal biopsy data did not show a single case of non-obstetrical RCN. Oliguria/anuria and severe azotemia were the main presenting features in this study population. Only 5

patients had urinary output >800 ml/24 hrs on admission (12.5%). PPH was the main etiological factor for RCN. It was seen in 32 (66.67%) of cases. Abruptio placentae, PET, and APH contributed to 16 cases (33.3%). 60.4% cases had operative interventions, with C section dominating. NVDs were seen in 39.6% cases and almost all of them were associated with PPH. Multiparity, low haemoglobin (Hb), septicaemia and associated DIC were major factors adding to RCN. Three histological patterns were seen. Acute diffuse cortical necrosis was seen in 39 cases (81.25%), patchy cortical necrosis with ATN in 6 cases (12.5%) and in 3 cases (6.25%), ATN dominated and a fragment showed area of cortical necrosis. Majority of patients, i.e., 42 (87.5%) were dialysis dependent. Only 6 patients (12.5%) could manage without dialysis with varying degree of renal insufficiency.

CONCLUSION

Obstetrical related RCN carries high morbidity and mortality. Oliguria/anuria on admission and dialysis dependency are invariably associated with RCN. PPH and history of operative intervention have significant association and are important aetiological factors contributing to RCN. The overall incidence of RCN has come down to 2.9% over ten year period.

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