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WHAT DECIDES : HIGH MORTALITY IN PAEDIATRIC ACUTE RENAL FAILURE?

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INDEXING WORDS

acute renal failure (ARF); acute glomerulonephritis (AGN); post streptococcal (PS); acute interstitial nephritis (AIN); haemolytic uraemic syndrome (HUS)

SYNOPSIS

Forty paediatric cases of A.R.F. (Acute Renal Failure) of various aetiology were included in the study. 60% of patients were less than 4 years of age with male predominance. 80% cases reported to us very late with oligoanuria of more than 24 hours (2-7 days). Diarrhoea, vomiting and fever were other dominant symptoms. Maximum cases were severely anaemic (87.5%) with mean Hb 7.73 ± 1.9 gm%. 40% cases were of underweight while only one case (2.5%) was of over weight, inspite of volume excess in 40% cases. All 24 cases, who were estimated for serum albumin, found to have marked hypoalbuminemia. Mortality was found to be as high as 65% inspite of effective peritoneal dialysis in all cases.

High mortality seems to be due to profound anuria of many days (because of marked delay in reaching the hospital), fever and malnutrition besides other factors as aetiology.

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INTRODUCTION

Acute renal failure in the paediatric age group is a significant component of the major problem of gastroenteritis and acute glomerulonephritis in India. It is one of the most therapeutically demanding, yet immensely gratifying clinical condition, with which, a physician has to deal. As the mortality due to A.R.F. reported to be high, especially in children, early and effective measures must be taken to manage these cases. It can only be done by studying various factors responsible for this adversity in paediatric A.R.F.

MATERIALS AND METHODS

The present study was carried out at Division of Nephrology, University Hospital, Banaras Hindu University. Forty children presenting in A.R.F. admitted to the Department of Paediatric Medicine, with various aetiologies, were included in the present study. Patients were examined as per proforma and various haematological investigations like blood urea, serum creatinine, blood sugar, serum sodium potassium and chloride, serum calcium and phosphorus, alkaline phosphatase, total/differential estimation of serum protein, urinalysis in cases which were not anuric, were done and urine samples were collected by condom connection and drainage in a urine bag and examined for reaction, specific gravity, protein, sugar and microscopy. Intermittent peritoneal dialysis was done in all of these patients.

RESULTS

The mean age of patients was 2.8 years, maximum number of patients were of 1-4 years of age (60%). Anuria was the commonest manifestation of renal failure with 38 children (95%) while only 2 cases (5%) had oliguria. Maximum patients (80%) came with oligoanuria of more than 24 hours duration (2-7 days). Diarrhoea, vomiting and fever were other dominant symptoms present. Mortality was found to be very high with prolonged oligoanuria (Table 1).

Sixteen children were found to be underweight, of which 12 had features of volume depletion and 7 were hypotensive. Although a state of volume excess was observed in 16 cases (40%) but only

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one child was found to be overweight (2.5%) and four were hypertensive (Table 2).

Table-1 : Mortality in cases of oligoanuria in relation with duration.

Days	Total No.	Percentage	Patients died	Percentage
First	8	20.0	5	62.50
Second	7	17.5	3	42.85
Third	9	22.5	5	55.50
Fourth	5	12.5	4	80.00
Fifth	7	17.5	6	85.70
> Five	4	10.0	4	100.00

Table- 2 : Occurrence of various physical signs in patients.

Physical signs	Number	Percentage
Weight :		
Normal	23	57.5
Under weight	16	40.0
Over weight	1	2.5
Blood Pressure:		
Normal	28	70.0
Increased	5	12.5
Decreased	7	7.5
Volume :		
Depletion	12	30.0
Excess	16	40.0

As regards aetiology acute tubular necrosis due to volume depletion following acute gastroenteritis was the main cause in 22 cases (55%) followed by acute glomerulonephritis, in 5 (12.5%) due to post streptococcal glomerulonephritis and 3 (7.5%) due to other infections. HUS in 6 cases and AIN in 4 cases were the other causes for A.R.F. (Table 3).

Haemoglobin was below 10 gm% in 87.5% cases with range of 2-13 gm% (Table 4).

Table- 3 : Various aetiological factors of A.R.F. on clinical datas and investigations and their outcome.

Aetiological diagnosis	No. of Cases	Percentage	Died	Percentage
Acute tubular necrosis	22	55.0	9	40.9
AGN-PSGN	5	12.5	7	87.5
Post Inf.GN	3	7.5		
H.U.S.	6	15.0	6	100.0
AIN	4	10.0	4	100.0

Table- 4 : Haemoglobin levels in patients

Range gm%	No. of cases	Percentage
1 - 6	5	12.5
6 - 8	15	37.5
8 - 10	15	37.5
10 - 12	3	7.5
> 12	2	5.0

Mean = 7.73 $\pm$ 1.9 gm%

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Out of 24 cases examined for serum albumin, levels were decreased in all (100%) in range of 1.2-3.3 gm% (1.8 ± 1.9 gm%). 4 cases had proteinuria of grade 1+(10%), out of 10 cases in whom urinalysis was done. In rest of the cases urine samples could not be collected because of absolute anuria. Most of the cases, 19 (47.5%) had blood urea values between 100-150 mg% while values of serum creatinine ranged between 3-6 mg% in most cases (57.5%). Mortality was found to be 65%, while only 30% cases showed recovery. Mortality was nearly 100% in cases diagnosed as acute GN, HUS, AIN, while it was 40.9% in cases of acute tubular necrosis (Table 5).

Blood biochemistry in form of blood urea and serum creatinine and potassium of patients who died, did not differ significantly when compared with patients who survived (Table 6).

Table- 5 : Outcome in 40 children with A.R.F.

Outcome	Number	Percentage
1. Recovered	12	30.0
2. Improved	2	5.0
3. Died	26	65.0

Table-6 : Mean blood biochemistry of patients who died and survived.

Investigations	Recovered	Died
1. Blood Urea (mg/dl)	137.00 ± 40.18	148.00 ± 46.73
2. Serum Creatinine (mg/dl)	4.40 ± 2.12	4.68 ± 2.05
3. Serum Potassium (mEq/L)	4.65 ± 1.32	4.36 ± 1.01

DISCUSSION

Anuria was the predominant (95%) complaint noted by us, was also the main complaint observed by Acharya et al¹⁾ and Bhuyen et al²⁾. Anuria being an uncommon complaint in children presenting with A.R.F. in developed countries may be due to lesser severity of the underlying disorder (e.g. AGN which itself is a common cause of A.R.F.) and better awareness and prompt medical care. 80% cases with oligoanuria came to hospital very late (2-7 days) showing less awareness to the disease. Mortality was very high in cases who presented with oligoanuria of more than 3 days (80-100%). The high incidence of fever obtained by us in the history (75%) reflects the role of infections as the main cause of perpetuating A.R.F. at our place. Most of the cases in present study were severely anaemic (87.5%) as mean Hb was 7.93 ± 1.9 gm%. This mainly reflects the poor state of nutrition along with the rapid development of anaemia in patients of ARF as stressed by Brenner and Rector³⁾ also.

Although volume depletion was observed in 12 children, 16 were found to be underweight (including all those who were volume depleted) but only 7 were hypotensive. This may reflect previous malnutrition in the former and compensatory response in the later case. Similarly 16 cases were found to be in volume excess but only 4 were hypertensive and only one was of overweight (2.5%). This again may reflect a reduced effective inter-vascular volume in these patients in the former cases and previous malnutrition in some of the later cases.

Mortality rate in our study was 65%. It is distinctly higher than 30-40% observed by Chaudhary et al⁴⁾, Counahan et al⁵⁾ and Hodson et al⁶⁾. This high rate of mortality is probably due to-

1. The late referral and consequently the increased duration of anuria before the commencement of treatment and intermittent peritoneal dialysis.
2. High incidence of infection as evidenced by fever in most of the cases (75%).
3. The degree of malnutrition as evidenced by a significant number of children being under weight and all of them were **hypoalbuminic**.

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In contrast to observation made by Shah et al⁷⁾ and Brenner & Rector,³⁾ we found no significant effect of blood urea and serum creatinine levels in the outcome of these patients.

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REFERENCES

1. Acharya, V.N. : J. Assoc. Phys. India 1976. 24(12). 811/817. Peritoneal dialysis in children.
2. Bhuyan, U.N., Srivastava, R.N. and Chaudhary, V.P. : Indian J. Med. Res. 1985. 81. 402/408. Pathology of acute renal failure and haemolytic uraemic syndrome in acute dysentery in children.
3. Brenner, B.M. and Rector, F.C. : Editors the Kidney. IV ed. W.B. Saunders Co. 1991. 2315/2316. Peritoneal dialysis in children.
4. Chaudhary, V.P., Kochar, G.S. and Srivastava, R.N. : Indian Paed. 1980. 17(9). 745/748. Acute gastroenteritis and renal failure.
5. Counahan, R., Cameron, J.S., Ogg, C.S., Spurgeon, P., Williams, D.G., Winder, E. and Chantler, C. : B.M.J. 1977. 1(6061). 599/602. Presentation, Management, Complication and outcome of acute renal failure in childhood - 5 years' experience.
6. Hodson, E.M., Kjellstrand, C.M. and Mauer, S.M. : J. Paed. 1978. 93(5). 756/761. Acute renal failure in infants and children : outcome of 53 patients requiring haemodialysis treatment.
7. Shah, B.V., Merchant, M.R., Almeida, A.F. and Acharya, V.N. : Indian Paed. 1985. 22(5). 361/365. Prognosis of Acute renal failure in paediatrics.