Original Article

Incidence, risk factors and prognostic factors of acute renal failure in patients admitted to trauma care unit

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Abstract

Background: Acute renal failure (ARF) is a frequent and fatal complication after trauma. A better comprehension of the clinical spectrum of a disease is needed to identify potential areas of intervention. The aim of the present study was to analyze the risk and prognostic factors and final outcome of ARF in patients admitted to trauma care unit. **Material and Methods:** This prospective study involved patients admitted to trauma ward presented with clinical signs of acute renal failure. Post trauma ARF was evaluated for risk factors for outcome like age, sex, refractory hypotension, exposure to nephrotoxic drugs, and exposure to intravenous contrast, time lag, surgical interventions and injury severity score. All patients were followed daily until improved or died. **Results:** Among 4660 patients admitted during the study period to the trauma ward, ARF developed in 40 patients (34 males and 6 females) with an incidence of 0.85%. Average trauma score was 17.4. Thirty three were survived and seven patients expired. Thirteen patients received dialysis and remaining 27 received conservative management. Refractory hypotension, higher time lag, higher trauma score in expired patients was higher compared to survived patients. **Discussion:** Renal hypo-perfusion was the most common cause of post trauma ARF. Monitoring and prompt careful management of patients with decreased renal perfusion may reduce the mortality rate.

Keywords: Trauma, Acute renal failure, dialysis, mortality.

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INTRODUCTION

Road traffic accidents are among the leading causes of death in young people. The causes of mortality in trauma patients are multifactorial. Acute renal failure (ARF) is uncommon complication in patients with trauma but one of the worst complication, with case fatality rate of 1-6% despite modern treatment modalities[1,2]. ARF is characterized by the sudden impairment of kidney function resulting in the retention of nitrogenous and other waste products normally cleared by the kidneys. ARF is not a single disease but, rather, a designation for a heterogeneous group of conditions that share common diagnostic features[3]. Widespread use of invasive medical, surgical and radiological procedures, use of nephrotoxic drugs and major surgical procedures are increasing burden of acute renal failure in trauma. Early identification, referral and treatment of pre-renal failure with proper therapeutic decisions can substantially improve the incidence and outcome of ARF[4]. Data indicates that ARF *per se* increases the risk of development of multiple complications that lead to death and disability[5]. The change in the clinical spectrum of ARF and its frequent occurrence in the hospital settings has contributed to the persistently high mortality[5]. A comprehensive understanding of the clinical spectrum of a disease is needed to identify potential areas of intervention. Thus, an attempt has been made to study the clinical spectrum of ARF in trauma cases.

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MATERIAL AND METHODS

Patients admitted to trauma ward of more than 12 years of age of either sex meeting the following inclusion criteria were included in the study. Patients who presented with oliguria (urine output <500 ml/24 hrs) or anuria for more than 24 hours and showed rise in urea and creatinine, or increase in serum creatinine of 0.5 mg/dl over base line value (<1.5 mg/dl). The Exclusion criteria was age < 12 years, patients with known renal diseases, burn and pregnant patients. Patient's trauma was then evaluated by Injury severity score[6]. It included trauma score and injury severity score. Trauma score includes Glasgow coma scale. Injury score depends on site of injury and type of injury. Patients were followed up daily, revaluated by clinically and laboratory methods. The outcome of the patients who were followed up was recorded for those requiring conservative therapy and improved, requiring dialysis support temporarily and improved, requiring temporary dialysis and discharged with advice for future dialysis, Expired, despite any of the above. All patients were followed daily until discharged, died or attained normal renal functions.

Statistical Analysis

Data entry was done using SPSS package. Data was analyzed by mean, standard deviation, frequency and comparison between various groups using student t test for statistical significance. Factor(s) determining outcome of ARF were analyzed by univariate and multivariate analysis.

RESULTS

Among 4660 patients admitted during the study period to the trauma ward, ARF developed in 40 patients (34 males and 6 females) with an incidence of 0.85%. The maximum number of patients 24 (60%) were between 40-60 years. Average trauma score was 17.4 and average Glasgow coma scale was 10.9. Operative procedures like laparotomy, thoracotomy, craniotomy did in 16 (40%), 5 (12.5%), 4 (10%) patients respectively. Two broad outcomes in this study were survived (33) or expired (7). Patients were classified in two groups based on treatment modality which was either dialysis or no-dialysis. Thirteen patients received dialysis and remaining 27 received conservative management. Out of 13 patients who require dialysis, cause for dialysis was refractory metabolic acidosis in 1 patient, refractory hyperkalemia in 4 patients, uremia in 2 patients and persistent oliguria in 6 patients. Post trauma ARF was evaluated for risk factors for outcome like age, sex, refractory hypotension, exposure to nephrotoxic drugs, and exposure to intravenous contrast, time lag, surgical interventions and trauma score. In a present study, mortality rate was observed more in older age patients (54.7 yrs. Vs 43.2 yrs) (P= 0.001). However, sex was not found to be a significant risk factor for dialysis requirement or death. Twenty-seven (67.5%) patients were presented with hypotension, out of which 9 (22.5%) patients had refractory hypotension. Five patients out of these 9 patients with refractory hypotension died (P= 0.001). There were 18 patients exposed to nephrotoxic drugs. Out of these 18, six patients expired. Among the 12 patients who required urgent CT Abdomen with contrast; five were expired(P =0.008).Time lag i.e. the difference between time of injury and time of admission was divided into 3 subgroups 0 to 8 hrs, 8 to 16 hrs and >16 hrs. It showed 20 patients, 12 patients and 8 patients respectively. Out of 20 patients 1 patient died in first group; out of 12 patients, 2 patients died in second group and out of 8 patients 4 patients died in third group. It had high significance (P=0.001). Surgical intervention was not found to be a significant risk factor. Trauma score in died patients was higher i.e. (31.14) than in survived patients i.e. 14.58. Expired group also had higher sr. creatinine at death; it was 7.4 in expired group and 1.28 in survived group. Treatment groups were also compared for each subgroup in terms of outcome of ARF (Table 1).The multivariate analysis revealed that the presence of oliguria is the only significant independent predictor for good outcome with dialysis.

Table 1: Univariate analysis of risk factors affecting outcome of ARF for Treatment Modality

Risk factors	No. of patients	Treatment		P value
		Dialysis	No-dialysis	
Age				
< 40 yrs	13	03	10	0.66
> 40 yrs	27	10	17	
Refractory hypotension	09	07	02	0.002*
Exposure to nephrotoxic drugs	18	10	08	0.007*
Exposure to intravenous contrast	12	08	04	0.003*
Time lag				
0-8 hrs	20	02	18	
8-16 hrs	12	04	08	0.001*
> 16 hrs	08	07	01	
Trauma score	40	25	13.8	0.000*
Serum Creatinine	40	4.67	1.24	0.000*

*significant

DISCUSSION

The present prospective study was undertaken to define the risk factors and outcome in patients developing ARF after trauma seen at tertiary care hospital. Over one-year

period, all patients of ARF who had been admitted in the trauma ward studied. The incidence of post trauma ARF observed in our study was 0.85%. In large trauma populations, the incidence of post-traumatic AKI varies from 0.098 to 8.4% in published series[7,8] with mortality ranging from 7 to 83%.[7,9-11]. Hypovolemia was found to be a major risk factor for the development of ARF. Refractory hypotension at the time of admission is an important risk for mortality. Five patients out of nine (55.55%) expired in our study. In a study by Browne *et al* 61.1% patients expired due to hypotension[12]. Higher time lag subgroup had more mortality than its previous subgroup. Patients presented >16 hrs had highest mortality. Fakhry *et al* also observed 16.7% deaths in > 16 hrs time lag[13]. Trauma score in expired patients was higher i.e. 31.14 compared to survived patients 14.58. Brown *et al* also demonstrated higher score (29+/-13 Vs 20+/-11) in expired patients[12]. Monitoring and careful management of patients with decreased renal perfusion, postoperative patients and patients given potential nephrotoxic agents may reduce the mortality rate. Despite better knowledge of fluid and electrolyte problems than a few decades ago, renal hypo-perfusion was the most common cause of post trauma ARF.

REFERENCES

1. Morris JA Jr, Mucha P Jr, Ross SE, *et al*. Acute posttraumatic renal failure: A multicenter perspective. J Trauma 1991; 31:1584.
2. Nadvi SS, Mokoena T, Gouws E, Haffajee AA. Prognosis in post-traumatic acute renal failure is adversely influenced by hypotension and hyperkalemia. Eur J Surg 1996; 162:121-4.
3. Albright RC Jr. Acute Renal Failure: a practical update. Mayo Clin Proc 2001; 76:67-74.
4. Acute renal failure in the new millennium: time to consider combination therapy. SeminNephrol 2000; 20:4-19.
5. Dela Cruz CM, Pineda L, Rogelio G, Alano F. Clinical profile and factors affecting mortality in acute renal failure. Ren Fail 1992; 14:161-8.
6. Baker SP, O'Neill B, Haddon W Jr, Long WB. The injury severity score: a method for describing patients with multiple injuries and evaluating emergency care. J Trauma. Mar 1974; 14(3):187-96.
7. Morris JA, Mucha P, Ross SE, Moore BF, Hoyt DB, Gentilello L, *et al*. Acute posttraumatic renal failure: a multicenter perspective. J Trauma. 1991; 31:1584-90.
8. Regel G, Lobenhoffer R Grotz M, Pape HC, Lahmann, Tscherne H. Treatment results of patients with multiple trauma: an analysis of 3406 cases treated between 1972 and 1991 at German level I trauma center. J Trauma. 1995; 38:70–7.
9. Nadvi SS, Mokoena T, Gouws E, Haffajee AA. Prognosis in post-traumatic acute renal failure is adversely influenced by hypotension and hyperkalemia. Eur J Surg. 1996; 162:121-4.
10. Mehta RL, Pascual MT, Soroko S, Chertow GM. PICARD Study Group. Diuretics, mortality, and nonrecovery of renal function in acute renal failure. JAMA. 2002; 288:2547–53.
11. Ympa YP, Sakr Y, Reinhart K, Vincent J. Has mortality from acute renal failure decreased? A systematic review of the literature. Am J Med. 2005; 118:827–32.
12. Brown CV, Dubose JJ, Hadjizacharia P, Yanar H, Salim A, Inaba K, *et al*. Natural History and Outcomes of Renal Failure after Trauma. J Am Coll Surg. 2008; 206:426–31.
13. Fakhry SM, Brownstein M, Watts DD, Baker CC, Oller D. Relatively short diagnostic delays (<8 hours) produce morbidity and mortality in blunt small bowel injury: An analysis of time to operative intervention in 198 patients from a multicenter experience. J Trauma 2000; 48:408-15.

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