



ACUTE KIDNEY INJURY IN SNAKE BITE :A STUDY ON PREDICTORS OF OUTCOME

Nephrology

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ABSTRACT

Snake bite induced Acute kidney injury(AKI) is very common in our state of Tamilnadu and is associated with significant morbidity & mortality. This study was undertaken to study the factors associated with development of AKI , need for Renal replacement therapy(RRT) & its outcome. Prolonged Bite to hospital time, Persistent oliguria, Thrombocytopenia, Coagulation abnormalities are associated with poor prognosis.

KEYWORDS

Snake bite, AKI, RRT, Thrombocytopenia, Coagulation abnormality

Study

Snakebite is an occupational hazard in the rural tropics & particularly very common in our state of Tamilnadu and is associated with significant morbidity & mortality. India has the highest mortality due to snakebites with an estimation of roughly 46,000 people dying every year(1) Acute Kidney injury(AKI) may develop after bites by several kinds of venomous snakes, such as Russell's viper, saw-scaled viper, puff adder, rattlesnake, tiger snake, green pit viper and sea snakes.(5). AKI is more frequent after Russell's viper, Bothrops, or Crotalus bites, with incidences ranging from 10% to 32%.

Aim of the study

This study was undertaken in Mahatma Gandhi Memorial Government Hospital & KAPV Medical college, Trichy to study the clinical profile of snake bite patients developing AKI admitted in the hospital and to determine the factors associated with prognosis.

Materials and Methods

This prospective observational study was conducted from June 2018 to November 2019 in Department of Nephrology & Medicine of MGMGH. The approval from Ethics committee of our institute was obtained prior to starting the study.

Inclusion criteria

- (1) History of snake bite or consistent with snake bite, as presence of fang marks or cellulitis or coagulopathy or neuroparalysis;
- (2) presence of AKI as defined using KDIGO criteria based on serum creatinine (increase in serum creatinine by ≥ 0.3 mg/dL within 48 h or increase in serum creatinine to ≥ 1.5 times baseline, 15].

Only those patients who had developed AKI either on admission or during the hospital stay were included in the study

Exclusion criteria

1. Exposure to nephrotoxic drugs/toxins.
2. preexisting CKD

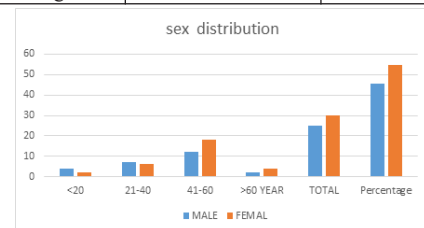
All the patients were subjected to detailed history and clinical examination. A bed side twenty minute whole blood clotting test (20WBCT) was performed to look for coagulation defect. Hematological and biochemical investigations were performed in all patients. Patients were administered tetanus toxoid injection & Anti Snake Venom as per standard protocol. Doses were repeated as needed based on clinical response. Supportive treatment (intravenous fluids, blood components, antibiotics and analgesics) was given. Patient subjected to Renal replacement therapy(RRT) if clinically indicated. Clinical details collected include age, gender, time from snake bite to arrival at hospital and site of the snake bite, presence of Oliguria, Haematuria, Diarrhoea, syncope. Laboratory results of Urine analysis, Hemoglobin, WBC count, platelet count, blood urea, serum creatinine, serum electrolytes, serum albumin, serum bilirubin, serum aspartate aminotransferase (AST) and alanine aminotransferase (ALT), alkaline phosphatase, creatine phosphokinase (CPK) were collected serially. A USG abdomen was done in all patients

Statistical analysis:

The patients were classified into two groups – those who needed Renal replacement therapy(RRT-Y) and Non Dialysis(RRT-N) group. Analysis of factors associated with need for RRT compared with RRT-N group. Among RRT-Y group analysis of factors associated with survival & death compared. The differences between the two groups were compared using the Chi-square test, the Fisher's exact probability test, or the Student's t test, wherever applicable

RESULT

| AGE | MALE | FEMAL |
|------------|------|-------|
| <20 | 4 | 2 |
| 21-40 | 7 | 6 |
| 41-60 | 12 | 18 |
| >60 YEAR | 2 | 4 |
| TOTAL | 25 | 30 |
| Percentage | 45.4 | 54.5 |



| Clinical manifestations | PRESENT |
|-------------------------|-----------|
| OLIGURIA | 42(76.3%) |
| HAEMATURIA | 7(12.7%) |
| DYSPNOEA | 29(52.7%) |
| DIABETIC MELLITUS | 1(1.8%) |
| HYPERTENSION | 1(1.8%) |
| PRE EXISTING CKD | 0 |

There were 55 cases (25 Males;30 females). The Age group ranged from 18 – 63 years in males & 18 -75 years in females. Majority of them had bites in lower limbs.(96.3%). The time lag range between snake bite & ASV administration was between 6 hours to 36 hours(mean 14 hours).

In patients who developed AKI, majority had oliguria(76%). However 12.7% also had micro or macrohaematuria. Twenty nine(52.7%) patients developed dyspnoea either on admission or during the hospital stay. We had 1 patient each having pre-existing Diabetes & Hypertension each. 33 patients had proteinuria ranging from $1 \pm$ to $3 \pm$. Eight (14.5%) patients had Hb < 10 gm/dl. Twenty one (38.1%) patients had significant leucocytosis (TC >15000). Seventeen (30.9%) patients had Thrombocytopenia (Range 33000-1.5 lakh). 26 patients(47.2%) had normal RFT on admission, however they developed renal failure during the course in the hospital. Average peak creatinine was 4.6 mg and that of discharge was 2.3 mg. 10 (18.8%) patients had developed hyponatremia. 7(12.7%) had Hypokalemia &

3(5.4%) had Hyperkalemia. 47(85.4%) patients had hypoalbuminemia, (<3.5 g/dl), 5 patients had < 2.2 g/dl. 22 (40%) patients had altered Liver function tests.

All patients had Normal USG Abdomen with increased Echoes.

OUT COME

| AGE | SURVIVED | | DEATH | |
|--------------|-----------|-----------|----------|----------|
| | MALE | FEMALE | MALE | FEMALE |
| <20 | 4 | 2 | 0 | 1 |
| 21-40 | 8 | 8 | 1 | 0 |
| 41-60 | 11 | 14 | 0 | 1 |
| >60 YEAR | 1 | 3 | 0 | 1 |
| TOTAL | 24 | 27 | 1 | 3 |

33 (60%) patients were treated with renal replacement therapy. 30 patients treated with Hemodialysis ; 3 had undergone Peritoneal dialysis . The average HD sessions given was 2.3/patient . 3 patients needed > 10 HD sessions , however recovered renal function after 3- 4 weeks.

| | RRT-Y | NO RRT | p value |
|-----------------------------|--------|--------|---------|
| Total | 33 | 22 | Ns |
| Age in years | 44.7 | 43.6 | Ns |
| Time lag to treatment hours | >24 | <12 | ..005 |
| Oliguria | 90 % | 54.5 % | <.005 |
| Hb <10 g/dl | 21.2 % | 4.5 % | <.005 |
| CPK total | >500 | <300 | <.005 |
| WBCT | 90% | 72% | Ns |
| Platelet < 1.5 l | 36.3 % | 22.7% | <.005 |
| S.ALBUMIN | 87.8 % | 81.8% | Ns |

4 patients(7.2%) died during treatment . The factors associated with poor outcome are time delay in reaching hospital, persistent oliguric renal failure, elevated CPK, Thrombocytopenia

| | Survived on RRT | Died on RRT | -p value |
|----------------------|-----------------|-------------|----------|
| Total | 29 | 4 | |
| Age average | 45.1 | 39.7 | Ns |
| Platelets | >1.2 lakhs | < 0.8 lakh | <.005 |
| WBCT | • 20 min | • 26 min | Ns |
| PT/INR sec (avg) | 1.4 | 1.8 | Ns |
| CPK | <500 | >1000 | <.005 |
| Peak creatinine mg | 5.6 | 6.8 | Ns |
| No of sessions of HD | 4.5 | 3 | Ns |

DISCUSSION

Clinical Features & manifestations of Snake bite depend on the nature of the venom and the injected dose. Pain, swelling, blister formation, ecchymosis of the bitten part, and tissue necrosis are frequent in Russell's viper(4). The most common systemic manifestation by these snakes is coagulation abnormalities leading to bleeding diathesis . Renal injury develops within a few hours to as late as 96 hours after the bite. Cola-colored urine is noted in those with hemolysis or rhabdomyolysis. AKI is usually oliguric and catabolic, with rapidly rising levels of blood urea nitrogen, serum creatinine, and potassium(3). Oliguria generally lasts for 1 to 2 weeks, and its persistence suggests the likelihood of acute cortical necrosis.

In our study, of the 55 patients, the snake was not identified in majority of cases but treated clinically as viper bites or Cobra bites based on predominant hemotoxicity or Neurotoxicity respectively. In this study, maximum number of victims (54.5%) were females. However other studies showing male preponderance were noted in many previous studies (6.) It was noted that patients who developed AKI had a significantly longer bite-to-hospital time, compared to those who did not develop AKI. Athappan (2) found that bite to needle time more than 2 hours (OR 2.10, $P = 0.001$) was an independent risk factor for the development of AKI. Early institution of ASV as mainstay therapy.

In our study Snake-bite-induced AKI resulted in mortality in 7.27% patients. The risk factors associated with development of AKI & need for RRT in snake bite are bite to hospital time, oliguria, prolonged bleeding time, prolonged prothrombin time, low haemoglobin, an elevated CPK level & Thrombocytopenia. Among patients of snake bite AKI who had died , they are of lesser age , had more profound Thrombocytopenia, more Coagulation abnormalities & elevated CPK. However the duration of Dialysis dependency didnot have a prognostic value as few patients have recovered renal function even

after 3 -4 weeks & needing more than 10 HD Sessions

CONCLUSION

AKI after snake bite occurs in significant number of patients . Many of the AKI patients needed renal replacement therapy . Majority Of AKI patients recovered over 1-3 weeks .The mortality in AKI patients in our study was low when compared to other studies(2,3). HD & PD are good in treating AKI of snake bite even though in highly catabolic snakebite AKI Hemodialysis is preferred. Delayed presentation to Hospital, Persistent Oliguria, Anemia ,Thrombocytopenia are associated with poor prognosis.

Limitation

Small sample size ; not able to identify the snake; FDP could not be done; Kidney biopsy not done

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