Tetanus in Pediatric Patients - Predictors Affecting Mortality and Role of Immunoglobulin

Analysis of pediatric tetanus cases was carried out to study the predictors of mortality and role of tetanus immunoglobulin (TIG). Shorter incubation period, onset time and autonomic dysfunction were significantly associated with mortality and may be used to stratify patients requiring intensive care. TIG may not have independent role in decreasing mortality in sick patients.

Key words: *Child, Immunoglobulin, Outcome, Tetanus.*

Tetanus is an important cause of preventable mortality and morbidity, particularly in the developing world [1]. Short incubation period (less than 7 days), short onset time (less than 3 days), autonomic dysfunction and cephalic tetanus are known predictors of mortality [2]. Tetanus immunoglobulin is one of the pillars of management [1]. There is a dearth of studies on tetanus from developing countries with resource constraint, especially in pediatric patients. Therefore, this study was planned to analyze the clinical profile, predictors of mortality and outcome of patients receiving TIG.

We present a retrospective analysis of 57 pediatric (<18 years age, excluding neonates) cases (non consecutive) of tetanus. The diagnosis was established clinically, in patients presenting with trismus, other rigid muscles and a clear sensorium.

Patients were given supportive therapy (including diazepam and chlorpromazine), and antimicrobials (crystalline penicillin 200,000 IU/kg/ day in 6 divided doses). Mechanical ventilation was implemented when necessary. TIG (500 IU stat dose) was given as per the patient's affordability. Socio economic status of ≤ class 4 and 5 was considered as low [3]. Autonomic dysfunction included heart rate and blood pressure abnormalities, diaphoresis etc [4].

The analysis was done between the two groups; the survival group and mortality group to see the relation between the final outcome and various possible risk factors (***Table* I**).

Mean age of the patients was 8.48 ± 4.61 years and 73.7% were males. Tetanus was classified as generalized (87.7% -statistically insignificant) and localized. Trismus was the presenting symptom in >3/4th of cases [6] as in our study (78.9 %). Incubation period, related to the amount of toxin and immunization status of the patient, averages 2-14 days [1,2]. In our study, mean incubation period in survival group and mortality group was 17.11 ± 21.18 and 8.32 ±9.38 days, respectively whereas mean onset period was 63.89 ±24.11 and 27.82 ±12.30 days, respectively. Shorter incubation and onset times are associated with more severe disease [1, 5]. In our study, both were confirmed as risk factors for mortality (P= <0.05).

Autonomic instability usually develops few days after the onset [1,5] in >1/3rd cases [6,7]. However, in our study, it was found in only 17.5 % cases, but this was statistically significant risk factor for mortality (P=0.025).

TIG has been an integral part of tetanus management and may reduce the severity of the illness [1,8]. In the survival group, 24 out of 35 received TIG, as against 18 out of 22 in the mortality group. This difference was not statistically significant (P=0.269). In the survival group, the duration of treatment in the survival group had very poor correlation with incubation period (correlation coefficients '*r*' – 0.076), onset time (*r*- 0.079) and age (*r*- 0.272).

Although mechanical ventilation appeared to be a risk factor for mortality, this is to be considered as a confounding factor indicating severity as only the sicker patients were considered for mechanical ventilation. Recovery period from tetanus is usually long. Patients' hospital stay has ranged from 14-28 days [7]. Similarly, in our study, mean duration of treatment in the survival group was 19.2 ± 10.7days. Country-wise mortalities are 41.0% in India [9] and 18.0% in USA [10], highlighting the importance of quality of care. The mortality rate in our study group was 38.6 %, comparable to the Indian data [9].

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REFERENCES

1. Bhatia R, Prabhakar S, Grover VK. Tetanus. Neurol India. 2002;50:398-407.
2. Arnon SS. Tetanus (Clostridium tetani). *In*: Behman RE, Kleigman RM, Jenson HB, Stanton BF, editors. Nelson

TABLE I ANALYSIS OF CASES AND COMPARISON BETWEEN THE SURVIVAL AND MORTALITY GROUPS

	Survival group (*n*=35)	Mortality group (*n*=22)	*P* value
Incubation period (d)	17.11 ± 21.18	8.32 ± 9.38	0.025
Onset time (h)	63.89 ± 24.11	27.82 ± 12.30	0.001
Immunization (complete)	11 (31.4%)	4 (18.2%)	0.269
Sex – male	24 (68.6%)	18 (81.8%)	0.269
Age	7.9 6 ± 4.59	9.32 ± 4.63	0.981
Drug abuse	1(2.8%)	2 (9.0%)	0.305
Socio economic status - low	28 (80.0%)	21(95.5%)	0.102
Trismus	27 (77.1%)	18 (81.8%)	0.673
Risus sardonicus	26 (74.3%)	18 (81.8%)	0.509
Refusal to feed	20 (57.1%)	16 (72.7%)	0.233
Ophistotonus	32 (91.4%)	18 (81.8%)	0.282
Autonomic dysfunction	3 (8.6%)	7 (31.8%)	0.025
Type-generalized	32 (91.42%)	18 (81.81%)	0.282
TIG	24 (68.6%)	18 (81.8%)	0.269
Mechanical ventilation	7 (20.0%)	22 (100%)	0.001

Textbook of Pediatrics. 18th edition. Philadelphia: Saunders; 2007. p. 1228-30.
3. Kumar N, Shekhar C, Kumar P. Kuppuswamy's Socioeconomic Status Scale-Updating for 2007. Indian J Pediatrics. 2007;74:1130.
4. Goldstein B, Giroir B, Randolph A. International Pediatric Sepsis Consensus Conference: Definitions for sepsis and organ dysfunction in pediatrics. Pediatr Crit Care Med. 2005;6:2-8
5. Cook TM, Protheoze RT, Handel JM. Tetanus: A review of literature. Br J Anaesth. 2001; 87:477-87.
6. Wassay M, Khealani BA, Talati N, Shamsi R, Syed NA, Salahuddin N. Autonomic nervous system dysfunction predicts poor prognosis in patients with mild to moderate tetanus. BMC Neurol. 2005;5:1-4.
7. Poudel P, Singh R, Raja S, Budhathoki S. Pediatric and neonatal tetanus: a hospital based study at eastern Nepal. Nepal Med Coll J. 2008;10:170-5.
8. Farrar JJ, Yen LM, Cook T, Fairweather N, Binh N, Parry J, *et al*. Tetanus. J Neurol Neurosurg Psy. 2000;69:292-301.
9. Patel JC, Mehta BC. Tetanus: study of 8697 cases. Indian J Med Sci. 1999;53:393-401.
10. Centre for Disease Control. Tetanus Surveillance - United States, 1998-2000. MMWR surveillance summaries [series on internet]. 2003;1-8. Available from: htpp://www.cdc.gov/MMWR/PREVIEW/MMWRHTML/ss5203a1.htm.