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Original Article

Complete elimination of tetanus is still elusive in developing countries: A review of adult tetanus cases from referral hospital in Eastern Nepal

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Abstract

Aim: To analyse demography, clinical presentation, treatment, complications and outcome of patients with tetanus over a 2-year period.

Materials and methods: A retrospective analysis of medical records of all patients with tetanus admitted to the intensive care unit of B.P Koirala Institute of Health Sciences, Dharan, Nepal between July 2004 and June 2006.

Results: Tetanus accounted for 1.1 % of our ICU admission. Eight tetanus patients (mean age 52 years; M: F ratio 7:1) were admitted. The tetanus prone wounds of seven patients were managed at home. The most common presenting complaints were trismus and stiffness of neck and back (87.5%). Elective intubation was followed by tracheostomy in all the patients. Overall mean duration of ventilatory support was 12.5 days. Treatments given in ICU were diazepam, magnesium sulphate, tetanus immunoglobulin, metronidazole, wound management and supportive measures. Five patients (62.5%) developed autonomic instability and three patients had ventilatory associated pneumonia (37.5%). Average ICU stay was 15.1 days while hospital stay was 20.1 days. Five patients (62.5%) survived the course of disease. Two patients (25%) left the hospital against medical advice while the other (12.5%) died in ICU.

Conclusion: Tetanus is a vaccine preventable disease. Tetanus prone wounds should be managed appropriately. Respiratory compromise and autonomic instability are the main causes of morbidity and mortality. Early recognition, intense support and prompt treatment improves morbidity and mortality of patients diagnosed with tetanus.

Tetanus is an acute disease associated with significant morbidity and delay in treatment leads to mortality. It is caused by *Clostridium tetani*, an anaerobic, gram positive, spore-forming bacilli commonly found in soil and faeces. Tetanus generally occur 7-14days after inoculation of the organism. The shorter the incubation time, the poor is the prognosis[1]. *C. tetani* secrets two kinds of toxins: tetanolysin and tetanospasmin. The exact role of tetanolysin is not fully known. Tetanospasmin is inactive peptide that is cleaved to its active form. It inhibits the release of gamma-aminobutyric acid and glycine that are inhibitory neurotransmitters in the brain and spinal cord. There is no inhibitory control over the excitatory nervous discharges. The end result is spasms, rigidity and autonomic instability.

It has been estimated that about a million deaths occur from tetanus each year worldwide[2]. Tetanus is not rare in the developing countries. In 2005, World Health Organization (WHO) reported 112 cases of tetanus in Nepal of which 29(25.8%) was neonatal tetanus. However, by the end of 2005, WHO validated elimination of neonatal tetanus in the country[3]. Yet, the risk of tetanus remains among people ≥ 50 year of age with no primary vaccination or persons who failed to maintain immunity against tetanus. There is lack of accurate statistical data on immunization of adults in Nepal. The exact incidence of adult tetanus in Nepal, a country with the population of 23 million, is not known partly because people die before they reach health centres but mostly because of lack of compliance to report new cases to the authority. In this article, we discuss the presentation, management, associated complications and outcome of 8 adult cases of tetanus treated in the intensive care unit of 700 bedded referral hospital in eastern Nepal over a period of two years.

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Materials and methods

Medical records of eight patients of tetanus admitted in the intensive care unit of B.P. Koirala Institute of Health Sciences between July 2004 and June 2006 were retrospectively reviewed. The case files were retrieved from the medical record section of the hospital. The patient demographics, presenting complaints, incubation time, management, related complications, their ICU and total hospital stay and the outcomes were recorded. Incubation period was defined as the time of injury to the appearance of symptoms.

Results

During July 2004-June 2006, eight tetanus patients were admitted in the intensive care unit. There were equal numbers of cases of tetanus admitted in two consecutive years. The average age of the patients was 52 years (30-68). Most of them were more than 40 years of age except one who was 30 year. There were 7 males (87.5%) and a female (12.5%). Five of eight patients (62.5%) did not know their vaccination status while three patients (37.5 %) had childhood vaccination. Seven patients had history of injury prior to appearance of symptoms of tetanus. Obvious injury was noted in these patients of whom five had injury (71.4%) in their upper limbs while the rest come with injury in the lower extremity (28.5%). The wound of seven patients were irrigated and dressed by patients themselves. One patient went to the local doctor to get the wound dressed and as a part of his treatment, he was given tetanus toxoid injection. Five (62.5%) patients presented to the emergency department 10 days following injury. The average incubation period was 11.8 (7-20) days. Majority of the patients presented with trismus (87.5%) table 1. The other common symptoms were stiffness of neck and back, repeated spasms of facial muscles, difficulty in swallowing and intense sweating. Sore throat and difficulty in breathing were the presentation in one patient. It was noted that light, touch and sound triggered the spasms. The trachea of all the patients was intubated as soon as the provisional diagnosis was made followed by early tracheostomy performed on the day of presentation to the emergency department. All the patients were admitted to the ICU for isolation and close monitoring. The ICU treatments of these patients are described in table 2. The treatment was started immediately once the diagnosis was made. Apart from specific and symptomatic treatment, supportive care such as enteral feeding, deep venous thrombosis prophylaxis and stress ulcer prophylaxis was provided. All the patients required ventilatory support. The average days on ventilatory support were 12.5 days (1-30). Autonomic instability was noted in five patients (62.5%) while three patients (37.5%) developed ventilatory associated pneumonia which was treated accordingly. A patient with longer ICU stay developed pressure sore.

The average length of stay in ICU in these patients was 15.1 days (1-34). Five of the eight tracheostomised patients survived the course of disease. They were decannulated and were discharged from the hospital. The length of hospital stay ranged from 1 to 37 days with an average length of 20.1 days. One patient developed severe autonomic instability and died in ICU while the other two left against medical advice on the 4^{th} day of ICU admission because of financial constrains.

Table 1: The presenting complaints of the 8 tetanus patients admitted in the intensive care unit

Symptoms	Number of patients (%)
Trismus	7 (87.5%)
Stiffness of neck and back	7 (87.5%)
Spasms	4 (50%)
Difficulty in swallowing	3 (37.5%)
Intense sweating	3 (37.5%)
Difficulty in breathing	1 (12.5%)
Sore throat	1 (12.5%)

Table 2: Treatment provided to the 8 tetanus patients in intensive care unit

Treatment	Doses	Duration (days)	Number of patients (%)
Mechanical ventilation	-	1-30	8(100%)
Inj. Diazepam infusion	40mg hr-1	5-22	8(100%)
Inj. $MgSO_4$ infusion	1-2mg hr-1	3-4	8(100%)
Inj. TIG	500 units IM	Single dose	8(100%)
Inj. Metronidazole	500mg 8 hourly	14	8(100%)
Inj. Thiopentone sodium	50mg IV prn	5-10	7(87.5%)
Inj. Vecuronium	1-4 mg IV prn	3-5	7(87.5%)
Tab. Atenolol	50mg via Ryles tube	14	1(12.5%)
Wound dressing	daily	3-11	7(87.5%)

TIG: tetanus immunoglobulin; $MgSO_4$: Magnesium sulphate

Discussion

Although incidence of tetanus is low in developed countries, it is still a major health problem in developing world. In this retrospective study we analyzed the demography, presentation, management, complications and outcome of eight patients admitted in the intensive care unit over a period of two years.

We noted in our study that about 87.5% of tetanus occurred in the adults more than 40 years of age. The immunization status against tetanus in five patients was unknown whereas three had childhood vaccination. Adults may not have adequate immunity and are therefore, more susceptible to develop tetanus. Wesche and Overfield studied people more than 50 years of age and found that only 14% had adequate protective level of antibodies and low level of antibodies were independent of previous childhood immunization [(4)]. We could not measure the tetanus antibody level in our patients because of lack of facility in the center. Immunization against tetanus is not life long thus revaccination at 10 years apart is recommended in adults[5].

The most common presenting complaints among our patients were trismus (lockjaw) and stiffness of neck and back that were consistent with other studies [(6)]. Diagnosis of tetanus in our series was entirely based on history and clinical signs. Wound culture was not performed. Moreover, isolation of *C tetani* from wound is difficult and is successful in only approximately 30% of cases in human [(7)]. Laboratory investigations may be helpful to rule out other diseases rather than making a diagnosis.

Elective tracheostomy was performed in all the patients to avoid the problem of laryngospasm and hypoxia. Autonomic instability is usually most prominent in the first week, peaking second week and then resolves [(1)]. In five of our patients, autonomic signs appeared in 1-4 days after the body stiffness and gradually resolved by 7-14 days.

Management of our patients in ICU included ventilatory support, infusion of diazepam, magnesium sulphate ($MgSO_4$), tetanus immunoglobulin, metronidazole, boluses of thiopental and vecuronium. Metronidazole is the choice for eliminating *C tetani*[8]. We did not use penicillin in our patients as penicillin, like tetanus toxin, is GABA antagonist that may increase the risk of convulsions. In addition, compared to penicillin, metronidazole has the ability to penetrate anaerobic tissues, reduces mortality and shortens hospital stay[8]. Previous studies have shown that magnesium sulphate was effective in treating both spasms and autonomic instability[9]. As a part of the protocol, $MgSO_4$ was infused in all the tetanus patients. Atenolol was used in one of our patients to treat autonomic dysfunction as $MgSO_4$ failed to control tachycardia and hypertension. Boluses of thiopental (50mg) were used during periods of stimulations as tracheal suction, turning patients and chest physiotherapy. Spasms may be intense enough to cause fracture and tendon avulsion [(10)]. Repeated spasms are associated with rhabdomyolysis which may be complicated by renal failure. Neuromuscular blocking agent vecuronium was used to prevent complications related to intense spasms.

Five of eight patients (62.5%) survived the course of illness. The retrospective study by Lau and workers revealed the survival rate of tetanus was 81.8% [(11)]. Trujillo and colleagues reported a reduction in mortality from 44% to 15% after the introduction of intensive care treatment [(12)]. In developing countries, where facilities of intensive care are lacking, mortality exceeds 50%. In our study, two patients left against medical advice (25%) and the other (12.5%) died on the

first day of ICU admission because of severe autonomic instability followed by sudden cardiac arrest.

Conclusion

Tetanus is entirely preventable by vaccination. Despite intense effort, complete eradication of tetanus has not been possible due lack of education. Adults of Nepal as rest of the world are vulnerable to tetanus because of inadequate immunity. Tetanus prone wounds should be taken seriously. Effort must be made to vaccinate all adults with tetanus toxoid. The review of our clinical experiences suggests that prevention is always better than cure. Early recognition, intense support and prompt treatment improves morbidity and mortality of patients diagnosed with tetanus.

References

1. Ernst ME, Klepser ME, Fouts M et al. Tetanus: pathophysiology and management. Ann Phamacother 1997; 31:1507-13
2. Abrahamian FM, Pollack CV Jr, LoVecchio F, et al. Fatal tetanus in a drug abuser with protective antitetanus antibodies. J Emerg Med 2000; 18:189-93
3. http://www.who.int/wer/2006/
4. Wesche HA, Overfield T.Tetanus immunity in older adults. Public health Nurs 1992; 9:125-7
5. General recommendation on immunization: recommendations of the Advisory Committee on immunization practice (ACIP). Mortal Morbid Weekly report 1995; 43:1-38
6. Henderson SO, Mody T, Groth DE, Moore JJ, Newton E. The presentation of tetanus in the emergency department. J Emerg Med 1998; 16: 705-8
7. Centers for Disease Control and Prevention eds. Tetanus, In: Epidemiology and Prevention of Vaccine-Preventable Diseases, 8th edn. Atlanta: National Immunization Program; 2004,pp.65-73
8. Ahmadsyah I, SAlim A. Treatment of tetanus: an open study to compare the efficacy of procaine penicillin and metronidazole. Br. Med J 1985;291:648-50
9. Lipman J, James MFM, Erskine J, Plit ML, Eidelman J, Esser JD. Autonomic dysfunction in severe tetanus: Magnesium sulphate as an adjuvant to deep sedation. Crit Care Med 1987; 15:987-8
10. Bleck TP. Tetanus: dealing with the continuing clinical challenge. J Crti lll 1987;2:41-51
11. Lau LG, Kong KO, Chew PH. A ten-year retrospective study of tetanus at a general hospital in Malaysia. Singapore Med J 2001;42:346-50
12. Trujillo MH, Catillo A Espana J, Manzo A, Zerpa R. Impact of intensive care management on the prognosis of tetanus. Analysis of 641 cases. Chest 1987;92:63-5