Tetanus in Adults : A Review of 85 Cases at Chon Buri Hospital

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Abstract

From 1988 to 1999, 85 cases of adult tetanus were admitted to the medical service of Chon Buri Hospital. The male to female ratio was 2.2:1. In 50 patients disease was severe enough to require paralysis and artificial ventilation. Fourteen patients needed diazepam and artificial ventilation but not paralysis ; and in twenty-one the condition was mild, requiring diazepam only. Eleven patients died, all of them had severe grade of tetanus. The mortality rate was 12.9 per cent. In 70 patients a wound was the source of infection, most of which were minor, often receiving no medical attention. No wounds or obvious source of infection could be found in 15 patients.

Tetanus is a preventable disease. The treatment of tetanus is time – consuming and costly and there is still a considerable mortality rate. In moderate to severe cases, the patients usually have to spend three to four weeks in an intensive care unit.

Key word : Tetanus

KANCHANAPONGKUL J
J Med Assoc Thai 2001; 84: 494-499

Tetanus is an acute, often fatal disease, caused by an exotoxin produced in a wound by Clostridium tetani, a spore-forming, Gram positive rod, obligate anaerobic form of the organism. Under anaerobic conditions the vegetative form of the organism produces a powerful neurotoxin, tetanospasmin, which on reaching the central nervous system causes the increased muscle tone and spasms that characterize the disease(1).

Although tetanus is rare in developed countries, it remains an important public health problem in developing countries. The global incidence of tetanus is still estimated at 1 million cases annually, with a case fatality ratio ranging from 20 to

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Table 1. Tetanus patients treated at Chon Buri Hospital, 1988-1999.

Grade of tetanus	No. of cases	No. of deaths	%
Mild	21	0	0
Moderate	14	0	0
Severe	50	11	22
Total	85	11	22

Table 2. Age and sex distribution of 85 cases of adult tetanus.

Age group	Male	Female	Total
15-19	4	2	6
20-29	20	0	20
30-39	14	2	16
40-49	6	4	10
50-59	7	6	13
60-69	5	4	9
> 70	3	8	11
Total	59	26	85

Table 3. Types of wounds.

Types of wounds	No. of cases	%
Puncture wounds	37	43.5
Lacerated wounds	20	23.5
Cut wounds	6	7.1
Crush wounds	3	3.6
Abrasion wounds	2	2.3
Injection wounds	1	1.2
Squamous cell carcinoma	1	1.2
No wounds	15	17.6
Total	85	100

Table 4. Sites of wounds.

Sites of wounds	No. of cases
Lower limb	45
Upper limb	21
Head	3
Both upper and lower limb	1
Total	70

over 50 per cent. At least half of the deaths from tetanus occur in neonates[2].

In this paper, the author reviews 85 cases of adult tetanus identified over a 12-year interval at Chon Buri Hospital.

MATERIAL AND METHOD

The author reviewed the charts of all patients 15 year of age or older in whom tetanus was diagnosed at Chon Buri Hospital from January 1988 through December 1999. Patients were classified as mild, moderate or severe according to the degree of severity described by Cole and Youngman[3].

RESULTS

There were 85 patients, 59 were males and 26 were females. Fifty patients had muscle spasms severe enough to interfere with swallowing and with ventilation ; they were graded as severe cases, and 11 of them died. A further 14 patients with less severe muscle spasms were classified as moderate cases. The other 21 patients had mild tetanus with increased muscle tone and trismus, but without major spasms. All patients with mild and moderate tetanus survived (Table 1).

Age and sex distribution

Table 2 shows the age and sex distribution of the patients. The male to female ratio was approximately 2.2:1. The youngest patient was a 15-year-old boy and the oldest patient a woman of 89. Half of the patients were under 40, and half were 40 or over.

Wounds

In 70 patients a wound was considered to be the likely source of infection. Most of the wounds were minor. Most were caused by splinters of wood or thorns or punctures by nails. Puncture wounds and lacerated wounds accounted for 43.5 and 23.5 per cent, respectively, of the wounds associated with tetanus. Other types of wounds included cut wounds (6 cases), crush wounds (3 cases), abrasion wounds (2 cases), injection wound (1 case), and infected squamous cell carcinoma (1 case). The feet,

hands, and legs were the most common sites of wounds. Most patients did not consider their injury serious enough to warrant medical attention. Of those who did seek medical attention, they were given only tetanus toxoid, but none received tetanus antitoxin, either equine or human. No wounds or obvious source of infection could be found in 15 patients (17.6%). Table 3 and Table 4 show the types and sites of wounds.

Incubation period and period of onset

The incubation period is the time between the injury and the first symptom of tetanus. In severe cases the incubation period tends to be short but a long interval is no guarantee of a mild attack. The period of onset is the interval between the first symptom and the first spasm. Severe tetanus usually follows a short period of onset.

Clinical features

Most patients presented with classical tetanus. Typically, the patient first noticed increased tone in the masseter muscle resulting in difficulty in opening the mouth – trismus or lockjaw. In mild cases this may be the main feature with, perhaps, just a hint of stiffness in other groups of muscles. Dysphagia or stiffness or pain in the neck and back muscles occurred concurrently or appeared soon thereafter. Sustained contraction of the facial muscle produced a grimace (risus sardonicus), and contraction of the back muscles produced an arched back (opisthotonos). The abdominal muscles were stiff and rigid. The hands and feet were relatively spared.

Mild cases of tetanus exhibited only stiffness without spasms. Spasms were characterized by a marked reflex exaggeration of the underlying rigidity, producing tonic contractions of the stiff muscle. They were frequently brought on by touch but may also be triggered by visual, auditory, or emotional stimuli. Spasms may be mild, infrequent, and brief or severe, protracted, excruciatingly painful, and spontaneous, according to the severity of the disease. Protracted severe spasms rendered breathing impossible or shallow, irregular and ineffective, so that the patient became hypoxic and even cyanosed. Respiration may be impaired by laryngospasm or tonic contraction of respiratory muscles, which prevents adequate ventilation. Hypoxia then may lead to irreversible brain damage and death.

Treatment

All patients received the following treatment. The wound, when identified, was explored, carefully cleansed, and thoroughly debrided. Parenteral penicillin 6-12 million units daily for 7-10 days was administered. Parenteral metronidazole was given as an alternative to some patients. All patients were given tetanus toxoid and 10,000 units of equine tetanus antitoxin (TAT). Symptomatic treatment was according to the severity of the case. Mild cases were managed with diazepam. Moderate cases required mechanical ventilation in addition to diazepam. Severe cases required paralysis with pancuronium or vecuronium in addition to diazapam and mechanical ventilation.

Early tracheostomy was performed in almost all cases with the exception of the mildest cases. Adequate nutrition and hydration were maintained by nasogastric tube feeding and intravenous fluid. Appropriate antibiotics were administered to treat hospital – acquired pneumonia and urinary tract infection.

Complications

Respiratory complications :

Pneumonia and atelectasis were common complications. Pneumonia was more frequent in patients with moderate to severe degree. The causative organisms were generally due to Gram-negative bacilli.

Cardiovascular complications and autonomic disturbances :

Autonomic dysfunction commonly complicated severe cases and was characterized by labile or sustained hypertension, tachycardia, arrhythmias, hyperpyrexia, profuse sweating, peripheral vasoconstriction. Sudden cardiac arrest accounted for six of the eleven deaths.

Other complications

These were generally due to prolonged and difficult management of critically ill individuals on ventilation support. The most common complication was infection. The potential sources of infection were the tracheostomy wound, central venous lines, urinary catheters and pulmonary infection. Upper gastrointestinal bleeding was common. Fluid and electrolyte disturbances were common and were aggravated by profuse sweating.

Table 5. Cause of death in eleven patients.

Patient no.	Age (y), sex	Cause of death	Time to death, d	Underlying illness
1	49, F	Severe hypoxemia	1	
2	89, F	Myocardial infarction	6	IHD
3	58, F	Cardiac arrest	4	DM, HT
4	32, M	Acute renal failure	23	
5	32, M	Severe hypoxemia	2	IVDU, HIV⊕
6	19, M	Cardiac arrest	8	
7	33, M	Cardiac arrest	19	
8	60, M	Cardiac arrest	17	
9	53, M	Pneumonia	13	
10	15, M	Cardiac arrest	14	
11	26, M	Cardiac arrest	13	HIV⊕

IHD = ischemic heart disease
DM = diabetes mellitus
HT = hypertension
IVDU = intravenous drug user
HIV = human immunodeficiency virus
d = day

Cause of death

The mortality rate in this series was 11 out of 85 patients (12.9%). Table 5 shows the age, sex and cause of death in the eleven patients. Six patients died from sudden cardiac arrest attributable to sympathetic overactivity. One woman and one man died from severe hypoxemia due to inadequate control of severe generalized spasm. One elderly woman died from myocardial infarction. One man died from nosocomial pneumonia related to the use of mechanical ventilation and one from acute renal failure complicating his tetanus. Three patients with severe tetanus were also infected with human immunodeficiency virus and two of them died.

DISCUSSION

The diagnosis of tetanus is made entirely on the basis of clinical findings. C. tetani can be isolated from wounds of patients without tetanus, and frequently the organism cannot be recovered from the wounds of those with tetanus[4].

The male to female ratio in this series was approximately 2.2:1. This preponderance of men probably reflects their greater exposure to tetanus-prone injury and was found in other series[4-6].

The great majority of patients with tetanus become infected through minor rather than major wounds. This is presumably because those with the latter almost invariably seek medical care early on so that their lesions are properly cleaned and appropriately treated, while minor wounds are often neglected. Moreover, 15 patients had no evidence of a recent wound. The finding of only minor lesions or none at all is therefore no bar to the diagnosis.

In severe cases the incubation period tends to be short. In some cases, however, one cannot be sure when the contaminated wound occurred. While it may be obvious, the wound causing tetanus is often trivial and soon heals, leaving behind it little or no evidence of a lesion. The incubation period alone, therefore, cannot be relied upon as a guide to severity. Since the period of onset is more readily determined than the incubation period, it is a better index of severity. Patients more frequently remember the time of the first spasm than the date of the wound and, as has been stated, no wound could be found in 17.6 per cent of cases.

In developing countries, where immunization programmes are inadequate, tetanus is most common in the young and newborn. In developed countries, the disease is now increasingly rare. Tetanus in developed countries is more frequent in the elderly, in whom effects of immunization have worn off[1,7]. In this series 20 patients (23.5%) were 60 or over. In the future, tetanus may occur predominantly in older adults who are either unimmunized or inadequately immunized.

The deaths in this series were due to complications directly attributable to tetanus. The single most troublesome problem was control of the cardiovascular effects of sympathetic overactivity

in patients with very severe disease. Similar to the experiences described by Kerr and colleagues[8], disturbances of the sympathetic nervous system were frequently encountered in patients with severe tetanus and were the major causes of death in this series. Other causes of death were due to complications that may arise in any severely ill patients who were paralysed and artificially ventilated for three to four weeks.

The prognosis and mortality depend upon the severity of tetanus. A short incubation period and a short period of onset signal the rapid evolution of severe disease and are associated with a high mortality. The mortality rate in various reported series from different countries ranges between 20 and 60 per cent, and is higher in the elderly. The mortality and morbidity rate of tetanus has dramatically decreased during the past three decades. In moderate to severe tetanus, early resort to tracheostomy, paralysis with neuromuscular blocking agent with artificial respiration and intensive care reduced the mortality rate to about 10 per cent or less[9,10]. Full intensive care facilities with trained nursing personnel should be implemented in the management of severe tetanus. An analysis of 335 consecutive tetanus patients treated before the organization of an intensive care unit (ICU), compared with 306 consecutive patients managed after development of the ICU, revealed a decrease in mortality from 44 per cent to 15 per cent[11]. The major improvement came from prevention of death due to acute respiratory failure.

The optimal therapy for sympathetic overactivity has not been defined. Considerations include intravenous labetalol, an alpha and beta-adrenergic blocking agent that is recommended by some experts[7]. Others include intravenous esmolol (a beta blocker with short half – life), clonidine (a centrally acting antiadrenergic drug), and morphine sulfate[12-14]. Parenteral magnesium sulfate and continuous spinal anesthesia have been used but may be more difficult to administer and monitor[15,16]. The relative efficacy of these modalities is yet to be determined.

The treatment of patients with tetanus is time consuming and costly and there is still a considerable mortality rate. In moderate to severe cases, the patients usually have to spend three to four weeks in an intensive care unit. Tetanus is a preventable disease. Active immunization with tetanus toxoid is one of the most effective preventive measures in medicine, and passive immunization may be performed at the time of any tetanus – prone wound. Preventing one case of tetanus saves enough health care expense to immunize several thousand people.

ACKNOWLEDGEMENT

The author wishes to thank the many physicians and nurses who were involved in the care of the patients and to the nursing staff of the intensive care unit upon whose skill and devotion successful treatment of these patients largely depends. The author also wishes to thank Mr. Suthipong Maneedit for typing the manuscript.

(Received for publication on November 15, 1999)

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บาดทะยักในผู้ใหญ่ : ทบทวนผู้ป่วย 85 ราย ในโรงพยาบาลชลบุรี

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ระหว่างปี พ.ศ. 2531 – 2542 มีผู้ป่วยบาดทะยักในผู้ใหญ่มารับการรักษาในกลุ่มงานอายุรกรรม โรงพยาบาลชลบุรี จำนวน 85 ราย อัตราส่วนชายต่อหญิงเท่ากับ 2.2:1 ผู้ป่วย 50 ราย มีอาการหนักต้องใช้เครื่องช่วยหายใจร่วมกับให้ยาหย่อนกล้ามเนื้อ ผู้ป่วย 14 ราย ใช้เครื่องช่วยหายใจร่วมกับให้ยาไดอะซีแพม ผู้ป่วย 21 ราย อาการไม่มาก ไม่ต้องใช้เครื่องช่วยหายใจ ให้แต่ยาไดอะซีแพม มีผู้ป่วยเสียชีวิต 11 ราย ทุกรายมีอาการรุนแรงมาก คิดเป็นอัตราตายร้อยละ 12.9 ผู้ป่วย 70 ราย มีบาดแผล ส่วนใหญ่เป็นบาดแผลเล็กน้อย มีผู้ป่วย 15 ราย ที่ไม่พบบาดแผล

บาดทะยักเป็นโรคที่ป้องกันได้ การรักษาบาดทะยักต้องเสียค่าใช้จ่าย และเสียเวลามาก และอัตราตายยังสูง ผู้ป่วยที่มีอาการรุนแรงปานกลาง หรือรุนแรงมาก ต้องรักษาในหออภิบาลนานประมาณสามถึงสี่สัปดาห์

คำสำคัญ : บาดทะยัก

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