

Case Report

Treatment of Tetanus in ICU: A Case Report

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Abstract:

Tetanus remains an important cause of death in the developing countries, like Bangladesh. The cause of death in tetanus is spasm of the larynx and muscle spasm. High dose muscle relaxant are required to prevent this which itself has side effect like respiratory depression. Treatment in ICU with the help of mechanical ventilation prevents death from respiratory complications and produce best possible therapeutic effect of the drugs. In this case, a patient of tetanus was managed in ICU with high doses of muscle relaxant along with all the medication necessary for tetanus and produced good outcome.

Key Word: Tetanus, ICU

Introduction:

Tetanus dates back to the earliest known medical history. Improvements in infection control, immunization and medical management has made it a rare disease in the developed world, but still remains an important cause of death in the developing countries. Availability of modern ICU has made treatment of tetanus easier and more

effective. We present a case of tetanus who was treated in ICU and had complete and early recovery.

Case Report:

At the end of November, 2012, a 25-year-old gentleman presented with neck pain and stiffness. Eight days before presentation, he suffered a road traffic accident, with minor injuries to the scalp. There was no bone fracture or feature of intracranial bleed. He was managed conservatively at the emergency & trauma department of a local hospital and later discharged home. Administration of prophylaxis against tetanus in that setting was uncertain. Five days after the discharge, he again presented to another hospital with the complaints of jaw and neck stiffness. Here he was treated symptomatically. But as his symptoms worsened gradually, he was shifted to the Square Hospital ICU. During admission to the ICU, he was conscious, haemodynamically stable, and maintaining good oxygen saturation in room air. A thorough physical examination revealed neck and facial muscle spasm and opisthotonus position. About half an hour after admission, the patient developed sudden generalized spasm and convulsion, and his oxygen saturation also became low. He was intubated and put on mechanical ventilator support. He experienced multiple episodes of generalized spasm and convulsion, mostly triggered by touch and sound. From the history of injury and the physical findings, he was diagnosed as a patient of tetanus.

Human tetanus immunoglobulin (6000 units) was immediately administered intramuscularly. Metronidazole (500 mg 6 hourly intravenously) was started. As

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immunization history was not clear, single dose of tetanus toxoid (40 units/0.5 ml) was also injected intramuscularly. To control muscle spasm, diazepam (initially @ 10 mg/hour, increased up to 20 mg/hour) and vecuronium bromide infusions were tried. But eventually the addition of magnesium sulphate (infused @ 2 grams/hour) resulted in adequate response. Metoprolol and prazosin controlled tachycardia and hypertension successfully. The patient underwent tracheostomy for prolonged requirement of mechanical ventilator. All along his course of treatment, he was managed in a low lighted quiet cubicle. His hospital course was complicated with ventilator associated pneumonia, which was dealt accordingly and successfully. After four weeks of treatment, he was weaned from mechanical ventilator. His symptoms gradually improved, took about 5 weeks to disappear completely. His tracheostomy was closed a week after weaning from ventilator. He was discharged home after 39 days of hospital stay in a completely recovered and haemodynamically stable state. In follow-up after a month, we found him healthy and with no further complain.

Discussion:

“Tetanus”, derived from the Greek word for stretching or rigidity, is a health hazard since the days of Hippocrates.¹ Although, it is rare disease in the developed world now-a-days, it still remains an important cause of death in the developing countries.^{1,2} World Health Organization reported 61,000 estimated deaths from tetanus in 2008, world-wide.³

Tetanus is caused by *Clostridium tetani*, a Gram-positive bacillus. Under anaerobic condition it secretes two toxins; tetanospasmin and tetanolysin.^{1,2} Tetanolysin damages locally viable tissue and make the condition favourable for bacterial multiplication.² Tetanospasmin prevents release of inhibitory neurotransmitter, glycine and γ -Amino Butyric Acid (GABA). Uncontrolled disinhibited efferent discharges from motor neurons in the cord and brainstem leads to muscular rigidity and spasm.^{1,2,4}

Wounds contaminated with soil, manure or rusty metal usually results in tetanus. Rigidity, muscle spasms and autonomic dysfunction are the clinical triad of tetanus.² Trismus or “lockjaw” due to masseter spasm, “risus sardonicus” due to facial muscle spasm, and “opisthotonus” due to neck muscle and truncal rigidity are classic features of tetanus.^{1,2} Our patient’s initial presentations were the same. The tonic contractions of the ‘agonist’ and ‘antagonist’ muscle groups have a convulsion-like appearance² which was also seen in our patient. Disinhibited autonomic discharge leads to disturbance in autonomic control, with sympathetic over-

activity and excessive plasma catecholamine level.² Our patient experienced hypertension and tachycardia.

The diagnosis of tetanus is usually made on clinical basis, and investigations are done only to exclude other illness, if in doubt.¹ Diagnosis was made from the classic clinical presentations in case of our patient, and it helped in starting treatment early.

The management of tetanus depends on expert medical and nursing skill.⁴ The treatment of tetanus is focused on the elimination of organism, neutralizations of toxin, control of symptoms, and supportive care.² Surgical debridement of contaminated wound and use of appropriate antibiotic is the mainstay of elimination of organism and removal of source of infection.^{1,2} *Clostridium tetani* is usually sensitive to penicillin,^{1,2,4} It is widely used but can be associated with convulsions. Metronidazole is the antibiotic of choice, and erythromycin, tetracycline, chloramphenicol and clindamycin are recommended alternatives.² Tetanus antitoxin neutralise newly produced toxin but once toxin is fixed in nerve tissue, antitoxin has no effect, then antibody which is produced by tetanus toxoid required to neutralize toxin.⁴ Although avoidance of unnecessary stimulation is a mandatory part to prevent control of rigidity and spasms, sedation with benzodiazepine is the mainstay of treatment.² Diazepam, a GABA agonist, effectively control spasm and hypertonicity without cortical depression. Muscle relaxing property is about 5 times as great as that of phenobarbitone. Along with ICU support (because patient need mechanical ventilation) high dose diazepam reduce mortality by its muscle relaxing property. It also induce amnesia which is useful for eliminating restlessness, excitement and hyperirritation.⁴ Midazolam can be used when diazepam causes prolonged coma for the accumulation of its metabolites. When sedation alone is not adequate, neuromuscular blocking agents may also be required.²

Tetanus cause autonomic storm with marked cardiovascular instability and patient fluctuated from a state of hypertension and tachycardia to hypotension and bradycardia. α and β -adrenergic blockers are used to control dysautonomia, according to symptom.² Magnesium, a presynaptic neuromuscular blocker, reduces autonomic disturbance as well as muscle spasm. It also blocks catecholamine release from nerve and adrenal medulla. As muscular weakness is apparent with the use of magnesium, ventilation is required. Use of magnesium in this patient along with beta blocker successfully controlled autonomic disturbance as well as spasm and rigidity.² In tetanus, cause of death is usually asphyxia because of spasm of the larynx and respiratory muscle.

Treatment related depression of respiratory and central nervous system is also responsible.⁴ With the availability of mechanical ventilator, and help of Intensive Care Unit, mortality in tetanus has significantly reduced.²

High dose diazepam and muscle relaxant, used in our patient, which was possible in the ICU setting with the patient on mechanical ventilator support, effectively controlled muscle spasm and rigidity which is the most important cause of death. Moreover, autonomic disturbance successfully overcame with the help of magnesium sulphate and adrenergic receptor blockers in this ventilated patient.

A ten year retrospective study at a teaching hospital in Bangladesh, without a modern ICU support, shows overall mortality in tetanus around 22.5%.⁵ Trujillo and colleagues reported reduction in mortality to 15% after the introduction of ICU.⁶ It is evident that our patient had a better chance of surviving, because his management took place in a modern ICU setting.

Conflicts of Interest: None declared.

Consent was taken from the patient for publication of this case report.

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