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SHORT COMMUNICATION

Tetanus in an unvaccinated laborer in Bahrain

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KEYWORDS

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Summary Mr. M.D.S., a 27-year-old Indian male, presented with complaints of diffuse body pain and spasms, 7 days after a needle penetrated his right foot at his place of work. He was diagnosed clinically with tetanus. The patient was electively intubated to protect the airway and transferred to an intensive care unit. In addition to his tetanus, he developed multiple hospital-acquired infections. After 34 days, he was successfully extubated and extensive physiotherapy commenced. He was discharged 10 days after extubation.

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Background

Tetanus is a leading cause of morbidity and mortality in developing countries. Despite international prevention efforts through the implementation of WHO vaccination protocols, it is estimated that one million cases appear worldwide annually, with 300,000–500,000 deaths annually [1]. After the 1940s, when the tetanus toxoid was introduced in routine childhood vaccinations, reported tetanus incidence rates in the United States declined steadily. Since the mid-1970s, 50–100 cases (~0.05 cases per 100,000) have been reported annually in the United States. From 2000 through 2007,

an average of 31 cases were reported per year. The death-to-case ratio has declined from 30% to approximately 10% in recent years. An all-time low of 18 cases (0.01 cases per 100,000) was reported in 2009 [2].

Tetanus toxoids were first produced in 1924. Each consists of a formaldehyde-treated toxin, and there are two types of toxoids available: an adsorbed (aluminum salt precipitated) toxoid and a fluid toxoid. Although the rates of seroconversion are approximately equal, the adsorbed toxoid is preferred because its antitoxin response reaches higher titers and is longer lasting than the antitoxin response resulting from the fluid toxoid [3]. Antitoxin levels decrease with time. While some people may be protected for life, by 10 years after the last dose, most people have antitoxin levels that only approach the minimal protective level. As a result,

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routine boosters are recommended every 10 years [4].

Field injuries are common among outdoor employees. A lack of awareness of the consequences of an injury and of the importance of seeking medical attention are major factors behind the rise in morbidity/mortality rates. In addition, tetanus treatment depends on early recognition of the disease as it diagnosed clinically. It is therefore essential for physicians to be alert to an infection to initiate the appropriate remedy.

In developed countries, where the incidence is low due to vaccine programs, any new case should be reported immediately. This will help familiarize people with the disease, facilitate further management progress, and develop approaches to create superior primary prevention protocols. This case study is published with the aim to focus physician attention on and improve their knowledge about tetanus. This study also presents a novel presentation of the disease and its treatment. Due to the national vaccination program involving laborers and the proper wound care generally provided by health care providers in the Kingdom of Bahrain, this case is considered a rarity due mostly to mismanagement. It also highlights the importance of vaccinating people who are at greater risk of infection, as tetanus is one of the diseases that does not confer immunity post-infection.

Case presentation

Mr. M.D.S., a 27-year-old Indian male, presented to the Accident and Emergency Department at Salmaniya Medical Complex (Manama, Bahrain) on 1/2/2013 with complaints of generalized body aches and stiffness for a duration of 7 days. He also described excessive sweating, palpitations, and difficulty in swallowing solids and liquids throughout the same period. He recalled a metallic needle (one used for tailoring) penetrating his right foot while working 7 days prior to presenting to the hospital. He previously sought care from another secondary care hospital, but unfortunately, they did not offer proper wound management.

His medical history prior to the needle penetration was uneventful. He was not known to have any chronic medical illness and was not taking any medications. His history of previous vaccinations was unknown. He works as a tailor.

Upon initial presentation to the Accident and Emergency Department, the patient was conscious, alert, oriented, and maintaining an open airway with a normal breathing pattern. Vitality, he was

tachycardic with a heart rate of 104 beats/min with normal blood pressure and temperature. He was able to follow commands, although there was a language barrier. The respiratory, gastrointestinal, and cardiovascular system examinations were normal and unremarkable. On neurological examination, he had lower limb stiffness without signs of upper limb stiffness. Power examination of the lower limbs was not performed as the patient was complaining of stiffness, but the power of the upper limbs rated 5/5. Reflexes were decreased in the lower limbs and normal in the upper limbs. The patient showed no meningeal signs and had normal pupil and eye movement. The *Spatula Test* was positive.

There was no evidence of wounds on his lower limbs except for a small, clean scar on his right sole.

A diagnosis of tetanus was made at that time in the Emergency Department. The patient was intubated electively once he was diagnosed to avoid risk of respiratory muscle and upper airway spasms with subsequent depression. He was then transferred to the intensive care unit (ICU).

Investigations

The patient's lab reports were normal at admission with the exception of an increase in his creatine kinase level, which gradually decreased during his stay in the ICU. Because of a hospital-acquired respiratory infection (pneumonia), the patient's white cell count fluctuated with antibiotic response.

Radiological investigations included chest X-rays for the diagnosis of tetanus and follow-up X-rays of the chest infection.

Differential diagnosis

Drug-induced dystonias, such as those due to phenothiazines: often produce deviation of the eyes, writhing movements of the head and neck, and an absence of tonic muscular contraction between spasms. Tetanus, however, does not produce eye deviations and the muscles are characteristically tonically contracted between spasms. The administration of anti-cholinergic medications can reverse spasms caused by drug-induced dystonia.

Trismus due to dental infection: the presence of an obvious dental abscess and the lack of progression or superimposed spasms typically make the distinction between the two diseases.

Strychnine poisoning due to ingestion of rat poison: accidental or intentional strychnine poisoning may produce a clinical syndrome similar to tetanus. Blood, urine, and tissue investigations can differentiate between the conditions.

Malignant neuroleptic syndrome: the presence of fever, altered mental status, and recent receipt of an agent, such as antipsychotics, that can induce the syndrome are indications for differentiating this syndrome from tetanus.

Stiff-person syndrome: those patients can have a similar manifestation to tetanus, but the rapid response to benzodiazepines distinguishes the spasms of stiff-person syndrome from those of tetanus.

Treatment

In the ICU, the patient was sedated using Dormicom infusion (Midazolam) and Nimbex infusion (Cisatracurium Besilate). He was started on penicillin G (0.5 million Unit, IV Q4 hourly), flagyl (Metronidazole 500 mg, IV Q8 hourly) at admission, and continued for a total of 14 days. Magnesium sulfate and DVT prophylaxis were added as well. The patient was kept on nasogastric (NGT) feeds after a dietician reviewed the nasogastric tube feeding started after the medical status and gave advice regarding the required calories.

Tetanus immunoglobulin injections were not available at the hospital. They were replaced by an alternative immunoglobulin (IVIG 400 mg/kg/day for 5 days). During the immunoglobulin injection period, propofol (Diprivan) and fentanyl infusions were added because the patient's spasmodic attacks were not controlled. He was continuously tachycardic with episodes of increased blood pressure. Septic workups were repeated many times as the patient intermittently developed fevers, despite being on multiple antibiotics, including meropenem, azithromycin, and colistin. Each septic workup grew different organisms, and the antibiotics were changed according to the sensitivity reports. The patient also received a tetanus vaccination.

Outcome and follow-up

On 11/3/2013, the patient was successfully extubated after 34 days in the ICU. No spasmodic attacks were reported since that time. He was subsequently transferred to a general medical ward to continue general medical care and a course of antibiotics.

The patient was stable without any residual stiffness. He had diffuse muscular wasting throughout his body due to his prolonged intubation and ICU stay. An extensive physiotherapy program was started, and gradually over 10 days, he was able to walk with assistance and was able to take oral feeds by himself after the removal of the NGT.

The patient was discharged on 21/3/2013 in a good general condition, with instructions to continue an outpatient physiotherapy and rehabilitation program.

Discussion

Tetanus is a nervous system disorder characterized by muscle spasm that is caused by the toxin-producing *Clostridium tetani* found in soils. It can present in four clinical patterns: neonatal, cephalic, localized, and generalized patterns. Although tetanus is now rare in the developed world, the disease remains a threat to all unvaccinated people, particularly in developing countries. Because of the nearly universal vaccination of children with tetanus toxoid in developed countries, the incidence of tetanus in these regions has dropped dramatically and steadily since 1940.

A case report from the Mayo Clinic described the case of a 65-year-old woman who presented with persistent hiccups, dyspnea, and pleurisy lasting 3 days that was caused by tetanus from inadequate secondary immunity. She required intubation for progressive trismus and laryngospasm-associated respiratory failure. Infusion of lorazepam did not control her spasms. Refractory spasms and hiccups resolved with fentanyl and cisatracurium therapy. After 3 weeks, the patient was weaned from the ventilator and had a complete recovery [2]. Before 2002, nine cases of tetanus were presented to the Mayo Clinic. Seven of the patients required intubation due to respiratory failure and six were successfully extubated [5]. The patient case described in our study showed a similar resistance to several types of sedations used and continued developing spasms for a time. Fortunately, the patient we described was only intubated as a primary protection to the respiratory system, unlike the Mayo Clinic patient who actually developed respiratory depression. Therefore, early intubation, even with no present risk of airway collapse, could help in early recovery from tetanus and protect a patient from anoxic brain damage secondary to airway collapse.

In a case report from West Virginia (USA), a 73-year-old woman presented with dysphagia 2

weeks after she obtained a superficial laceration while gardening. Within days, jaw spasms and subsequent respiratory compromise necessitated ventilator support that continued for 5 weeks. This shows how devastating the disease progression can be. Populations most at risk in the U.S. include under- or non-immunized elderly and immigrant populations [6]. Therefore, tetanus booster vaccines should be given to these populations, particularly to those at highest risk, such as laborers and gardeners. Along with vaccinations, an awareness about the need to seek medical attention when skin injuries (penetrating and non-penetrating) take place should be advertised.

Singapore, an Eastern Asian country, reported three cases of tetanus during the 1990s. One patient was a local resident who had cephalic tetanus, most likely secondary to otitis media. The other two patients were residents from neighboring Asian countries who both had generalized tetanus. The portal of entry was a puncture wound on the foot in one patient and the ear in another. No portal of entry was identified in the third patient. All three patients required tracheostomy, ventilator support, and intensive care management for periods ranging from 11 to 22 days. One patient died from complications due to a hospital-acquired septicemia infection, and another patient required prolonged rehabilitation [7]. The difficulty of extubation is a major issue faced by all ventilated patients, regardless the cause, particularly with the high risk of ventilator-induced and hospital-acquired infections. Our patient acquired ventilator-acquired pneumonia with strong organisms, including one multi-drug-resistant (MDR) organism. However, the extubation was successful and the rehabilitation process was fast.

Cases of tetanus have been reported in developing countries as well. In Rwanda, four cases were reported in 2009. Two cases involved adults who were inadequately vaccinated and experienced injuries. The other two cases involved neonates. All patients required tracheal intubation and were mechanically ventilated when equipment was available [8]. One of the neonates and one adult died due to disease complications.

Learning points

The differential diagnosis of tetanus is wide and may be confusing. Survival depends on the rapidity of initiation of treatment with antitoxin and proper antibiotics.

High doses of sedatives and muscle relaxants, as well as prolonged mechanical ventilation, are usually necessary and expected in most cases. Intensivists have an important role to play in the management of these patients.

This is a disease that may be largely prevented by adequate immunization.

Targeting high-risk groups will enable primary care physicians to be more involved in providing immunization and, thus, in preventing this disease.

Even if this case is a rare one in the Kingdom of Bahrain, this report was worth reporting as it highlights the mismanagement of the patient when he first presented to another medical center. It also highlights the importance of vaccination and regular booster doses of tetanus toxoids.

Conflicts of interest

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Competing interests: None declared.

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