A Man With Intractable Convulsion

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CASE PRESENTATIONS

A 67-year-old man presented to the emergency room with back and neck pain, trouble swallowing, and trismus. A welding accident 2 months previously left a healed metal burn on his left arm. One week before presentation, he had a closed fracture to his right thumb with subungal hematoma. The hematoma became infected and was treated with drainage, trimethoprim-sulfamethoxazole (Bactrim DS [double strength]), and ciprofloxacin. Three days into treatment, increased right-thumb pain required repeat drainage. Symptoms progressed to back pain, neck stiffness, and dizziness and advanced to trouble swallowing and trismus, which prompted hospital admission.

A welder by trade and a current smoker, he denied alcohol or drug abuse. His medical history included hypertension, idiopathic thrombocytopenia, gastroesophageal reflux disease, lumbar spine surgery, appendectomy, and tonsillectomy. He was allergic to tetanus vaccine, penicillin, and oxymetazoline. His medications included metoprolol succinate (Toprol XL), doxycycline, prednisone, sulfamethoxazole (Bactrim DS [double strength]), and ciprofloxacin. Three days into treatment, increased right-thumb pain required repeat drainage. Symptoms progressed to back pain, neck stiffness, and dizziness and advanced to trouble swallowing and trismus, which prompted hospital admission.

Examination revealed a normal-built man. Temperature was 98.5°F, heart rate 98 beats/min, blood pressure 190/85 mm Hg, and respiratory rate 12 breaths/min. Testing revealed forceful closing of the jaw as from spasm of the masticatory muscles, nuchal rigidity, and increased muscle tone. His left thumb had a few punched holes with white matter underneath the nail (Fig. 1).

Lungs were clear with no wheezing; heart and abdominal examinations were normal. Cranial nerve examination was grossly normal. Strength and light-touch sensation were normal. Reflex of the patella was hyperactive on both sides. A complete blood count revealed platelet at 84 × 10^9/L. The metabolic panel and urinalysis were normal. Computed tomography scans of the neck and lung both did not show abnormalities.

Over the hospital course, progressive shortness of breath, throat tightness, and change in mental status required initiation of mechanical ventilation. Lumbar puncture was normal. He developed rhythmic, tonic muscle contraction muscles and jerky movements (see Supplemental Digital Content, Video, http://links.lww.com/IDCP/A15), but electroencephalogram showed no seizures.

With a provisional diagnosis of tetanus, infectious disease specialist was consulted. Ceftriaxone and metronidazole were started. Tetanus immunoglobulin 1000 U was given intramuscularly, and the case was reported to the Ohio Centers for Disease Control and Prevention. Despite maximal efforts, his tonic muscle contraction was intractable, and his clinical course deteriorated. He continued to have stimulus-enhanced muscle spasms, board-like abdomen, and autonomic instability with alternating tachycardia and bradycardia, along with rhabdomyolysis causing acute kidney injury. On day 8, the patient died.

DISCUSSION

The term tetanos came from Greek, meaning “to stretch.” Tetanus is defined as acute onset of hypertonia and painful muscle spasms without other apparent medical causes. It is caused by Clostridium tetani, an anaerobic, mobile, gram-positive rod with terminal spore. Clostridium tetani produces the hemolytic toxin tetanolysin and neurotoxin tetanospasmin, the latter referred to as tetanus toxin. Through retrograde intraneuronal transport, the toxin reaches presynaptic terminals, blocks the release of -aminobutyric acid), inhibits cleavage of synaptobrevin, and thus causes tonic muscle spasms.1

Clostridium tetani is widespread in human and animal excrement. Spores of C. tetani are ubiquitous in soil and around the human habitation. Tetanus can be introduced into human body through deep puncture wounds where anaerobic bacterial growth is facilitated. Incubation periods range from 3 to 21 days, but averaging 8 days. In the United States, tetanus has an annual incidence 0.10 cases per million between 2001 and 2008, and the incidence of tetanus is declining. Tetanus carries a case-fatality rate of 13.2% overall and 31.3% in high-risk groups.2,3

Four basic forms of tetanus are known: neonatal, local, cephalic, and generalized, with 80% being the generalized form. In adult patients, typical presentation includes nuchal rigidity, apnea, dysphagia, and generalized spasms; with the most characteristic sign of generalized tetanus being lockjaw or trismus. The diagnosis of tetanus is mostly based on clinical manifestations, rather than bacteriologic findings. The organisms can be recovered in only 30% of cases, and positive culture can occur in immunized, healthy people.3 Electromyographic test can show continuous discharge of motor units and shortening or absence of silent interval after action potential. Creatine kinase usually is elevated.

The 3 objectives of management of tetanus are (1) to neutralize unbound tetanospin, (2) to halt the production of toxin, and (3) to provide supportive care. Patient should receive active immunization with tetanus vaccine and passive immunization with tetanus immune globulin (TIG). Passive immunization with TIG does not affect the neuron-bound toxin, but it can neutralize...
in 10 to 14 days.7 Oral tetanus toxoid (TT) can be given at doses of 500 mg every 6 hours intravenously or orally for up to 100 mg/kg in children under 3 months of age.8,9

Antibiotics and elimination of the anaerobic environment with aeration and wound debridement can reduce tetanus toxin. Clostridium tetani is sensitive to β-lactams, macrolides, tetracycline, and metronidazole. Metronidazole is the preferred antimicrobial because of its better penetration in anaerobic tissues; it can be given at doses of 500 mg every 6 hours intravenously or orally for 10 to 14 days.7

Supportive care, including control of muscle spasms and autonomic stability, may be achieved by various ways. It is paramount to protect airway and have the patient rest in a dark, quiet room to minimize sensory stimulations. Benzodiazepines are often preferred drugs because they not only control the rigidity and spasms but also sedate the patients. The neuromuscular-blocking agents, such as vecuronium and pancuronium, are used when benzodiazepines are insufficient. Baclofen, a GABA agonist, can also be used intrathecally to control spasms and reduce the need for tracheal intubation. Other agents such as dantrolene, barbiturates, propofol, and chlorpromazine can also be used.

Complications of tetanus, as in the case with our patient, include autonomic instability and rhabdomyolysis with renal failure.8,9 Excessive catecholamine release can cause hypertension and tachycardia alternating with bradycardia and hypotension. Medications that lead to adrenergic blockade and inhibition of autonomic reactivity are the proper management to achieve control of autonomic function. Magnesium sulfate, which blocks catecholamine release and desensitizes catecholamine receptors, can be used alone or with benzodiazepine. It can be started with an intravenous loading dose 5 g (or 75 mg/kg of body weight), followed by 2 to 3 g/h.10 Other alternatives include labetalol, esmolol, and clonidine. Prolonged contractures and convulsions may result in bone fractures and rhabdomyolysis with renal failure. Adequate fluid resuscitation and early nutritional support are imperative because of high metabolism state from constant muscle contracture.

**SUMMARY**

The diagnosis of tetanus poses a challenge because it is rarely seen now. The diagnosis is made mainly on clinical manifestations. Practitioners should carefully evaluate patients with muscle spasm and include tetanus in the differential diagnoses. Treatment includes active and passive immunizations, antibiotics, wound debridement, antispastic agents, and supportive care. It is paramount to follow the current immunization recommendations to prevent this highly lethal disease.

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**FIGURE 1.** Photograph of the left thumb shows a few punched holes with white matter underneath the nail.