Postoperative tetanus: a case report

Kevin C. Katz, Sharon L. Walmsley

In this report the authors describe a mild case of tetanus. This case reinforces observations from a small number of previous reports that the disease can occur despite tetanus antitoxin levels substantially above reported protective levels. The authors review reasons why this might occur.

Case

A previously healthy 77-year-old woman presented to a community hospital with massive hematemesis. Following transfusion with 13 units of packed red blood cells and 5 units of fresh frozen plasma, she underwent urgent laparotomy, pyloroplasty and oversewing of a bleeding duodenal ulcer. Her postoperative course was uneventful until the eighth postoperative day, when she began to complain of painless trismus. This became apparent when she had difficulty opening her mouth wide enough to put in her dentures. She had not received any neuroleptic drugs nor ingested toxic agents, and the intubation had been nontraumatic. She was transferred to tertiary care with a presumed diagnosis of postoperative tetanus.

The patient had immigrated to Canada from Germany over 20 years before this event. She could not recall the details of her medical care before immigrating, nor could she recall having had a primary vaccination series as a child. She was certain that she had not received any vaccinations since arriving in Canada, and there was no record of tetanus vaccination in her primary care physician's chart. She had no significant medical history, and she was not taking any medication before admission.

On transfer to tertiary care, the patient was alert and oriented. Her blood pressure was 130/76 mm Hg without postural drop, her heart rate was 76 beats/min and regular, her respiratory rate was 16 breaths/min, and her temperature was 36.8°C. Physical examination revealed trismus. The remainder of the findings on neurological examination were unremarkable. No muscular spasms were noted on exposure to loud stimuli, and there was no evidence of autonomic lability such as flushing, diaphoresis or urinary retention. There was no meningismus or cervical lymphadenopathy. The oropharynx was clear. There was no tooth or jaw tenderness, and examination of the temporomandibular joint did not reveal evidence of arthritis or subluxation. The results of cardiopulmonary examinations were unremarkable. The midline abdominal incision had a 5–6 cm indurated, erythematous and somewhat tender area extending from its margin. The incision was closed, and there was no discharge. There were no peritoneal signs and no organomegaly, and bowel sounds were present.

Blood was drawn for investigations including tetanus serology. This was followed by the administration of intramuscular tetanus immune globulin, 500 U, in one arm and tetanus toxoid, 0.5 mL, in the other. The patient was prescribed metronidazole, 500 mg, intravenously every 6 hours, in addition to broad-spectrum antibiotic coverage for the suspected wound infection. A single dose of benztropine was administered to exclude the possibility of a dystonic or extrapyramidal reaction secondary to phenothiazine derivatives, although there was no documentation of such a drug having been administered. The patient was kept in a private room with the lights dimmed.

The tetanus antitoxin level was greater than 2.0 IU/mL (enzyme immunoassay, Medox, Ottawa). Pretransfusion blood serum was not available for testing. Initial blood work, once the patient had been transferred to tertiary care, revealed a hemoglobin level of 86 g/L, a total leukocyte count of 15.4×10^9/L and a neutrophil count of 12.8×10^9/L. The serum sodium, potassium, bicarbonate, chloride, calcium and creatine kinase levels were normal. The serum creatinine level was elevated, at 123

Review

Synthèse

Dr. Katz is a resident in internal medicine, Toronto General Hospital, and Dr. Walmsley is with the Division of Infectious Diseases, Department of Medicine, University Health Network, Toronto General Hospital, Toronto, Ont.

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μmol/L, and the blood urea nitrogen level was 3.2 mmol/L. Tests for serum myoglobin yielded negative results, and blood and urine cultures were negative. Electrocardiography confirmed normal sinus rhythm. A chest radiograph revealed small bilateral pleural effusions. A temporomandibular joint radiograph was normal. A drug screen for strychnine and phenothiazines was not performed, nor was electromyography.

Twelve hours after the patient was transferred to tertiary care the abdominal incision dehisced, and a significant amount of foul-smelling purulent fluid drained out. A CT scan of the abdomen revealed inflammatory changes with multiple foci of gas in the subcutaneous tissue and intraperitoneally in the region of the wound, but no significant fluid collection. The wound was further opened, irrigated and packed. The gram stain from an aerobic swab from the deep portion of the wound revealed moderate polymorphonuclear cells, moderate gram-positive cocci and few gram-positive bacilli. The classic gram-positive "squash-racket" morphology of *Clostridium tetani* was not seen. Cultures were positive for coliforms, coagulase-negative staphylococcus and group C streptococcus. No anaerobic swabs were performed.

The patient remained stable. A 10-day course of metronidazole was completed. The trismus gradually resolved over about 2 weeks. The woman was given the second injection of a primary tetanus vaccination series 4 weeks after presentation, and arrangements were made for the third dose in 4–6 months.

Comments

Tetanus has become rare in the developed world.[1] Immunization policies in North America have led to near eradication of this disease in children and young adults. About 70% of all cases diagnosed in the United States now occur in adults over the age of 50 years.[2,3] Active immunization is remarkably effective and safe but is unfortunately underused in this population.[4] A cross-sectional prevalence study conducted in Toronto revealed that almost 27% of blood donors over the age of 60 years were unsure of their tetanus immunization status, and more than one-third of patients over 50 years did not have protective tetanus antitoxin titres. More than half of the patients older than 50 years who did not know their vaccination histories did not have protective tetanus antitoxin titres, as compared with 16% of those with written documentation of vaccination.[5] Similar rates have been found in other elderly populations.[6] Given these statistics, tetanus has to be highly suspected in the appropriate clinical setting.

Postoperative tetanus has been reported following both elective and emergency surgical procedures, particularly those involving disruption of the lower gastrointestinal tract.[7] Spillage of the intestinal contents of patients with asymptomatic colonization with *C. tetani* leads to seeding of the abdomen and the wound. Subsequent infection can occur with the production of toxin that leads to the clinical manifestations of tetanus. A high index of suspicion is required to make an early diagnosis and institute appropriate management. It is important that primary vaccination status be determined for patients at risk. Prevention is easily achieved with appropriate immunoprophylaxis. Booster vaccination for tetanus is recommended every 10 years. Some authors have argued that tetanus immunoprophylaxis be given to all patients undergoing gastrointestinal surgery.[7] Tetanus immune globulin should at least be considered in emergency cases in which immune status is unknown.

A mild case of tetanus developed in our patient 8 days after laparotomy for massive upper gastrointestinal bleeding. The tetanus antitoxin titre before administration of tetanus immune globulin was more than 20 times higher than "protective levels" reported by the Provincial Health Laboratory in Toronto. Enzyme immunoassay is routinely performed at this laboratory rather than the more cumbersome standard serum toxoid neutralization test for measuring immune response to tetanus. Although there is controversy as to what is considered a protective level of antibodies, the provincial laboratory uses a cut-off of 0.1 IU/mL. The titre was drawn 8 days after multiple transfusions with both packed red blood cells and fresh frozen plasma. We hypothesize that the patient did not have protective immunity against tetanus and that her course was benign as a consequence of passive immunization from the transfusions before surgery. However, because the patient's baseline antitoxin level is unknown, it is possible that tetanus developed despite protective immunity before the transfusions. Prompt diagnosis and institution of appropriate local and immunotherapy probably contributed to her benign course.

Although there may not be an absolute protective level of antibodies, the presence of antibodies substantially reduces the risk of tetanus. However, toxin-neutralizing antibodies can be "overwhelmed" if the burden of toxin is high enough, and clinical tetanus can develop. Berger and colleagues[8] reported clinical tetanus in a brother and sister who had shared heroin. The brother did not have protective antibodies and had a severe case of tetanus requiring mechanical ventilation and neuromuscular blocking agents. In contrast, his sister, who had received a tetanus vaccination 15 years earlier and had a serum antitoxin level of 0.04 IU/mL, had a mild case of local tetanus manifesting as trismus, neck stiffness and difficulty swallowing. The relatively mild clinical course of tetanus in patients who have been previously vaccinated and who have protective antitoxin levels[9,10] has led to the concept of "modified tetanus."[11,12] The severity of the clinical course is likely multifactorial.

Management of tetanus usually requires intensive care and should, therefore, occur at centres that can provide high levels of medical, nursing and ancillary services. Severe cases will require control of the airway and mechanical ventilation, neuromuscular blockade and management of autonomic nervous system dysfunction. Detailed summaries, including time-based protocols, that provide effi-

cient and effective management strategies for generalized tetanus are presented elsewhere.[1,13] Our patient was managed with local wound débridement, muscle relaxants, antibiotics and passive and active immunotherapy. Metronidazole was selected preferentially over penicillin, because the latter can theoretically act synergistically with tetanospasmin (the substance commonly called tetanus toxin) as a centrally acting gamma aminobutyric acid A ($GABA_A$) antagonist. In a single prospective, open, nonrandomized study comparing the efficacy of procaine penicillin (1.5 million U intramuscularly every 8 hours) with that of metronidazole (500 mg orally every 6 hours), the metronidazole group demonstrated significantly less progression of disease, shorter time spent in hospital and better survival.[14] Antitoxin-mediated neutralization of tetanospasmin probably reduces the severity of the disease. Antitoxin and complete active vaccination series should be administered to all patients suspected of having tetanus, even those previously vaccinated. Tetanus itself does not induce immunity to the toxin. Therefore, cases such as ours require full vaccination series. Controversy exists as to the ideal dose of tetanus immune globulin. We administered 500 U intramuscularly based on a retrospective analysis of 545 cases of tetanus.[15] The study noted that 500 U of tetanus immune globulin was as effective as the previously recommended dose of 3000–10 000 U. Others have argued that doses of 3000–6000 U are optimal.[16]

Tetanus is an often severe and fatal disease that is difficult to diagnose. Prevention is of the utmost importance because the vast majority of cases occur in patients who have not had primary vaccination. Our case supports previous reports that tetanus can develop in patients with "protective" antitoxin levels. Given the severe and potentially fatal outcomes in untreated patients, a high index of suspicion should prompt initiation of therapy regardless of the tetanus antitoxin level.

Competing interests: None declared.

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Reprint requests to: *Dr. Sharon L. Walmsley, Division of Infectious Diseases, Toronto General Hospital, Rm EN-G222, 200 Elizabeth St., Toronto ON M5G 2C4; fax 416 595-5826; sharon.walmsley@uhn.on.ca*