

## Tetanus following a Major Thermal Injury

BRIAN W. AMY, M.D., WILLIAM F. McMANUS, M.D., F.A.C.S., AND  
BASIL A. PRUITT, JR., M.D., F.A.C.S.

A case of tetanus in an unimmunized burned patient is presented. This foreign national sustained a 32% total body surface area burn, received inadequate prophylaxis initially, and subsequently developed tetanus 11 days postburn.

The rare occurrence of tetanus in thermally injured patients has been attributed to the superficial nature of most burns, the use of exposure and topical chemotherapy, and the widespread use of immunization. A case of tetanus in an unimmunized foreign national burned patient is presented. This is the first recognized case of tetanus noted in more than 6,500 admissions to this burn center in 33 years.

### CASE REPORT

A 73-year-old woman sustained a 32% total body surface flame burn and 6 days later was transferred to this burn center. The full-thickness burns, which had been treated with gentian violet and occlusive dressings, were grossly infected and malodorous. An immediate wound biopsy contained Gram-positive spore-forming microorganisms and was considered diagnostic of gas gangrene. This prompted subeschar burn wound debridement with mezlocillin sodium and excision of the gangrenous burn wounds shortly after arrival (10). Postoperatively, broad-spectrum systemic antibiotic coverage, ventilator support, and sedation were continued. On the fourth postoperative day, the eleventh postburn day, the patient became less responsive to verbal commands, exhibited trismus, developed generalized muscle twitching which progressed to muscle rigidity, and a diagnosis of tetanus was made. Serum samples for antitetanus titer assay were drawn and then aqueous penicillin and 5,000 units of human tetanus immune globulin were administered. On the thirteenth postburn day, while comatose, rigid, totally ventilator dependent, she had a cardiac arrest and died.

Postmortem, a review of hospital records from her initial admission and information supplied by relatives confirmed the fact that she had never been immunized for tetanus and had received only a booster dose of tetanus toxoid before aeromedical transfer. Her antitetanus titer, drawn before serotherapy at our facility, was subsequently reported to be greater than 0.1 units per milliliter but less than 1.0 units per milliliter (Bacterial Toxins Branch, National Center for Drugs and Biologics, Department of Health and Human Services).

### DISCUSSION

Larkin and Moylan reported that the burn wound is the portal of entry in 2-6% of patients who develop

From the United States Army Institute of Surgical Research, Brooke Army Medical Center, Fort Sam Houston, TX 78234.

The opinions or assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of Defense.

Address for reprints: Medical Library, U.S. Army Institute of Surgical Research, Fort Sam Houston, TX 78234.

tetanus (9). Sherman reported only four tetanus cases in his series of more than 2,000 burn patients (13). An antitetanus titer of 0.01 units/ml is generally considered to be protective, although, as observed in our patient, tetanus has been reported in patients with titers 10 to 20 times higher (1, 7, 8, 14). The mortality of tetanus ranges from 30 to 60% once the clinical symptoms are evident but survival may be improved if human tetanus immune globulin is administered to bind circulating toxin (3-5, 11). The 3,000-6,000 units of human tetanus immune globulin dose should be combined with appropriate antibiotic coverage, burn wound excision, mechanical ventilation, sedation, and supportive measures (2, 6, 12).

Immunologic naiveté must be considered in treating any patient from a developing country and elderly burn patients from any country. In order to provide adequate tetanus prophylaxis, the patient's immunologic status must be accurately determined at the first echelon of medical care.

**DISTRIBUTION STATEMENT A**  
Approved for public release;  
Distribution Unlimited

### REFERENCES

1. Berger, S. A., Cherubin, C. E., Nelson, S., et al.: Tetanus despite pre-existing antitetanus antibody. *J.A.M.A.*, 240: 769-770, 1978.
2. Blake P. F., Feldman R. A., Buchanan T. M., et al.: Serologic therapy of tetanus in the United States, 1965-1971. *J.A.M.A.*, 235: 42-44, 1976.
3. Centers for Disease Control, Public Health Service, U.S. Department of Health and Human Services: General recommendations on immunization. *M.M.W.R.*, 32: 1-17, 1983.
4. Centers for Disease Control, Public Health Service, U.S. Department of Health and Human Services: Recommendation of the Immunization Practices Advisory Committee (ACIP): Diphtheria, tetanus, pertussis: Guidelines for vaccine prophylaxis and other preventive measures. *M.M.W.R.*, 30: 392-396; 401-407, 1981.
5. Committee on Trauma, American College of Surgeons: Poster: Prophylaxis against tetanus in wound management. *American College of Surgeons Spring meeting*, April 1984.
6. Furste, W., Wheeler, W. L.: Tetanus: A team disease. *Curr. Probl. Surg.*, October 1972, p. 3.
7. Goulon, M., Girard, O., Grosbuis, S., et al: Tetanus antitoxin levels in 64 patients with tetanus before serotherapy. *Nouv. Presse. Med.*, 1: 3049-3050, 1972.
8. Lallemand, P. Y., Kaloustian, E., Denamur, E., et al: Tetanus cephalique post-serique. *Nouv. Presse. Med.*, 13: 562, 1984.
9. Larkin, J. M., Moylan, J. A.: Tetanus following a minor burn. *J. Trauma*, 15: 546-548, 1975.
10. McManus, W. F., Goodwin, C. W., Pruitt, B. A., Jr.: Subeschar

85 12 -5 017

- treatment of burn wound infection. *Arch. Surg.*, **118**: 291-294, 1983.
11. Nation, N. S., Pierce, N. F., Adler, S. J., et al: Tetanus: The use of human hyperimmune globulin in treatment. *Calif. Med.*, **98**: 305-307, 1963.
  12. Pruitt, B. A., Jr., McManus, W. F.: Therapy of tetanus. In Conn, H. F. (ed): *Current Therapy*. Philadelphia, Saunders, 1982, pp. 75-78.
  13. Sherman, R.: The prevention and treatment of tetanus in burn patients. *Surg. Clin. No. Amer.*, **50**: 1277-1281, 1970.
  14. Sherman, R. T.: Tetanus after antitoxin prophylaxis: Report of six cases. *Am. J. Surg.*, **108**: 36-40, 1964.

Accession For	
NTIS CRA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	21

