

## Tetanus in Leprosy Patients: Report of Five Cases<sup>1</sup>

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Leprosy causes loss of sensation in limbs in up to 39% of patients (<sup>2</sup>) as well as foot ulcers in 10%–15% (<sup>16</sup>). Since the ulcers harbor abundant aerobic and anaerobic flora, and leprosy patients have a high incidence of injury, it may be expected that leprosy patients would have a high incidence of tetanus. However, many clinicians have observed that tetanus is quite rare in leprosy patients.

In a study of 55 cases of tetanus in Addis Ababa, Ethiopia, four cases (7.3%) occurred in patients with leprosy. An additional case presented after the above survey had been completed.

### CASE REPORTS

**Case 1.** AH is a 35-year-old male diagnosed as having borderline tuberculoid leprosy at age 4 and treated for 3 years. He returned with right ulnar paralysis and leg numbness as well as complete anesthesia of the soles of the feet and partial palmar anesthesia in 1979. The patient worked as a daily laborer and suffered occasional minor wounds. He presented in April 1983 with dysphagia of 5 days duration and inability to open his mouth of 4 days duration, which progressed to upper and lower extremity rigidity. There was no history of trauma. On examination, he had a fever of 38°C, frequent generalized spasms, risus sardonicus, abdominal rigidity, and multiple scratch marks on his palms. No ulcer was present. Tetanus was diagnosed, based on clinical findings, and he was treated with crystalline penicillin, tetanus antitoxin (TAT), and muscle relaxants. He was discharged home after 29 days in the hospital.

**Case 2.** TW is a 24-year-old male who presented at age 7 with 2+ nodules on his face and 3+ nodules on his eyes, nose, and ears along with left ulnar nerve enlargement. His bacterial index (BI) was 4.2; morphological index (MI) was 12%. He was diagnosed as lepromatous leprosy and started on dapsone (DDS). His hands and feet remained uninvolved during follow-up. In September 1985 he presented with backache and generalized body stiffness, followed by the inability to swallow and 3 days of generalized spasms. The patient worked as a daily laborer; there was no history of trauma. On examination, he was afebrile and had generalized and abdominal rigidity with neck stiffness. No ulcer was present. Tetanus was diagnosed. He was treated with penicillin, TAT, and muscle relaxants, and was discharged home improved after 24 days in the hospital.

**Case 3.** AT is a 20-year-old male who presented at age 11 with mottled skin patches on his buttocks and back. He had moist hands, dry feet, and 1+ enlargement of the right cervical and bilateral ulnar nerves. His BI was 3.5; MI was 7.5%. Borderline lepromatous leprosy was diagnosed, and he was started on DDS. In 1981 he presented complaining of 5 days of generalized spasms. Three weeks before he had a nail wound of the left heel. On admission he was febrile with generalized spasms, abdominal rigidity, trismus, and a crusting left leg ulcer. Tetanus was diagnosed. He was treated with penicillin, TAT, and muscle relaxants, and was discharged home improved after 22 days.

**Case 4.** MI is a 50-year-old female who first presented at age 26 in 1963 with multiple, bilateral, hypesthetic lesions on the trunk and thighs. Her BI was negative. Tuberculoid leprosy was diagnosed and she was started on DDS. Over the next decade she had progressive hand and foot injuries and ulcers. She presented in June 1987 with neck stiffness and trismus of 10 days duration. She had received an injection of penicillin at the start of her illness for presumed phar-

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ynngitis. There was no history of trauma. On examination, she was afebrile with generalized body stiffness and the inability to move her neck. Her extremities were very deformed, with no evidence of ulcers. She was treated with TAT and muscle relaxants and was discharged home improved after 19 days.

**Case 5.** HD is a 40-year-old male with a known history of leprosy although records of his leprosy are unavailable. He presented in September 1984 with trismus and generalized rigidity of 3 days duration. There was no history of trauma. He was afebrile and had generalized spasms with abdominal and spinal rigidity. A healed ulcer was present on his right hand. Tetanus was diagnosed. He was treated with TAT and diazepam, and was discharged home recovered after 6 days.

### DISCUSSION

These five cases of tetanus are the first reported in African leprosy patients. In a series of 503 cases of tetanus in adult Nigerians, no patient had leprosy (<sup>1</sup>). Neither is there mention of leprosy in other series of African tetanus cases (<sup>5,7</sup>). Tetanus was found to be much less common among Japanese leprosy patients than the general population (<sup>13</sup>). In 1980, Smith reported on 67 deaths of leprosy patients in Karnataka, India. While 4.98% of deaths in the province were caused by tetanus, no leprosy patient died of tetanus (<sup>15</sup>).

The mechanism which protects leprosy patients from tetanus is unclear. Tetanus protection may be immunologically or non-immunologically mediated. As recently as 1981 it was stated that there is essentially no natural immunity to tetanus (<sup>6</sup>). Some have suggested that peripheral nerve changes with perineural or intraneural fibrosis prevent the spread of tetanus exotoxin along the peripheral nerves of leprosy patients (<sup>17</sup>).

However, several studies have detected significant levels of antibodies in nonimmunized populations. In a study of 200 unimmunized Ethiopian Jews (Falashas) upon arrival in Israel, antitoxin was detected in 197, with 30% having protective levels ( $\geq 0.01$  IU/ml). This was age dependent, with 63% of the over-60 age group having protective levels (<sup>8</sup>). In two groups of un-

immunized Brazilians, 34% of 43 rural adults and 25% of 16 medical students had protective levels of antibodies (<sup>19</sup>). Of 57 unimmunized inhabitants of the Galapagos Islands, the mean antibody titer was 0.015 IU/ml (<sup>18</sup>). Similarly, 40.6% of 662 unimmunized Indians had protective levels of antibodies (<sup>10</sup>).

The immune status of leprosy patients to tetanus has been studied in India. Saha tested 40 unimmunized patients with lepromatous leprosy, 36 unimmunized healthy controls, and 12 normal immunized Indians. It was found that 45% of the leprosy patients, 17% of the controls, and 100% of immunized persons had adequate levels of antibodies (<sup>12</sup>). Singh found that all 35 unimmunized lepromatous leprosy patients with ulcers had detectable antitoxin, with 42.8% having protective levels. In unimmunized controls, 32% had protective immunity (<sup>14</sup>). It has been postulated that naturally acquired antitoxin is the result of chronic clostridial contamination of the small bowel, causing stimulation of the lymphoid system (<sup>3,9,11</sup>).

An additional factor protecting leprosy patients from tetanus may be the bacteriology of their foot ulcers. In 39 Ethiopians with leprosy and plantar ulcers cultured using aerobic and anaerobic techniques, no clostridia were identified (<sup>4</sup>).

Thus, it appears that: a) Significant immunity to tetanus may be found in non-immunized populations, including Ethiopians. b) The immune status of unimmunized leprosy patients to tetanus appears to be higher than that of the general population. c) Clostridia may be rare in the foot ulcers of leprosy patients.

Despite these findings, this report of five cases shows that tetanus can occur in leprosy patients, even in the absence of overt ulcers. Although firm epidemiologic data are lacking, it would appear prudent to give all leprosy patients at least one dose of tetanus toxoid (<sup>3</sup>).

### SUMMARY

It has long been noted that tetanus is rare in leprosy patients. Five cases of tetanus are reported in leprosy patients in Addis Ababa, Ethiopia. Although natural immunity to tetanus occurs and this appears to be higher in leprosy patients than in the general pop-

ulation, it is not completely protective. Further research on the relationship between tetanus and leprosy is indicated. Although firm epidemiologic data are lacking, it is prudent to give leprosy patients at least one dose of tetanus toxoid.

### RESUMEN

Se reportaron 5 casos de tétanos en pacientes con lepra en Addis Ababa, Etiopía. Aunque la inmunidad natural contra el tétanos ocurre y parece ser mayor en los pacientes con lepra que en la población general, no es completamente protectora. Puesto que la vacunación con dosis únicas resulta efectiva, se recomienda que todos los pacientes con lepra reciban una dosis de toxoide tetánico.

### RÉSUMÉ

On a rapporté cinq cas de tétanos chez des malades de la lèpre à Addis Abeba, en Ethiopie. Quoiqu'une immunité naturelle au tétanos existe, et qu'elle semble être plus élevée chez les malades de la lèpre que dans la population générale, cette immunité ne confère pas une protection absolue. Puisque, ainsi qu'on a pu le démontrer, une vaccination à dose unique est efficace, il est recommandé d'administrer à tous les malades de la lèpre une dose de toxoïde tétanique.

### REFERENCES

1. ADEUJA, A. O. G. and OSUNTOKUN, B. O. Tetanus in adult Nigerians, a review of 503 patients. *E. Afr. Med. J.* **48** (1971) 683-691.
2. BRAVO, L. L. and RATARD, R. C. Leprosy disabilities in the New Hebrides. *Lepr. Rev.* **48** (1977) 247-260.
3. DASTUR, F. D., AWATRAMANI, V. P., DIXIT, S. K., D'SA, J. A., COOVERJI, N. D. and ANAND, M. P. Response to single dose of tetanus vaccine in subjects with naturally acquired tetanus antitoxin. *Lancet* **2** (1981) 219-222.
4. GOODWIN, D. S. and WOOD, M. J. Bacteria isolated from plantar ulcers of Ethiopian leprosy patients with antibacterial drug sensitivities of the isolates. *Trans. R. Soc. Trop. Med. Hyg.* **64** (1970) 421-426.
5. HABTE-GABR, E. and MENGISTU, M. Tetanus in Gondar Public Health College Hospital, Ethiopia: a review of 72 cases. *Ethiop. Med. J.* **16** (1978) 53-61.
6. IMMUNIZATION PRACTICES ADVISORY COMMITTEE. Centers for Disease Control. Diphtheria, tetanus, and pertussis. Guidelines for vaccine prophylaxis and other preventive measures. *Ann. Intern. Med.* **95** (1981) 723-728.
7. MASSAWE, A. E. J. Tetanus in Kampala-Uganda, the experience of Mulago Hospital from 1963-68. *E. Afr. Med. J.* **51** (1974) 256-261.
8. MATZKIN, H. and REGEV, S. Naturally acquired immunity to tetanus in an isolated community. *Infect. Immun.* **48** (1985) 267-268.
9. MULLER-SCHOOP, J. W. and GOOD, R. A. Functional studies of Peyer's patches; evidence for their participation in intestinal immune response. *J. Immunol.* **114** (1975) 1757-1760.
10. RAY, S. N., RAY, K., GROVER, S. S., SHARMA, R. S. and SHARMA, S. P. Sero-survey of diphtheria and tetanus antitoxin. *Indian J. Med. Res.* **68** (1978) 901-904.
11. ROTHBERG, R. M., KRAFT, S. C. and MICHALEK, S. M. Systemic immunity after local antigenic stimulation of the lymphoid tissue of the gastrointestinal tract. *J. Immunol.* **111** (1973) 1906-1913.
12. SAHA, K., SHARMA, V. K., SEHGAL, V. N. and AGARWAL, S. K. Natural resistance against tetanus in patients with lepromatous leprosy. *Trans. R. Soc. Trop. Med. Hyg.* **75** (1981) 832-834.
13. SASAKI, N. A discussion of the cause of death in leprosy from a pathologic point of view. In: *Research Activities of the National Institute for Leprosy Research, Special Issue for the 20th Anniversary, July 1975*. Namba, M., ed. Tokyo: National Institute for Leprosy Research, 1977, pp. 83-84.
14. SINGH, M., KUMAR, B., AYAGIRI, A. and KAUR, S. Natural tetanus immunity in lepromatous leprosy patients. *Indian J. Lepr.* **58** (1986) 91-95.
15. SMITH, W. C. S. Tetanus infection in patients with leprosy. *Lepr. India* **52** (1980) 536-539.
16. SRINIVASAN, H. Plantar ulcers. In: *A Window on Leprosy*. Chatterjee, B. R., ed. Wardha: Gandhi Memorial Leprosy Foundation, 1978, pp. 133-142.
17. SRINIVASAN, H. and DHARMENDRA. *Leprosy, Volume 1*. Bombay: Kothari Publishing House, 1978, p. 232.
18. VERONESI, R., BIZZINI, B., FOCACCIA, R., COSCINA, A. L., MAZZA, C. C., FOCACCIA, M. T., CARRARO, F. and HONNINGMAN, M. N. Naturally acquired antibodies to tetanus toxin in humans and animals from Galapagos Islands. *J. Infect. Dis.* **147** (1983) 308-311.
19. VERONESI, R., CECIN, H., CORREA, A., TAVARES, J., MORALES, C. and BERTOLDO, O. J. New concepts in tetanus immunization: naturally acquired immunity. *J. Hyg. Epidemiol. Microbiol. Immunol.* **19** (1975) 126-134.