

Tetanus immunisation in the elderly population

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Abstract

Objective—To emphasise that tetanus still occurs in the United Kingdom, particularly in elderly people — as illustrated by two case reports — and to examine the state of tetanus immunity in elderly people.

Methods—111 elderly people (over 65 years) were studied: 43 males, mean age 77.7 years, range 67–94; 68 females, mean age 81.3 years, range 67–95. They were either attending the accident service or were hospital inpatients. An attempt was made to obtain an immunisation history and anti-tetanus antibody titres were measured.

Results—Immunisation history was uncertain and unreliable. Measurement of antibody titres showed that they were inadequate to ensure protection in 50% of those studied. Low levels were particularly prevalent in the over 80 age group and in females. Questioning about military service confirmed that this had predominantly involved males.

Conclusions—Elderly people are at risk of contracting tetanus and should be targeted for community immunisation. Extra precautions in the form of passive immunisation with human anti-tetanus immunoglobulin should be used in this age group in addition to the usual wound management measures when the elderly sustain tetanus prone injuries.

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Key terms: tetanus; tetanus immunisation; elderly

Tetanus remains an uncommon disease in the United Kingdom and over the last 10 years the number of cases recorded in East Anglia was 23, of whom 13 were older than 65 years.¹ During the five year period from 1984 to 1988 inclusive the number of deaths in England and Wales was 20,² with the majority (12) being over the age of 65. This contrasts with the situation in developing countries where neonatal tetanus remains as a major cause of neonatal and maternal mortality. We illustrate the problem with two case histories.

CASE 1

A woman of 82 years of age was admitted as an emergency having sustained a laceration to the right shin while gardening. This was treated with a split skin graft the day after the original injury but the graft was noted to have failed a week later. At that time she became confused, sustained a fall, and two days later complained of pain in the neck and jaw and was found to

have difficulty opening her mouth. Wound culture subsequently grew *clostridium* species but meanwhile a clinical diagnosis of tetanus was made and treatment begun with intravenous benzyl penicillin and metronidazole, together with intramuscular human anti-tetanus immunoglobulin. Two days later she developed respiratory distress, cyanosis, and opisthotonos requiring urgent tracheotomy. She remained on ITU with continuing spasms for seven weeks, after which she recovered sufficiently to return to the ward, and she was subsequently discharged.

CASE 2

A woman of 86 was admitted as an emergency with trismus and dysphagia five days after cutting her arm while gardening. She was found to have risus sardonicus and neck stiffness, and a diagnosis of tetanus was made. She was treated with intravenous benzyl penicillin, intramuscular immunoglobulin, and tetanus toxoid. She deteriorated and developed aphagia and dyspnoea requiring tracheotomy, and was transferred to ITU where she developed *staphylococcus aureus* septicaemia and died one month after her admission.

A minimum estimate of the numbers of people at risk can be gauged from the numbers of patients with wounds, abrasions, burns, and open fractures seen in the Accident and Emergency (A&E) department. In a six month period in our department 289 such patients over the age of 65 were seen (121 male and 168 female). In younger age groups the incidence of such injuries was higher and males predominated: 2562 males and 1005 females attended with tetanus-prone injuries during the same period. Because of existing immunisation programmes, however, younger patients are likely to have received immunisation before their injuries.

Methods

Approval was given by the ethics committee for blood to be taken from consenting patients.

The survey was undertaken to investigate the level of immunity of elderly persons using the enzyme linked immunosorbent assay (ELISA) technique.³ The population sampled consisted of patients over the age of 65 years either attending the accident service or admitted to the department of medicine for the elderly. The number studied was 111, comprising 43 males of mean age 77.7 (range 67 to 94) and 68 females, mean age 81.3 (range 67–95); 62 of the subjects were questioned concerning previous tetanus immunisation and military service.

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Antitetanus antibody titres

| | Total | Protective > 0.1 IU/ml | | Borderline 0.01–0.1 IU/ml | | Unprotected < 0.01 IU/ml | |
|--------------------|-------|---------------------------|----|------------------------------|----|-----------------------------|----|
| | | Number | % | Number | % | Number | % |
| Males > 80 years | 22 | 6 | 27 | 12 | 56 | 4 | 18 |
| Males < 80 years | 21 | 15 | 71 | 5 | 24 | 1 | 5 |
| Females > 80 years | 41 | 11 | 27 | 23 | 56 | 7 | 17 |
| Females < 80 years | 40 | 8 | 29 | 16 | 59 | 3 | 11 |
| All | 111 | 40 | 36 | 56 | 50 | 15 | 14 |

Results

There is no clear cut distinction between what is and what is not a protective level of antibody but clearly the higher the level of antibody the greater the degree of protection. It is usual to regard titres of 0.01 IU/ml as the lowest protective concentration⁴ but clinical tetanus has been described with much higher titres^{5, 6} and 0.1 IU/ml has been recommended as a safer protective level.⁷ Other workers have suggested a threshold level of 0.05 IU/ml.⁸ We have therefore divided our results as follows (see the table):

Protective > 0.1 IU/ml

Borderline 0.01–0.1 IU/ml

Unprotected < 0.01 IU/ml

Thirty six per cent of the subjects surveyed showed protective levels of antibody, whereas 50% were borderline, and 14% were clearly unprotected. These results are further categorised by age and sex in the table. Fourteen of those with antibody levels below 0.1 IU/ml gave a positive history of previous immunisation and of these four had levels below 0.01 IU/ml. Ten subjects who stated that they had never received immunisation had titres above 0.1 IU/ml.

MILITARY SERVICE

Four women gave a history of military service during the second world war. All four were under 80 years of age. Three had protective antibody levels and the fourth was borderline.

Fifteen men gave a history of military service. Ten of these were under 80 and five over 80 years of age. Of these ex-military men, 10 were protected, four had borderline levels, and one was clearly unprotected. These were not distributed according to age group.

These findings were compatible with our suggestion that men called up after 1939 are likely to have had some immunisation during their military service. However, the small numbers involved in this study make it impossible to show that the higher levels of immunity in the group who had served in the military were not due to chance.

Older men are less likely to have benefited from the widespread use of immunisation in the forces from 1940 onwards. Women, being less likely to have served in the military, have missed this opportunity for immunisation and, as mass population programmes had yet to be initiated in their youth, remain vulnerable to tetanus.

Discussion

Our study suggests that the patient's recall of previous immunisation is not always reliable, and this has been shown before.⁹ It has also been suggested that levels of immunity wane in the elderly.^{10, 11} This may provide an alternative explanation for the patients with low antibody levels in spite of a history of previous immunisation or military service.

The World Health Organisation has a stated aim of eliminating clinical tetanus by the year 2000.¹² This seems optimistic in the light of existing information concerning levels of immunity, and the common presence of spores in the soil. Using the same ELISA technique to assess levels of immunity 45% of patients of 65 years or more attending an accident department in Toronto were found to have levels below 0.01 IU/ml. If this is the state of immunisation in developed countries such as the United Kingdom and Canada then the prospects are bleak in developing countries, where poor basic hygiene together with lack of immunisation and basic medical care contribute to one million deaths from tetanus worldwide per year. It is clear that even in this country, while tetanus remains uncommon, it can still easily be contracted through seemingly trivial injuries sustained during such activities as gardening, a popular pastime in the elderly (at risk) population. It is a distressing illness which is always severe and frequently fatal (especially in the elderly people in whom it is most prevalent), and treatment is prolonged and expensive. It is entirely preventable by immunisation, and severe adverse effects of immunisation are rare.¹² However, as the two cases we experienced show, it is not currently being adequately prevented.^{13, 14}

In view of our findings we strongly recommend that all health care workers involved with elderly people take every opportunity to offer immunisation against tetanus to this vulnerable group.

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