EDITORIAL

TETANUS IMMUNISATION IN THE BRITISH ARMY

The Armed Services have played an important role in the development of prophylactic immunisation against tetanus. Passive immunisation using tetanus antitoxin produced in horses was introduced on a large scale in the war of 1914-18 as a part of the prophylactic treatment of all lacerated wounds, reducing the incidence of, and mortality from tetanus. However, although prophylactic antitoxin accomplished much, it did not provide absolute protection and there were disadvantages.

In 1924 Descombey reported the preparation of a tetanus toxoid, and in 1927 Ramon and Zoeller demonstrated that this toxoid stimulated active immunity in man. In collaboration with Wellcome Research Laboratories, Boyd, at the Royal Army Medical College, confirmed the discovery and determined an optimal two-dose regimen. Consequently, active immunisation against tetanus was introduced as official policy of the British Army in 1938, although acceptance was voluntary. Significant evidence for the efficacy of tetanus vaccine was provided by wounded vaccinees in the war of 1939-45, although passive immunisation also was used for wound prophylaxis. An annual reinforcing dose of toxoid was introduced in November 1942. Active immunisation was discontinued in 1945 only to be resumed in 1949. Current tetanus prophylaxis originates from the comprehensive studies by Sachs in which emphasis was laid on active rather than passive immunisation.

A combined vaccine against Typhoid, Paratyphoid A and B, and Tetanus (TABT) was first described by Ramon and Zoeller; the tetanus antitoxin response being found to be greater to toxoid in combination than to toxoid alone. This enhanced response was confirmed later by Maclean and Holt during vaccination of hospital staff in 1940. The RAF introduced a phenolised TABT vaccine in 1949, and this was adopted by the Army in 1953. TABT, manufactured by the David Bruce Laboratories (DBL), has been in general use since 1959 for both primary intradermal immunisation and 3-yearly reinforcement of Service personnel. The clinical protection effected by this vaccine appears to be excellent and the incidence of general and local reaction has been remarkably low.

The success of tetanus prophylaxis in the Armed Forces had repercussions in civilian practice, and active immunisation was introduced into the UK as part of primary immunisation of infants in 1961 and for universal use in the treatment of wounds in 1970. Tetanus has been virtually eliminated from the child population in Britain, but some elderly adults remain at risk.

In 1988, the production at DBL of vaccines for Tri-Services use: TABT, TAB (without Tetanus) Plague and Cholera, was discontinued. However, this year sees the adoption of Adsorbed Tetanus Vaccine BP, Typhoid Vaccine BP (monovalent) and Cholera Vaccine BP among the radical changes occurring in Service immunisation policy. Adsorbed Tetanus Vaccine BP is fundamentally different from TABT: the toxoid content is seven-times greater, it is adsorbed on to aluminium hydroxide, it is routinely inoculated intramuscularly and ordinarily should not be given more often than once every ten years.

Faithfull-Davies et al., (this issue) have provided serological evidence that during 30 years of use, TABT has maintained a protective level of tetanus antitoxin in the blood of Service personnel of all ages. Similarly, all individuals tested had protective levels of antitoxin at entry. These levels are commensurate with age-related antitoxin titres defined in recent UK studies.

The prophylactic efficacy of a completed primary course of tetanus toxoid is established, with evidence that adsorbed toxoid produces higher and more prolonged antitoxin titres than plain toxoid. After primary immunisation, serum antitoxin levels decline continuously. However, immunological recall can occur up to 30 years after primary vaccination; one reinforcing dose of adsorbed toxoid being sufficient to induce long lasting protective levels of antitoxin.

Recent studies have indicated that the greater the interval between primary and re-vaccination, the slower is the rise in antitoxin level; this finding has been proposed as one explanation for the development of tetanus after trauma in previously vaccinated individuals. These observations emphasise the need for re-vaccination in order to maintain solid immunity in the later life of each individual.

The recommendations for re-vaccination regimens vary between countries, are often complicated and dosage intervals range from 5-20 years. In the UK, routine re-vaccination is recommended on entering and leaving school and 10 yearly thereafter, with special indications for tetanus-prone wounds.

However, no wound should be considered free from potential infection with Clostridium tetani. The majority of tetanus cases follow minor wounds, to the extremities associated with agricultural injury or sport. Because of the trivial nature of these wounds many patients do not seek medical attention. Hence tetanus cannot be totally eliminated even by correctly administered prophylaxis after injury. Service personnel are at increased occupational risk of infection. New recruits, particularly those in field units, often sustain minor wounds.
injuries during training and sport, after which tetanus re-vaccination is frequently given. When formulating a tetanus vaccination policy the risks of hyper-immunisation must be considered. Excessive frequency of tetanus re-vaccination incurs unnecessary expense and has produced antitoxin levels of more than 40 times that required for protection. Such high levels are associated with adverse reactions. These are mostly local and delayed, but rarely severe reaction including anaphylactic shock may occur. Therefore adoption of the present Service tetanus policy for Adsorbed Tetanus Toxoid BP could result in unacceptable numbers of adverse reactions and so may prejudice acceptance of tetanus immunisation by serving personnel.

Under the current UK tetanus vaccination policy recruits should have received at least a complete primary course, with re-vaccination on entering and leaving school. The probability that they will all possess serum antitoxin levels above the accepted minimal protective level (Faithfull-Davies et al) indicates that a single dose of toxoid on entry will be sufficient to maintain protection (Strategy 2).

It is intended to extend this study to determine antitoxin levels on entry for a further 1000 recruits (Strategy 3). Thereafter, it is proposed that both immune new recruits and serving personnel will convert to a routine reinforcing dose every 5 years, until 35 years of age. After this, re-vaccination will be undertaken every 10 years. This regimen obviates the need to depend upon emergency boosters after trauma because of uncertainty regarding the immune status of the individual. An integral part of this new policy will be the notification of adverse reactions after re-vaccination, and accurate recording of immunisation history so that unnecessary re-vaccination may be avoided.

The pervasive tetanus bacillus is, and will remain, ineluctable but the eradication of the terrifying disease that it causes requires nothing more than the conscientious application of the methods of immunoprophylaxis that have long been to hand.

REFERENCES

ERRATUM
The National Confidential Enquiry into Perioperative Deaths (NCEPOD) commenced on 1st January 1989 and not 1988 as stated in the last issue. (Editorial J R Army Med Corps 1989; 135 2: 41.)

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