NOTES ON PREVENTION OF TETANUS IN INJURED PERSONS

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The need for these notes was brought home to us by several requests for guidance from surgeons, casualty officers, and others. We do not consider the decision concerning which injuries require tetanus prevention falls within the scope of this paper,* but when, after clinical assessment of the injury, it has been decided that there is a risk of tetanus infection and that suitable preventive measures should therefore be taken, it is suggested that the following procedures should be adopted.

Suggested Procedures

Determination of Immunity Status.—Inquiry should be made into the possibility of previous tetanus toxoid administration, in order to determine whether the patient is non-immune or actively immune. (A difficulty may arise in taking the patient's history, as he may confuse previous injections of serum or various prophylactics with injections of tetanus toxoid.)

Definitions.—The following definitions are derived from those used in British Army practice. A person is considered to be:

Non-immune (this category includes those who may be incompletely immunized) (a) when he/she has never received any injection of tetanus toxoid; (b) when he/she has received only one injection of tetanus toxoid; (c) when more than six months have elapsed after two injections of tetanus toxoid, or when more than five years have elapsed after the initial course of three injections of tetanus toxoid or a subsequent boosting (reinforcing) dose; (d) where there is any doubt about previous tetanus toxoid administration.

Actively immune (a) for a period up to six months when he/she has received two injections of tetanus toxoid, the second injection being given not less than six weeks and not more than twelve weeks after the first injection; (b) for a period up to five years when he/she has received three injections of tetanus toxoid, the third injection being

*The following summary of the types of injuries which require specific preventive measures against tetanus is quoted by kind permission of Mr. W. Gissane, F.R.C.S., and Dr. E. J. L. Lowbury, of the Birmingham Accident Hospital:

Tetanus antitoxin should not be given as a blind routine for all open wounds. Reactions are not uncommon, and may, though rarely, be fatal. Prophylactic injections against tetanus need not be given in the case of clean superficial wounds or abrasions not more than three to four hours old. Physical removal of any organisms by gentle or thorough washing for three to four minutes may be relied upon. Subsequent contamination must be prevented by a good cover dressing with or without closure by suture or grafting.

Prophylactic injection of either tetanus antitoxin or tetanus toxoid, according to the patient's state of immunity, is indicated in the following cases: (1) wounds more than three to four hours old; (2) wounds already infected by pyogenic organisms; (3) wounds through skin that may have been contaminated by soil or manure—for example, wounds in farmers, stablemen, agricultural labourers, sewage workers, gardeners, garage mechanics, football players, etc., and most children; (4) deep and punctured wounds, however small; (5) wounds in which the tissues have been devitalized by the force of the injury—for example, hand-press injuries; and (6) wounds that cannot be closed properly and may therefore be infected later.

given not less than six months and not more than twelve months after the second injection mentioned above; (c) for a period up to five years after he/she has received a boosting dose following a full primary course of immunization.

Preventive Measures Recommended

Non-immune (as defined above).—Passive immunization with tetanus antitoxin will be required. Keep a small sterile syringe and needle and a 1:1,000 solution of adrenaline ready for emergency use whenever antitoxin is injected. Keep the patient warm and under observation for at least 30 minutes after receiving antitoxin by any route.

Give tetanus antitoxin in accordance with the following procedure:

(1) Try to obtain the patient's previous history of: (a) injections of horse serum of any kind, and (b) allergic conditions, especially asthma and infantile eczema.

(2) If no previous serum and no history of allergy, give full dose of tetanus antitoxin, 1,500 international units subcutaneously or intramuscularly. If there are any doubts about previous injections of serum or allergic diathesis, proceed as in (3).

(3) If the patient has had serum before, but has no history of allergy, give a "trial dose" of 0.2 ml. of undiluted antitoxin subcutaneously. If no general symptoms develop within 30 minutes, give a full dose of tetanus antitoxin, 1,500 international units, subcutaneously or intramuscularly.

(4) If history of allergy, give a trial dose of 0.2 ml. of 1:10 dilution of antitoxin subcutaneously. If no general reaction within 30 minutes, give 0.2 ml. of undiluted antitoxin subcutaneously. If no general reaction within a further 30 minutes, give full dose of tetanus antitoxin, 1,500 international units subcutaneously or intramuscularly. The object of the trial dose is to determine any predisposition to general reaction and not to detect any local reaction, the latter having no practical significance. If symptoms develop, see "Types of Reactions which may follow Administration of Antitoxin, and their Treatment" and "Antitoxin after Anaphylaxis," below.

(5) Additional prophylactic doses (usually 1,500 international units), subcutaneously or intramuscularly, may be given at weekly intervals if the surgeon in charge of the case considers this necessary.

(6) Whenever antitoxin has been given, recommend toxoid later—see "Active Immunization," below.

Actively Immune.—Tetanus antitoxin will not be required. Give a boosting dose of 1 ml. of tetanus toxoid (unless the third dose of the primary course or a boosting dose has been given less than 18 months previously, when even a boosting dose is unnecessary).

Children in both non-immune and actively immune groups should be given the same dosage of antitoxin or toxoid as adults.

Records

Keep careful records of all injections (antitoxin, toxoid, etc.) noting: the dates of inoculation; the correct name of the preparations; the batch numbers; the dosage administered; and reactions, if any (local, general, etc.).

Give a record card to the patient or parent, and ask him/her to keep it in a safe place, as in the event of injury it will be required as soon as possible by either the hospital or the private doctor.

Types of Reaction which may follow Administration of Antitoxin, and their Treatment

Anaphylactic Shock.—Onset within few minutes, or, with less intensity, up to two hours. Dyspnoea, pallor, collapse; sometimes oedema or rash. **Treatment.**—Give 0.5 to 1 ml. of 1:1,000 solution of adrenaline intramuscularly. If recovery is not rapid, repeat the injection in 15 to 20 minutes. Give an antihistamine drug in full doses intramuscularly: specially useful if urticaria or oedema develops. Keep the patient recumbent with the head low, and warmed with blankets and hot-water bottles. Recovery from anaphylactic shock is usually rapid after adrenaline. Very rarely, the return of the blood pressure to normal is delayed for some hours; in these cases give a slow intravenous

drip of diluted noradrenaline, blood-pressure readings being taken frequently in order to avoid an unduly elevated pressure.

Serum Sickness.—Common ("delayed") type after 7 to 12 days; "accelerated" type after three to four days (typically seen in persons who have had a previous serum injection). Urticaria and other rashes, oedema of the tissues, joint pains, and pyrexia. **Treatment.**—Give an antihistamine drug by mouth for one to three days. In more serious cases, antihistamine drug, by injection; soothing lotions such as calamine to the skin. In rare cases of severe serum sickness, when symptoms reappear in spite of antihistamine drugs, give prednisolone, orally in doses of 5 mg. six-hourly or eight-hourly for one or two days; discontinue the drug gradually over the next two days. While this treatment will be found successful, bear in mind the dangers of prednisolone in the presence of peptic ulcer, diabetes, tuberculosis, and any uncontrolled infection.

Local Reaction without Constitutional Disturbance.—Often after 7 to 10 days, lasting two days. Localized erythema and urticaria; may be very irritating but never dangerous. **Treatment.**—Give an antihistamine drug orally; soothing lotions to the skin.

Local Hypersensitivity Analogous to the Arthus Phenomenon.—Swelling and induration, leading to sloughing of skin, subcutaneous tissues, and even muscle. Very rare. May appear after repeated injections of serum. The administration of serum should be avoided so far as possible while the patient is already suffering from serum sickness due to a previous injection.

Thermal Reaction.—Sudden pyrexia and severe chill, mostly after intravenous injections. Rare. **Treatment.**—Give adrenaline as above. Keep the patient warm.

Antitoxin after Anaphylaxis

Wait till blood pressure is normal and rashes (if any) have subsided. (This takes between 6 and 12 hours.)

Repeat the "trial dose" of 0.2 ml. of undiluted tetanus antitoxin subcutaneously. If no general reaction occurs after 30 minutes, give a full dose subcutaneously or intramuscularly.

The recurrence of anaphylactic shock is extremely rare, but the patient may develop so-called accelerated serum sickness.

Supplementary Notes

Active Immunization.—There is now general agreement that the ideal method for the prevention of tetanus is by active immunization. Patients who have been given tetanus antitoxin as a matter of urgency should be actively immunized afterwards. Some of them may have become sensitized to serum, with the result that if they are given antitoxin again at some future date they may eliminate it too rapidly for protection to be adequate. Active immunization may be achieved by either (a) inviting the patient to return to the hospital in six or eight weeks for active immunization with tetanus toxoid; or (b), when making a report on the case to the usual medical attendant, recommending that a full course of active immunization should be commenced six to eight weeks later. For primary immunization three 1-ml. doses of tetanus toxoid are injected subcutaneously or intramuscularly at intervals of 6 to 12 weeks between the first and second injections and 6 to 12 months between the second and third injections. A boosting dose of 1 ml. of toxoid needs to be given every five years to maintain immunity. As active immunization against tetanus is not yet undertaken routinely by either the general practitioner or the local public health authority, those hospitals which receive a large number of casualties with injuries of a type likely to develop tetanus may find it convenient to set up a monthly immunization clinic for implementing the above recommendations.

Routine Immunization of Allergic Subjects.—In our opinion known asthmatic and other allergic subjects should

always be actively immunized as a routine against both tetanus and diphtheria in order that injections of antitoxin for prophylaxis or treatment at a later date may be avoided.

Intravenous Injections of Antitoxin.—Intravenous injections of tetanus antitoxin are not necessary for prophylaxis: they are required only for the treatment of tetanus. The intravenous route should never be used unless an intramuscular injection (if necessary preceded by a trial dose), given at least half an hour before, has been tolerated. The antitoxin should be at room temperature, and the patient recumbent and kept warm. Everything should be in readiness for the treatment of anaphylactic shock. Intravenous injection should be given very slowly. The patient should be kept under observation for at least one hour afterwards.

Conclusion

The above notes and recommendations have been drafted in an attempt to assist all who are called upon to treat wounds which may be infected with *Clostridium tetani*. It is hoped that the recommendations made would facilitate the drawing up of a concise guide to procedure, as, for example, the preparation of a wall chart.

We would welcome criticism of our suggestions and an expression of the views of the many different categories of the doctors concerned.

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COLLECTIVE NEUROSES OF OUR DAY

A distinguished Viennese psychiatrist, Professor V. FRANKL, addressed the Austrian Institute in London on February 21 on "Collective Neuroses of the Present Day." Professor Frankl is head of the Neurological Polyclinic at Vienna. Professor E. STENGEL, of Sheffield University, presided, and he introduced Professor Frankl as one of the most productive of living psychiatrists. He had developed his theories, said Professor Stengel, not just from his armchair, but in the hard school of life. During the years Professor Frankl had spent in concentration camps he had had ample opportunity to observe both himself and others under conditions of extreme stress.

Contemporary Man and His Sickness

"Am I expected to give the opinion of psychiatrists on contemporary man?" asked Professor Frankl of his audience. They might well be tempted to think so, he said, if they had come across a book entitled *The Nervous Condition and Diseases of our Time*, particularly as the date was '53; but the full date was 1853, not 1953, and the nervous condition was not exactly a contemporary disease.

Neurosis had by no means increased in frequency during the last decade. All that had changed were the symptoms. But it was surprising to find that anxiety had decreased in prominence, although it could be said, not altogether untruthfully, that anxiety was at the root of the diseases of our time. What gave rise to the impression that neurosis had increased was that, thanks to the growth of psychotherapy, some of those who would do far better to see a priest—as in former days they would have done—now went to the psychiatrists. To-day they refused to go to the priest and the doctor was forced to become a medical minister.