TETANUS TOXOID VACCINATION

by Kris Gaublomme, MD[1]

THE DISEASE

Tetanus as a clinical entity is linked to a bacteria, Clostridium tetani. Obviously, the germ is not as malicious as one may think because it lives as a harmless commensal in the animal and human intestinal tract (1). It is not the very presence of the bacteria which causes the trouble, but the toxins that are produced by the bacteria under anaerobic conditions, that is, where the bacteria operates in an environment free of oxygen. These toxins can be spread through the blood vessels and finally affect the nervous system causing tetanic muscle contraction and pain. The condition is extremely painful and potentially lethal.

Tetanus morbidity is very low in industrial countries. In the USA, for example, there are only about 50 cases a year (2); in Germany, 17 (3).

Mortality figures range between 33% (4) and 20% (2). The incidence is higher in tropical countries and under poor hygienic conditions. Mortality is 135 times higher in developing countries compared to developed countries. In those countries, tetanus in newborns plays a very important rote. Most of those cases are caused by using dirty, rusty scissors when cutting the umbilical string of the newborn.

THE VACCINE

1. Efficacy

Prophylaxis against tetanus raises serious theoretical and, above all, practical questions, since the disease itself is known not to induce immunity. It the disease cannot induce protection, how can a vaccine?

Antibody levels do not rise until 4 days after vaccination (5), so vaccination at the time of injury is of no use.

Paseen writes: "There is no absolute or universal protective level of antibody... The level of neutralizing antibody in humans currently considered protective, 0.01 antitoxin unit/ml, is based on animal studies that correlated levels with symptoms or death" (5). This figure was proposed by Sneath in 1937, and subsequently accepted by most investigators. But not everybody agreed. "Ipsen found that there is a distinct but specific relationship to toxin challenge in each species. Experimental human data are extremely limited and insufficient for analysis."

Viera et al confirm this: 'This minimal protective level is an arbitrary one and *is not a guarantee of security for the individual patient" (*6).

The advantage of routine vaccination can be questioned based on the data given by Peebles (7). Although the author supports a 4-dose primary vaccination schedule,

[1] The author is a Belgian medical doctor who has studied the effects of immunization for many years. He edits the *International Vaccination Newsletter*.

the simple facts he offers should make us reflect: He bases his analysis upon the 235 cases reported in the USA in 1966. 34 of these cases occurred in infancy, "and presumably most of these were neonatal and could not have been prevented by immunization of the individual child." Peebles further calculates the annual' risk of acquiring tetanus at I per 300,000 in unimmunised people. Crossing the street while going to work obviously is more life-threatening than that.

Cunningham, ironically, writes that "there is *nothing unusual* about this moderate titre, obtained approximately three months after the second of two injections of tetanus toxoid separated by six weeks" (8). If he says so... Edsall, in 1959, already mentioned vaccine failure (9). During the Second World War, five U.S. soldiers died from tetanus; one of them was fully immunised, the others partly. Also among the survivors of tetanus infection, 50% were fully immunised, and part of the other 50% were partly immunised (10 p156).

During that same war, the British Army counted 22 tetanus cases, and half of them died; all of the deaths were partly immunised (10). The drop in tetanus cases between 1950-1974 from 2.5 to 0.1 cases/100 000 population is not only a result of vaccination; mechanisation of farming and other changes in living habits also played a major role (10).

In 1968, the National Communicable Disease Center, USA, mentions a case of tetanus in a fully immunised person (11). Antibodies were below the 'protective' level in a patient after three doses of DPT, as discovered by Peebles (7).

Goulon (1972) saw tetanus occurring in 10 out of 64 "immunised" patients (12), Berger (1978) made observations about tetanus in well-vaccinated patients (13). Passen & Andersen (1986) relate a case in a 35-year-old man who developed tetanus despite the fact that he was found to have a neutralising antibody level 16 times that considered protective (5). He was fully vaccinated in childhood and had had boosters up to 4 years before the accident.

Also In 1986, Vieira and colleagues describe tetanus of the facial muscles in an 18-year-old man, fully immunised, with a booster being administered six years previously (6). Also, Vieira mentions that two out of three other cases that came to his hospital were partially vaccinated, meaning that 3 out of 4 cases were vaccinated! Crone and Reder (1992) (2) describe three patients with severe tetanus despite high titres of antibodies. In one patient the disease was even fatal. Two of them had received the vaccination one year before the disease occurred. One of them had been deliberately hyperimmunised to produce commercial tetanus immune globulin! With one of the patients, the mouse test was negative despite positive serum antibodies, implying that immunity to tetanus toxoid (in the vaccine) was not parallelled by immunity to tetanus neurotoxin (produced during the disease). This raises another important question about the capability of the vaccine to produce immunity against the disease. 'Sufficient' antibody titres are not synonymous with a guarantee for clinical protection.

II. Safety

"Infections and intoxications due to mistakes in the production of the vaccine have played a role since the beginning of its development. Due to technical failure, particles of tetanus remained in the vaccine fluid causing illness and death. ... The

use of certain soils makes it possible that the concentration of formaldein is insufficient, so that un-detoxified toxoid remains. (10 p157)." McComb describes how "In the National Guard, for example, present regulations require a booster dose against tetanus every three years, and, as a consequence, some of the older members often suffer severe and sometimes temporarily incapacitating reactions to conventional doses of tetanus toxoid."(14).

4% of complications end with the death of the patient, 6% cause permanent damage (10 p163). Side-effects occur after boosters as well as after primary vaccination (10 p164).

GENERAL REACTIONS

These may not be as rare as usually assumed. Sisk (15) described 4 general reactions with 1 fatal outcome in 500 DT vaccinations.

Fever is not a normal reaction (10 p161, 3).

General weakness in a man who was hyperimmunised (14).

Immune suppression

A very spectacular observation was made by Eibi et al in 1984 (16).

In order to study the effect of vaccination on the T-lymphocyte helper/suppressor ratio, 11 healthy persons were given a tetanus booster shot. A significant decrease in the T4/T8 ratio was observed. In 4 of the patients the ratio even fell temporarily to 1 or lower. This is a situation often observed in AIDS-patients or in persons at risk for the condition!

Allergy.

Allergic reactions after tetanus vaccination occur due to hypersensitivity to any of the components of the vaccine. We do not have to consider the tetanus toxoid only, but also additives such as aluminium hydroxide, formaldehyde and thiomersal.

ACUTE.

Fatal anaphylactic reactions are possible (10 p162). The tetanus toxoid vaccine became available in 1938. Within 2 years, reports about anaphylactic reactions started to surface. "These reactions occured with both formol and alum-precipitated toxoid, and were seen after first, second or subsequent injections." (17).

Cooke and colleagues (1940) have drawn attention to this phenomenon and have described a number of cases (18). Parish and Oakley (1940) gave a description of anaphylaxis after tetanus vaccination (19). So did Whittingham, that same year (20).

Cunningham (8) in 1940, reported a recurrent severe anaphylactic reaction after tetanus toxoid injection in a healthy female medical staff member. Three weeks after her first shot, a sudden rigor was followed by an intense urticaria preceded and accompanied by marked skin irritation. Despite this, a second shot was given six weeks later, and the patient collapsed within five minutes after the shot. After she regained consciousness, there was rigor with vomiting and diarrhoea. The patient felt very poorly afterwards for about twenty-tour hours.

The allergy was traced down to Witte peptone, a constituent of the medium in which Clostridium tetani was grown.

The vaccination was initiated despite a severe reaction to her preceding diphteria vaccination.

Apparently, 1940 was a fruitful year for learning how to treat anaphylactic reactions after vaccination. Regamey (21) mentions two cases. One is about a patient who did not react to the first shot, but suffered a shock reaction 4 weeks later, 8 hours after the second shot; the third shot, 6 months later, caused the patient's death within 2 hours due to anaphylactic shock. A second patient, a 44 year old doctor, died 30 minutes after vaccination.

Blerechenk (1969) reports a case with fatal outcome after anaphylaxis (22), Ehrengut (1973) saw a fatal anaphylactic reaction (23), Spiess (1973) looked at the problem that same year (24). Zaloga & Chernow (1982) relate a case of acute anaphylaxis which was almost fatal (25). The patient was 20 years old, and had not received a booster since the age of 7.

Prof. Dr. W. Spann (26) (1986) described the case of a 14 year old boy, who suffered nothing but a scratch while playing with a dog. The owner of the dog insisted on tetanus prophylaxis. Five minutes later the boy was dead. Wilson (27) mentions 10 cases in England between 1938 and 1946, 3 of which after tetanus vaccination and 2 after combined vaccines. 7 out of the 10 were fatal.

Staak and Wirth mention another fatal case of anaphylaxis in 1973 (28). A 24-year-old woman died half an hour after her tetanus booster. She had not reacted to prior shots, but she was asthmatic, and her sister had had an allergic reaction to tetanus vaccination. Both contra-indications had been disregarded by her father-in-law who administered the vaccine. Frank et al add another dramatic case of exitus in a 34-year-old man after a complicated reaction with shock and Lyell syndrome (palm-size blisters, exfoliating, with blackish fluid), 4 days after the second booster shot (29). After formation of a strong intumescence of the arm in which the injection was carried out, as well as the torso, neck and of the head on the same side, a continued shock and Lyell syndrome developed, especially concerning the swelled parts of the body. Ischemic contractures of the skeletal muscles finally appeared and a cadaveric rigidity occured. Factor, in 1973, wrote an article on tetanus toxoid hypersensitivity (30).

Acute anaphylactic shock within 3-5 minutes after vaccination (31). Acute urtlcarla, within minutes or hours (10).

Brindle and Twyman (1962) reviewed allergic reactions to tetanus toxoid (17). They reported four cases. A second dose was followed within 5 minutes by generalised

pruritus and an urticarial rash on the trunk. Generalised urticaria appeared 10 minutes after the fourth dose, after preceding doses had produced no reactions (17). The man had suffered a similar reaction after yellow-fever vaccination. Smith also covered the same aspect as Brindle and Twyman (17).

Fardon reported a case of generalized itching and urticaria associated with lightheadedness and dyspnea occurring two hours after injection of tetanus toxoid (32). Mulchandani (1962) saw a 12-year-old boy with generalised itching and skin eruptions after a first dose of tetanus toxoid (33). Itching, general malaise, and a severe local reaction after the third shot (17). The patient had suffered from eczema on his hands and forearms.

Angloneurotic oedema (40; 32). Angioneurotlc oedema of the lips after 5 minutes (17). Oedema of eyelids and lips after 10 minutes (17). Asthma (10 p162).

Coagulation deficit. The case is quoted by Dittmann (10 p163) of a 16 year old girl who collapsed 24 hours after vaccination with shock and a complete coagulation deficit. The post-mortem revealed 6 liters of blood in the abdomen. A second case was that of a 34-year old man displaying severe local reactions 24 hours after the tetanus shot. After another 24 hours he was admitted to hospital with shock. He died during the fourth day a.v. from lack of coagulation, diagnosed as Lyell syndrome (29).

A 55 year old man suffered an acute heart infarction after vaccination and died within hours (34). Other authors confirmed the possibility of a causal relationship between vaccination and heart infarction (35, 36).

DELAYED.

Most allergic reactions are of the delayed type (10). Edsall (9) described a number of cases. Skin reactions, such as urticaria (40); chronic urticania was described by Steigleder (37), Hollander and Wortmann (38) and Fabry (39). In this last case, aluminium hydroxide again is supposed to have played a role.

- scarlatiform exanthema (40);

- derniatitis (40);

- generalised pruritus (40 41)

- serum disease (Daschbach in 40)

Sweeney reports three cases after vaccination, presenting themselves as serum sickness, with local redness, swelling, itching, regional lymphadenitis, fever and polyarthritis (42). A 49-year-old female developed serum sickness together with an Arthus reaction.

There was fever, swelling of the joints and the lymph nodes, and a local reaction. The patient had to be hospitalised and needed treatment with high doses of cortisone. Hyperimmunisation was observed (3).

Hall mentions some serious general reactions (43), as do Kittler (44) and Griffith (45).

Polio cases after combined vaccines have been reported (10 p158). Sepsis (generalised infection) (10 p159, 46). Asthma (32, 40), 2 hours after vaccination.

Asthma, one month after vaccination with shock reaction (31). Hyperventilation after hyperimmunisation (47). Death is the outcome in 0.4/million vaccinations (10). Frank mentions a lethal outcome in a person who first developed a local reaction, then swelling of the arm, trunk, neck and head, then shock and Lyell-syndrome (29).

LOCAL REACTIONS

The presence of aluminium hydroxyde in the fluid may lead to increased local reaction to the vaccine (48). These reactions are more violent if the vaccine has been frozen (10 p160). They occur more frequently in females (49).

1. SKIN

Reactions at the site of vaccination are not rare. Jet (pressurised) injection leads to complications more often than syringe injection. Bleeding after vaccination is possible.

1.1. Redness and infiltration/swelling of the skin (3). Extensive, painful, oedematous swelling of the site of inoculation (50). Painfully inflamed swelling, followed by neuritis of the Nervus Recurrens (51). In Germany, the 'network for mutual information' recorded 35 cases of redness, swelling, pain and induration after vaccination (3).

David & Zehnter tried to link the frequency of these reactions to the place of injection (52). Ehrengut (1973) mentions two cases in which a strong local reaction occurred 7 and 9 days respectively after the (List tetanus shot, which means, without previous specific sensitisation (23). Large local swelling and temperature, disabled for work for one week (14). White et al reported 33 severe and 137 moderate local reactions with erythema in 1973 (53), and another 19 severe and 74 moderate reactions in 1980 (54).

1.2. Acute urticarla (8). Severe local reaction after vaccination followed by nettle rash (55, 54).

1.3. A burning pain immediately after inoculation.

1.4. Abcess at site of infection (10 p159). The presence of aluminium hydroxide raised the number of abcesses, most of all when the injections was not made deeply intramuscularly. Local streptococcus infection with abcesses in 37 vaccinees (56). Recurrent abscesses after DPT vaccination, due to extreme hypersensitivity to the tetanus toxoid component were reported in a 5-year-old girl by Church & Richards (1985) (57).

1.5. A streptococcus-phlegmone occurred in a large number of vaccinees described by Seyfert (46). 32 out of 196 vaccinees had to be hospitalised because of this complication, and 26 needed surgical intervention.

1.6. An embolism of the skin was reported by Sticki after a combined diphteria-tetanus vaccination (58).

1.7. Dermatitis (10 p159).

1.8. A granuloma at the site of inoculation (10 p159) can remain for several months.

1.9. Lyell syndrome or 'burnt skin syndrome', with large, flacid blisters and livid discoloration. The death rate is 50% in adults and 25% in children (29).

1.10. Generalised oedema, 12 days after vaccination (31).

2. The LYMPH NODES of the axilla can be swollen (3).

3. NEUROLOGICAL REACTIONS

Neurological reactions were observed in 1.4/million vaccinations (10 p. 161). The peripheral nervous system is affected more often than the central nervous system. The rate of side effects is clearly lower than with the DPT vaccination, but similar to the DT vaccination, with the important remark that with the latter the central nervous system is affected more often. The time span between vaccination and complication differs from barely a few minutes for acute allergic reactions, to 12 to 48 hours for delayed allergic reactions, to 4 to 10 days for the onset of neuritis (49). 43% of cases show their first symptoms within 72 hours.

Peripheral neuropathy occurs in 1.4/million vaccinations (10 p161). The first symptoms can be observed within 10-14 days. It can be provoked by different mechanisms. In one case, a clear cut causal relationship was established with hypersensitivity to the tetanus toxoid.

Affected parts are the arm muscles (plexus brachialis, N. medianus) (59), or cranial nerves (40). Apart from single nerve affections, also poIyneuritis and radiculoneuritis occur.

In 1966, Blumateln & Kreithen published their observations of peripheral neuropathy caused by hypersensitivity to the toxoid itself (60).

Fardon, in 1967, wrote down his observations of neurological complications along with other side-effects of the vaccine (32), in 1970, Gathier & Bruyn followed the same track (61). In 1976, Gersbach & Waridel published their findings (62).

Dieckhofer continues the queue in 1978 (63). Quast (1979) mentions both mono- and polyneuritis after vaccination (64). Baust (1979) notIced peripheral neuropathy (65). Brachial Plexus Neuropathy was described by Tsairis and colleagues in 1972 (66). After the DPT-combined shot this synrome was published by Martin & Weintraub (1973) (67) and Tsairis (66) after combined vaccines.

Wooling & Rushton (1950) gave a description of this syndrome 5 days after tetanus vaccination (68). Polyradiculoneuritis in a 22-year-old man was reported by Holliday & Bauer (1983) (69) after the third booster, after previous boosters had been uneventful. There was no apparent reaction at the site of the injection.

Paralysis of the respiratory nerves (Landry paralysis) lead to exitus in one case (70). A 48-year old healthy man was vaccinated after injury. One week later he suffered from an influenza-like disease. From the 8th day on he developed severe pains and swelling of the joints, mainly of the right shoulder. During the next 2 to 3 weeks a right-sided plexus brachialis paralysis developed with severe wasting of the muscles. It took the man 2 years to recover from the disease (71). Katz pictured similar findings as early as 1927, and Schilling followed soon after. Demme (72), Lische (73) and Ridder confirmed this in the early thirties (71). Schlenska (1977) reported a number of neurological complications (74).

Palffy & Merei (1961) observed a reversible one-sided paresis with motor aphasia, 10 days after vaccination (50).

Gullain-Barré paralysis was seen following tetanus vaccination by Hopf (1980) (75). Pollard & Selby observed a patient with three episodes of GBS, each following administration of tetanus toxoid (76). After each vaccination, the attack came sooner than after the previous one (3 weeks, 2 weeks and 9 days interval). Despite this, vaccination was not terminated!

Landry-paralysis was described by Elsasser (77).

Acute Transverse Myelitis was seen by Whittle & Robertson (1977) (78).

Tetanic spasms may develop (40, Ehrengut, Bethge 49), Rigor after vaccination (8).

Central neuropathy was described in 1961 by Meering (21). An 11 year old girl developed encephalits 2 months after vaccination.

Palffy and Merel witnessed a hemiplegia with aphasia 10 days after vaccination, with recovery after five weeks (50). A meningoencephalitis in a formerly healthy patient was diagnosed by Dengler (1978) on the fourth day, after the man suffered a severe local reaction within hours after vaccination (79). Three cases of encephalitis and encephalomyelitis were officially compensated in the GDR before 1981 (10 p163).

Bodechtel described encepha lomyelitis after vaccination (80). Buchwald mentions a fatal case of encephalitis (34). A soldier died after weeks of unconsciousness (July 1980). He had been vaccinated in spite of a serious cold.

Headache belongs to the more frequently observed reactions (3).

A bout of multiple sclerosis can be provoked by a tetanus shot (10 p163, 81). Schabet et al (82) quote the case of a 50 year old man who developed MS and multifocal cerebral vasculitis and infarction after simultaneous TBE (tickborne encephalitis) and tetanus vaccination.

The cranial nerves can be affected. Damage of the nn. acusticus, opticus, oculomotorius, facialis and recurrens have been noticed (51). As early as 1936, Cutter presented a case of auditory nerve involvement in a healthy 4-year-old schoolboy who also developed double vision (55). Harrer and colleagues (1971) described lack of eye accomodation and inability to swallow in a 21-year-old patient, 10 days after vaccination (83).

Eicher & Neundörfer in 1969 made observations about a 28-year-old man in whom the left recurrent laryngeal nerve was affected 8 days after a booster dose. It took him 2 months to recover (51). The reaction was immune mediated (allergic).

Bauer and Ellis described a right sided paralysis of the recurrent laryngeal nerve '84, Basek did a similar observation in 1958 in two patients (85). Wirth, in 1965, reported auditory nerve problems 5 days after vaccination, which lasted for two weeks (86).

3. HeavIness of the affected arm (10).

Provocation tetanus by vaccination must be considered a possibility. The case described by Passen & Andersen (5) was admitted into hospital with a painful wound, not with tetanus. The patient developed a life threatening attack of tetanus only 24 hours after he was 'prophylactically' vaccinated.

IV. CARDIAC COMPLICATIONS

1. Myocardial infarction was noticed by Czirner & Besznyàk in 1969.

2. Tachycardia (25, 29, 31).

V. RHEUMATIC REACTIONS

Swelling of the joints in a 49 year old female (3).

Persistent joint pains in 1 leg, which was placed in a cast to afford sleep. The patient was unable to work for one week and the symptoms persisted for several weeks (14).

VI. GASTRO-INTESTINAL REACTIONS

1. Vomiting (8).

2. Severe abdominal pain and diarrhoea for 3 days, during which the patient (28 years old) was confined to bed (14). Upset stomach after a severe local reaction (14).

3. Diarrhoea (8).

VII. UROLOGICAL REACTIONS

Anuria due to shock, followed by death (29).

BOOSTERS & HYPERIMMUNISATION

Generally, booster shots are recommended for tetanus prophylaxis. The recommendations about the frequency of these boosters have changed throughout the last decades. In earlier times, a booster every five years was recommended; later this was stretched to a booster every decade. But once again, even this strategy appears not to be based upon evidence. "The epidemiologic evidence indicates that routine decennial boosters are of marginal value and are not cost effective." (87). Moreover, there is no need for them if the goal is to maintain adequate recall ability of the antibodies, this is no problem for as long as 25 years after previous immunization (7).

Also, importantly, extensive boostering leads to a less effective immune response. In fact, after 5 injections the decrease in antibody level is steeper than it is after 4 shots (7).

Frequent boosters also lead to increased risks for side-effects. This is why the widespread habit in hospitals and general practices to give a tetanus booster with every injury not only is ineffective but even dangerous. If the immunity status is unclear, treatment should be restricted to immunoglobulin, after a blood sample has been taken for evaluation of this status (3). Peebles explicitly writes: 'When there is a valid history of the routine schedule of immunisation outlined, special tetanus boosters on admission to camps, schools and colleges and emergency injections at times of injury should be abandoned, to minimize toxoid reactions." (7). He agrees with the observation that vaccine reactions are often paralleled by a hyperimmune state. Especially the practice of blind repetition of the primary immunisation with three shots has to be omitted in order to avoid hyperimmunisation (3). There is no scientific basis for this practice, as "booster doses of tetanus toxoid induce anamnestic increases in antitoxin levels even after intervals of 25 to 30 years." (87). As an alternative, a booster dose at the age of 50 is suggested. Everyday clinical practice, however, is miles away from this.

Zastrow (88) mentions severe local and systemic reactions after too frequent repetition of the vaccine.

Werner & Grimm write that in six to seven year olds, the antibody level may still be high enough to produce increased reactions to the vaccine (48). Holliday & Bauer admit that adverse reactions are most likely to occur in persons who have had repeated booster immunizations (69).

Also Baraff et al (89) and Relihan (90) state that adverse reactions appear to be related to the number of prior immunisations and the level of preexisting antibody response. Mc Comb & Levine confirm that neuropathy is more frequent after multiple boosters and in older people (14), as does Griffith (45). And Gardner writes: "Brachial-plexus neuropathy has occurred almost exclusively in adults who have received multiple injections of tetanus toxoid." (87). Hyperimmunisation led to serum sickness and an Arthus allergic reaction in a woman, 49 years of age, 12 years after the primary immunisation (3). Hospitalisation and cortisone were necessary to save her. Hyperimmunisation is observed more often in elderly persons (49). Levine et al noticed that vaccine reactions "occurred in previously immunised persons and that they were age dependent, rising markedly after the twenty-fifth year..." (14). McComb again underlines the important role of frequent previous tetanus toxoid vaccination (e.g. in servicemen) as the decisive factor for more frequent vaccine reactions (14). He illustrates his point with 4 new cases. Edsall (1967) also addressed this issue (91).

ALTERNATIVE PREVENTION MEASURES

It would be absolutely wrong and short-sighted to present vaccination as the only means of prevention against tetanus. Infection occurs through defects in the skin or mucosal barriers. Hygienic occlusion of such defects when in contact with potentially infected matter (dust, horse manure) is a first essential measure.

Profound wound cleaning is the next very important measure. Every wound should be allowed to bleed freely, since this eliminates bacteria and infected matter from the wound and supplies oxygen through the blood stream. It is an inexcusable professional mistake to sew infected wounds. They should be left open to the air until completely clean before being stitched.

Application of hydrogen peroxide is another cheap, easy, very efficacious and, thus, essential protection against tetanus infection of open wounds. The only exception is small punctured wounds in which the peroxide will not permeate. Peroxide is the first essential product in every household pharmacy. In order to be effective, it has to be replaced annually.

In the third world, the main occurrence of tetanus is in newborns, by cutting the umbilical string with infected scissors. Here again, proper hygienic measures is all it takes to avoid the problem. "The first (method of preventing neonatal tetanus), *which has been the principal means of virtually eliminating the disease* in the industrialised world and more recently in the People's Republic of China, is by reasonably strict cleanliness at childbirth, in a sanitary environment, and in particular by hygienic cutting of umbilical cord and hygienic care of the umbilical stump after the birth." (92). And the author adds: "... Nor is maternal immunisation alone an adequate solution. Provision of trained assistance at delivery may be slower in eliminating neonatal tetanus, but it also confers many other benefits in reduction not

only of neonatal and maternal septicaemia but of a variety of causes of neonatal and maternal morbidity and mortality." Alternative medicine can be highly effective in preventing the disease. Homeopathic remedies like ledum and hypericum, administered when a wound looks suspicious, have proven to be of great value in the prevention of the disease for more than a century.

CONTRA-INDICATIONS

Acute infections (10 p165); Temporal coincidence with other vaccinations (10 p165); Allergy to one of the components of the vaccine (tetanus toxoid, aluminium hydroxide, formaldehyde, thiomersal)

Liver and kidney affections (21). Chronic diseased and recent hepatitis (59).

An allergic disposition or immune disorder in the patient or in a close relative (28). Parish and Cannon state that the risk is greater in people with a history of asthma, hay-fever, or other allergies (19).

PASSIVE IMMUNISATION

If the risk of contracting tetanus is high, after an injury spoiled with infected matter, it is common to inject antitetanus serum containing gammaglobulins. The advantage is that immediate immunity against the toxin is offered. This procedure originated before 1900 and was widely applied in the form of administration of equine tetanus antitoxin during World War I. However, numerous accidents have been described as a result of this, mainly in the earlier days of the procedure before active immunisation had been invented. The main problem was an anaphylactlc reaction to the serum. Shock due to this resulted in death in more than a few cases (93, 94, 95). Clarke (1960) relates allergic reactions to tetanus antitoxin (96).

CONCLUSION

The overwhelming amount of literature on tetanus toxoid vaccine adverse side-effects and the severity of those complications make it absolutely impossible to ridicule them as rare and benign. Doing so could only demonstrate a profound lack of knowledge of the literature concerned.

Cunningham, Brindle and others insist on having adrenalin readily available when tetanus toxoid is administered, thus admitting that the vaccination is in fact a life-threatening medical intervention, even in apparently healthy individuals. This speaks for itself. Risking one’s life by an intervention which is probably ineffective, to avoid a disease which will probably never occur, is not sound medical practice. All it takes, on a world scale, to avoid the majority of tetanus cases is clean scissors to cut the newborn’s umbilical cord. Information, soap and peroxyde might do a far better job than tetanus vaccine.

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