

Case Report

Tetanus Following Root Canal Surgery

Ahmed H

Abstract:

2400 years ago Hippocrates recognised Tetanus as a dreadful disease. It is caused by a straight slender gram positive anaerobic rod--Clostridium Tetani, the toxin of which interferes with acetylcholine/cholinesterase balance at peripheral motor end plate of central nervous system causing sustained tonic spasm. Children are routinely immunized these days everywhere against Diphtheria, Pertussis, Tetanus, Poliomyelitis etc. But this does not apply with aged people who were not routinely immunized during their infancy making them vulnerable to these diseases including Tetanus. Majority of Tetanus cases follow wounds (war, accidents, post-operative) contaminated with soil, manure or other external sources. Following is a rare case where tetanus occurred without so called wound i.e. Clostridium Tetani infected pulp space in the root of the tooth following root canal surgery. As the pulp space becomes a closed chamber after filling it with inert material in R.C.T. so anaerobic infection can occur here as it occurred in this case of 42 year old female school teacher. All wounds however trivial from whatever cause should be considered tetanus prone.

Introduction

Tetanus derived its name from ancient Greek word tetanos and tetanin which means 'taut and to stretch'. It is clinically a disease of the central nervous system.

Ever since the time of father of medicine Hippocrates more than 2400 years ago tetanus has been recognised as a dreadful disease. It is caused by clostridium tetani. Various diseases caused by clostridium are:

- a. Gas gangrene: Cl. Welchii, Cl. oedematiens, Cl. septicum
- b. Tetanus: Cl. Tetani
- c. Botulism [a type of food poisoning]: Cl. Botulinum, Cl. Welchii type A produces both gas gangrene and food poisoning.

Clostridium tetani:

Clostridium tetani is a straight slender 5µ long rod with a characteristic terminal spore having drum stick appearance. It is an obligatory anaerobe and gram positive. Incubation period is from 8 days to several weeks. It causes prolonged contraction of skeletal muscles which often begins with jaw muscles [lock jaw and

trismus] followed by facial muscles and that of neck causing stiffness of neck. Contraction of frontalis and muscles at the angle of mouth give rise to 'risus sardonicus'. Back muscles' spasm often cause arching [opisthotonos] leading to breathing and swallowing problem. There occurs board like abdominal wall, uncontrolled urination, defecation even fractures of spine, muscle tears, elevated blood pressure, rise of temperature and increased heart rate. Violent spasms last for few seconds to 3-4 minutes. It occurs spontaneously or even after minor stimuli. Tonic muscular spasm in between the reflex attacks distinguishes it from strychnine poisoning.

In 1886 Rosenbach had experimentally reproduced tetanus by injection of material collected from local lesion but the relation of clostridium tetani to tetanus was first established by Kitasato in 1889. Bacillus clostridium Tetani produces 2 distinct exotoxins:

- a. Tetanospasmin - a neurotoxin responsible for convulsions and destroyed at 60° C.
- b. Tetanolysin - a haemolytic [lytic action of RBC] and of little pathogenic significance. It is destroyed at 50° C.

1. Prof. (Dr.) Hafizuddin Ahmed, Prof. & Head of the Department of Anatomy, Khwaja Yunus Ali Medical College, Enayetpur, Sirajgonj.

The organism does not damage the tissue. The toxin travels to the Central Nervous System where it:

- a. Interferes with acetylcholine/cholinesterase balance at peripheral motor end-plate so that a continuous excess of acetylcholine remains causing sustained tonic spasm.
- b. Causes extreme hyper-excitability of motor-neurons in the anterior horn cells causing explosive spasm of muscles with slightest stimuli.

Cl. Tetani can be cultured in Robertson's Cooked Meat Medium. Majority cases follow wounds [war, accidents] contaminated with soil, manure or infection [umbilical cord of new born/criminal abortion]. Post operative tetanus has been traced to external source but few seem to arise from endogenous source since 10% population bear Cl. tetani intestinally. Cl. tetani exists as a commensal in the gut of the human and animals. They are excreted in faeces and returns to the soil in the form of manure. spores of Cl. tetani are widely dispersed in the soil. Cases occurred after rubber band ligation of haemorrhoid drainage of anorectal abscess, even after trival injury like prick from rose-thorn, nail, splinters when neglectful. However the following rare case describes a school mistress who developed tetanus after root canal therapy of tooth.

Case Report:

A 42 year old Bangladeshi school mistress visited me on 18.03.'87 with complains of swelling of jaw following Root Canal Therapy in a dental college on 14.03.'87. She was only on analgesic. I therefore prescribed cap. Ampicillin 250 mg 6 hourly in addition. On 21.03.'87 morning she reported again with complains of pain while chewing and deviation of mouth to the left.

On Examination:

An average built woman having normal pulse, temperature, blood pressure, high intelligence with right sided facial palsy but no neck and abdominal rigidity and reflexes were normal. A clinical diagnosis of tetanus with involvement of facial nerve was suspected the patient was referred to the same dental college. They disagreed to accept the diagnosis as they never saw such occurrence after R.C.T in the previous 20 years and rather suggested the followings:

1. Facial palsy due to injury to mandibular nerve

while giving local anaesthesia by injection.

2. Bell's palsy and patient should rather see physiotherapist.
3. Pain and swelling due to unerupted wisdom tooth [later excluded by negative X-Ray].

By noon the patient developed slight lock jaw with doubtful risus sardonicus. An experienced professor of medicine was available who supported my diagnosis and the patient was immediately rushed to Infectious Disease Hospital, Mohakhali, Dhaka.

Management:

A Ryle's tube was introduced into the stomach and kept in situ. Immediately Human Tetanus Immunoglobulin 3000 units I.M. stat followed by inj. Crystapen Penicillin 10 lacs. I.M. 6 hourly, tab. Diazepam 20 mg [4tabs] 4 hourly, syr. Largactil 2 teaspoonful [50 mg] 8 hourly, inj. Velosef [cephradine] 500 mg i.v 6 hourly plus nasogastric feeding through Ryle's tube of 300 ml liquid diet [chicken soup, greencoconut, pulse's soup, milk etc] 2 hourly from 6 AM to 12 PM amounting to 3000 ml started.

On 2nd day lock jaw and risus sardonicus fully developed. On 3rd day facial and generalised spasm with gradual increasing intensity started causing tongue-bite, intra oral injury, asphyxia, occasional incontinence which necessiated introduction of indwelling catheter, air-way tube [forced introduction caused fracture of upper incisors], maintenance of fluid balance and spasm charts.

At the end of one week she developed remittent temperature upto 104° F [oral]. Blood culture showed no growth, blood film for Malarial parasite was negative but to be on safe side Fansider [3

Tab] was given. But the fever did not respond. Patient started deteriorating with repeated reflex spasm and blockage of air-way tube continued. Velosef stopped and Gentamycin started as C/S of throat swab showed coliform sensitive to it.

Later of respiratory arrest with repeated spasm. Occured and patient was given mouth to mouth respiration, oxygen therapy and transferred to Dhaka Medical College Hospital for lack of facilities in the infectious hospital.

An emergency life saving tracheostomy was done and artificial ventilatory support was provided. The operation had to be done in the cabin as a tetanus case can't be taken to the O.T. The treatment was revised as follows:

Inj. Crystalline Penicilline 10 lacs I.M stat, Syr. Erythromycin 250 mg 6 hourly, Diazepam 15 mg [3 tabs] 4 hourly, Syr. Largactil 50 mg 4 hourly, Kemadrin ½ tab B.D, Syr. Penicillin 500 mg B.D, Inj. Gentamycin 80 mg I.M.B.D, Syr. Ventolin 2 teaspoonful TDS, Vit. A and D, Diet: liquid - 300 ml 2 hourly from 6.00 am to 12.00 pm i.e 2700 cc.

In spite of all the measures overall condition of the patient did not improve and it was thought probably the anaerobic condition of the closed cavity of the treated tooth-root might be acting as a continuous source of infection. It was decided to remove the pack but it was not possible due to lock jaw and general anaesthesia was not only risky for the patient but difficult too. However under light G.A. with great caution on the bed of the patient the dental pack was removed on 09.04.'87. On the same day test reports from the lab showed:

Blood urea 8 mg/dl, Serum creatinine 1 mg/dl, Serum sodium 137 m.mol/L, Serum potassium 4.5 m.mol/L, Serum chloride 100 m.mol/L, Serum carbondioxide combining power 21 m.mol/L, Serum bilirubin 1.5 mg/L, Serum GPT 24 I.U/L and ECG showed sinus tachycardia.

The patient gradually improved and left the hospital fully recovered from tetanus after staying sick for two months.

Discussion:

Children are routinely immunized these days everywhere against Tuberculosis, Diptheria, Tetanus, Pertusis, Polio myelitis etc but this was not so few decades ago especially in the third world countries and therefore mainly middle aged and old people are easily vulnerable to tetanus there. The risk of developing tetanus is low but mortality is high. It is 100% in the new born and 40% in the adult. Early tetanus can be detected by pressing the tongue with a spatula in a patient with trismus. It reliably distinguishes those who have tetanus, as they respond by closer of mouth or spasm of face and neck. The above is an unique case of tetanus after RCT.

Root canal is a natural space in the root of tooth i.e. pulp space containing nerve, blood vessels and connective

tissue. To cure infection and save the tooth the dentist drills into pulp chamber and remove infected pulp and drills the nerve out of root canal. He then fills each of the root canal and chamber with inert materials and seals up the opening. Since, this becomes a close chamber so anaerobic infection can occur here as occurred in this case.

In tetanus treatment prognostic index is the "time of onset" i.e. the time between the first symptom and the first reflex spasm. If it is less than 48 hours then death is the result. In our case it was more than 48 hours. Besides although dreadful tetanus is self limiting provided if the patient can kept alive for at least 3 weeks which was proved in our case.

For the purpose immunization 2 dosage of Tetanus Toxoid [T.T] given at least 4-6 weeks apart to pregnant women from six month onwards will provoke antibody formation in the women and this will pass through placenta to baby protecting him or her from neonatal tetanus. Children immunized with 3 dosages of DPT 1st at 3 months, 2nd and 3rd dosages with four weeks gap along with oral polio vaccine. A booster dose at school entry and leaving and ten years or after severe neglected wound is required.

The essentials of tetanus management:

A. Neutralisation of toxin - Human Tetanus Immunoglobulin [TIG] 3000-6000 units I.M. or 3000 I.U. Antitoxin I.V. TIG or Antitoxin should be given before tetanospasmin gets fixed to neural tissue. In established cases sometime larger dosages i.e. 100,000 I.U of antitetanic serum are given at once, ½ I.V. and ½ I.M to limit further fixation of toxin. All patients having antitetanic serum should be immunized at once with toxoid.

B. Prevention of further toxin production - Debridement of wound plus Benzylpenicillin 600 mg 6 hourly I.V. [Metronidazole if Penicillin allergy, I.V-10 days]

C. General measures - Isolate the patient in a darkened room, Maintain complete silence, Intra gastric tube feeding/Total parenteral nutrition, Diazepam for spasm, Neuromuscular blocking agent i.e. Tubocurarine to control seizure if facilities for artificial ventilation available, O₂ inhalation, Tracheostomy, Artificial ventilation, Treatment of secondary infection, Fluid electrolyte balance, meticulous nursing, minimum handling.

Conclusion:

Usefulness of antitetanus serum in the management of tetanus has been debated and in fact it has little affect on the final outcome. But however initial early use of antitetanus serum on admission would seem to be logical in order to prevent unabsorbed toxin.

All wounds however trivial and from whatever cause should be considered tetanus prone. Tetanus vaccination history should be obtained from every patient seeking medical care so that correct prophylaxis can be prescribed.

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