Role of immunisation in preventing tetanus - A case report of tetanus in a 19 year old boy

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Abstract

Introduction

The aim of this report is to highlight the importance of immunisation in the prevention of tetanus. Tetanus is an acute neurologic disease caused by *Clostridium tetani*, leading to release of neurotoxin – Tetanospasmin, which causes muscle spasm. It is a major cause of morbidity and mortality in Nigeria. The high prevalence of tetanus in Nigeria is due to poor access and poor utilisation of routine immunisations as tetanus is a vaccine preventable disease with low morbidity and mortality in developed countries where routine immunisations are taken religiously.

Methodology

The case presented highlights the management of tetanus in a nineteen year old boy at the Irrua Specialist Teaching Hospital, Irrua, with a ten day history of dirty wound secondary to road traffic accident who presented with trismus and generalized spasms of three and two days duration respectively. He was from a poor socio-economic background and has not received immunisation for tetanus in the past fifteen years and could not ascertain if he was given routine childhood immunisation.

Results

He was hospitalised for a month and discharged without sequelae. Immunisation is vital in the prevention of tetanus and it saves a lot of time, money and resources spent in combating tetanus when it arises and should therefore be embraced by all.

Conclusion: This case brings to fore the disease burden of tetanus and the need for routine and booster immunisations to prevent tetanus.

Keywords: Tetanus, trismus, spasm, neurotoxin, 19 year-old

Introduction

Tetanus is an acute neurologic disease[1,2] and major cause of morbidity and mortality in Nigeria.[1,2,3] It remains mainly a disease of the young (40 year and lower) thereby threatening our future. It is the second leading cause of neurological infection admission among adults, second to meningitis.It is caused by a spore forming anaerobic gram positive bacillus, *Clostridium tetani*. It is transmitted through contaminated wound, broken skin or mucous membrane.[1]

Tetanus is a vaccine preventable disease.[4,5] The case below highlight the burden of tetanus which could have been prevented through vaccination.

Method/Results (Case Report)

He was Mr AG, a 19 year old secondary school leaver who resided at Igarra, Edo State. He was Akoko-Edo and a Christian. He was admitted for 29 days.

He presented with complaints of difficulty in opening the mouth of three days duration; spasm, neck pain and neck stiffness all of two days duration. Patient was well until three days prior to presentation when he noticed he could not open the mouth. This was associated with difficulty in swallowing. Fourteen hours later, patient developed generalised spasms, about twenty episodes daily. Spasms were triggered by noise and touching the patient. There were also spontaneous spasms in between, associated with pain. There was no history of photophobia or loss of consciousness. About the same time, patient started having neck stiffness which made it difficult for him to turn from side to side. There was associated pain on turning his head. There was no headache, fever or vomiting. There was no difficulty in breathing. There was no history of trauma to the head. There was no history of ear pain or discharge and no history of sore throat.

He sustained an injury to the left knee ten days prior to presentation following a motor cycle accident for which he was treated in a patent medicine store by cleaning the wound and giving him some medications he could not ascertain. He was not given anti tetanus prophylaxis. The wound had however not healed. Following onset of symptoms, patient presented to General Hospital, Igarra from where he was referred to Irrua Specialist Teaching Hospital.

He has not had tetanus or any other immunisation for the past fifteen years; he however could not ascertain if he completed his childhood routine immunisations. He had never been admitted nor had surgeries in the past. He was not a known epileptic, Haemoglobin SS patient, diabetic or hypertensive. There was also no known drug allergy. He was the fifth of seven children (5 boys and two girls) in a monogamous setting. Father was a 57 year old farmer and mother was a 53 year old trader who sold foodstuff in the local market. Two of the elder brothers were working and supporting the home and his elder sister was married to an auto-mechanic. His immediate elder brother was in the polytechnic while his two younger siblings (a boy and a girl) were in senior secondary three and one respectively. He lived with his parents and younger siblings in a three room apartment with pit latrine. Source of water supply was rain water and the village stream. He has finished secondary school but yet to gain admission into a tertiary institution. Presently assists the parents in the farm. He neither smoked nor drank alcohol. He was not sexually active.

Examination findings revealed a young man, afebrile, not pale, with neck stiffness, but there was no sign of meningeal irritation and no focal

neurologic deficit. Pulse rate was 94 beats per minutes, regular, blood pressure was elevated (170/90mmHg) with only first and second heart sounds heard. There was an ulcer from an avulsion wound on the left knee measuring 5cm by 4cm in the widest diameter with sloping edge and slough on the floor of the ulcer.

An assessment of tetanus with traumatic ulcer in the left knee was made with meningitis and seizure disorder as differentials. Full blood count done was as follows: Packed cell volume – 37.3%, white blood cell count – 4,100/mm^3 with neutrophil being 49.4%, lymphocytes 45.9% and others 4.6%. The Erythrocyte Sedimentation rate was elevated – 90mm/Hr. Urinalysis revealed hematuria (++) with a pH of 5.0. Electrolytes, Urea and Creatinine was also normal (sodium 140mmol/L, potassium of 3.6mmol/L, urea of 26mg/dl and creatinine of 1.1mg/dl) and Random blood sugar was 95mg/dl (normal)

He was admitted and nursed in a dark and quiet room. He was co-managed with the neurological and plastic surgical team. He was also catheterised to monitor urine output and commenced on nil per oral. He was given intra muscular tetanus toxoid 0.5ml stat, subcutaneous anti tetanus serum 20,000iu (after a negative test dose), intravenous diazepam 40mg into 500ml of dextrose saline to run 4hourly. The wound was debrided and he was commenced on daily wound dressing with honey and Povidone iodine.

Patient progressively got better with improvement in symptoms. Vital signs improved with pulse rate normalising on the second day on admission (88bpm) and blood pressure normalising on the 4^{th} day on admission (130/80mmHg). Vital signs thereafter remained within normal limits throughout admission. Fluid input/output was monitored and was satisfactory throughout admission. Last spasm was recorded on the 18^{th} day of admission and patient was commenced on graded oral sips on the 20^{th} day on admission. Catheter was discontinued on the 23^{rd} day on admission. Intravenous metronidazole was converted to oral on the 26^{th} day on admission and diazepam converted to oral on the 28^{th} day on admission. Wound healing was also satisfactory throughout admission. On the 29^{th} day on admission, patient was discharged after he and his parents were counselled on the need to avoid injuries as much as possible and when they occur, they should present promptly to the hospital as tetanus was a preventable disease. They were also counselled on the need to seek proper medical care from qualified medical practitioner whenever any member of the family had health challenges rather than patronise patent medicine dealers and quacks. He was given two weeks' appointment.

Follow up was clinically uneventful. Patient was well and wound healed satisfactorily. He resumed farming activity with his parents while he wrote his university matriculation examination during the period. He was

discharged after the third visit three months post discharge.

Discussion

Tetanus is an acute neurologic disease[1,2] and major cause of morbidity and mortality in Nigeria.[1,2,3] A hospital based study done in Benin reported a mortality of 26%,[3,4] 29% in Port Harcourt[3] and 37% in Lagos[3]. Higher values have been reported elsewhere in the country.[4] Hesse and colleagues found a case fatality of 50% in a teaching hospital in Accra, Ghana.[5] Eighty per cent of global deaths from tetanus occur in Africa and Southeast Asia.[3] It remains mainly a disease of the young (40 year and lower)[6,7] thereby threatening our future. Komolafe and colleagues reported the highest frequency among males less than 30 years in Ile Ife[3], as opposed to over 60years in developed countries.[3] The high prevalence among males[3,5,7] may be due to the fact that most women get immunised when pregnant during antenatal visits.[3,7] This highlights the role of immunisation in tetanus prevention. Males' predominant involvement in occupations/vocations with predisposing injuries[7]such as farming and commercial activities such as motorcycling and driving have also being adduced to be responsible for the increased prevalence in males.[8] Mr AG was a male and less than 30 years (19years) and got the infection from an injury to his lower limb, which is the common entry point of tetanus,[3,5,7] in a motorcycle accident. Over 70% of tetanus patients are in the low socioeconomic class.[1] The disease burden is ernomous.[1,3] It is among the leading cause of neurologic disease in Nigeria over the past three decades.[1,3,8] Furthermore, tetanus is the second leading cause of neurological infection admission among adults, second to meningitis.[2,8]

Tetanus, caused by a spore forming anaerobic gram positive bacillus, *Clostridium tetani*[5,9], is transmitted through contaminated wound, broken skin or mucous membrane.[10] In the neonatal group, portal of entry is the umbilical stump during cutting or poor stump care whereas in the post neonatal period, the most important portal of entry is via contaminated wound followed by otitis media.[6,10] It causes muscle spasm from the neurotoxins produced – *tetanospasmin*.[3,9]

tetanus typically presents with trismus (from masseter muscle spasm), difficulty in swallowing and more ominously difficulty in breathing or opisthotonus.[4,9] It could be generalised, as was seen in Mr AG, localised, cephalic or neonatal.[9] Generalized tetanus is the most commonly recognized form usually beginning with trismus and a *risus sardonicus* (increased tone in the orbicularis oris)[9]. Dysphagia and abdominal rigidity may also be present.[4,9] Above features were all present in this patient with the exception of opisthotonus.

Management include eliminating the source of the toxin through appropriate antibiotics to eradicate the vegetative cells,[4,5,7]neutralising unbound toxins using antitoxins,[4,9] control of

muscle spasm using muscle relaxants,[4,9] supportive care[4,7,9]and active immunisation.[4,7,9] Wound care is also an important component in the management.[5,7]A study in Ghana found the case fatality rate of patients whose wounds were not debrided to be twice that of those who had wound debridement.[5]Wound debridement is important in eliminating the source of the toxin.[5]

The antibiotic of choice is metronidazole given intravenously at a dose of 500mg every eight hours.[5,7] Not giving antibiotics, particularly to patients with a wound resulted in a high mortality of 76.2% in a Ghanaian study and giving antibiotics was found to reduce mortality to 33.3%.[5] Reasons for not giving antibiotics to those who did not receive was mainly cost, as cost of treatment in Nigeria and west Africa is mainly out of pocket.[5,7] A combination of antibiotics and tetanus immunoglobulin further reduced mortality to 12.5% in the Ghanaian study.[5] Thus, wound debridement and daily wound dressing, antibiotics (intravenous metronidazole) and tetanus immunoglobulin which were an integral component in the management of Mr AG were justified. Longer duration of hospital stay was associated with higher chance of survival.[7]

Tetanus is a vaccine preventable disease.[4,5,7] The world health organisation (WHO) recommends that three doses of tetanus toxoid injection be given before the first year of life and another three doses given during childhood, school age and adolescence respectively. This confers a lifelong immunity against tetanus.[11] It is therefore worrisome that the disease burden as well as fatality associated with tetanus in our environment is still very high in spite of availability of vaccines. This has been attributed to inadequate and irregular immunisation programmes[6,12] as well as ignorance of the clinical significance of tetanus as well as the role of immunisation in its prevention.[5,7,13] A study by Orimadigun et al in Ibadan showed that educated parents were more likely to get their children immunised.[13] Knowledge about tetanus is poor even among healthcare providers in developing countries where the scourge is high.[14] In Nigeria, only 47% of infants get the third dose of tetanus immunisation and only 60% of women of child-bearing age have protective level of immunity against tetatnus.[13,15] Less than 50% of pregnant women are immunised against tetanus in Nigeria as most pregnant women do not book for ante natal care and only 35% deliver in health facilities.[13,16]

Conclusion

Healthcare providers should cease the opportunity whenever it presents to assess the tetanus immunisation status of patients and recommend immunisation particularly to at-risk patients as immunisation remains the best option for reducing the scourge of tetanus which is preventable. In addition, all patients with injuries including road traffic accident victims should receive immunisation for tetanus, irrespective of their immunisation status.

Muslims should encourage one another to embrace immunisations to reduce the morbidity and mortality and ensure a healthier ummah.

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