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Retrospective study of Tetanus in Children presented to a Tertiary care hospital

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ABSTRACT:-

Background: - Tetanus is an acute potentially fatal disease caused by *Clostridium tetani* which produces a neurotoxin which affects the Central Nervous System. The disease can affect people of any age and fatality rate is high. Wherever the immunization programs are in place the incidence of tetanus declines. Due to lack of proper immunization, tetanus is still persistent in Low Socioeconomic strata of society.

Case Series: -We report four cases in six months durationfrom September 2019 to February 2020, common factors for all of them belong to low socio economic strata having lack of knowledge for vaccination and inappropriate wound care. These children presented with complaints of fever, muscle pain and generalized contractions, trismus, one of them developed ophisthotonus posturing also. On questionnaire, all of them were unvaccinated and early detection of wound not done & no appropriate wound management was done. All these cases were clinically diagnosed as tetanus and management was based on latest recommendation of WHO: penicillin-metronidazole antibiotic regimen, tetanus toxoid, tetanus high dose gammaglobulin, nursed in a quite dark room with sedation Out of the four three survived, one expired.

Conclusion: -Tetanus is still present in pediatric population, associated with lack of vaccination; Treatment is very costly as compared to vaccination which is low cost. Complete vaccination and proper wound care is the only option to reduce the ongoing burden of tetanus.

KEYWORDS: -Tetanus, Trismus, Ophisthotonus, Tetanus Toxoid, Tetanus gamma globulin

I. INTRODUCTION:-

Tetanus is an acute, spastic paralytic illness, potentially fatal disease caused by neurotoxin produced by *Clostridium tetani*, which affects the Central Nervous System [1]. *Clostridium tetani* is a motile, gram-positive, spore forming, obligate anaerobe. *C. tetani* forms spores terminally, with classic morphologic appearance of drumstick or tennis racket microscopically. The formation of spores is a critical aspect of *Clostridium tetani,* which can survive boiling, but not by autoclaving, whereas vegetative cells are killed by antibiotics, heat, disinfectants. *C. tetani* is not a tissue invasive organism, illness causes through tetanospasmin which is second most poisonous substance; human lethal dose of tetanus toxin is estimated to be 10^{-5} mg/kg [2]. The disease can affect people of any age, with a high fatality rate (10-80%).The global incidence of tetanus is still estimated at one million cases annually, with a case fatality ratio ranging from 20% to over 50%.[3]

The real magnitude of disease is unknown because of incomplete notification. According to epidemiological reports from average of 230 cases in 1990, the number of cases decreases to 60 cases per year from 2001 to 2010, and number decreases to less than 30 cases per year from 2010 to 2015[4,10].Approximately 57,000 deaths were caused by tetanus globally in 2015, of these approximately 20,000 deaths occurred in neonate and 37,000 in older children and adults [2]

The main objective of this reporting is to describe the clinical presentation of pediatric tetanus cases, reinforcing the early diagnosis, wound care and importance of vaccination.

Pathophysiology:-

Most cases of tetanus occurs due to penetrating skin injury, often the injury may be trivial so that medical attention will be missed [3]. Tetanus is also associated with ulcers, burns, gangrene, snake bite, septic abortion, child birth, otitis media, intramuscular or intravascular

injections [5].Tetanus toxoid is released from clostridium tetani spores, these spores usually enter the tissue through penetrating contaminated wound after a period of anaerobic intubation they become bacilli and release tetanus toxin. The toxin enters peripheral neurons and travels retrograde up axons to central nervous system. It can enter motor, sensory and autonomic neurons. Tetanospasmin is a metalloproteinase substance which acts as a presynaptic membrane to cleave synaptobrevin , a protein that allows fusion of neurotransmitter vesicles to nerve membranes when this fusion process is prevented neurotransmitters are not released into synapse and blocking of neurotransmission occurs. Centrally, transmission along the inhibitory GABA and glycinergic neurons is interrupted and the level of spinal cord, inhibitory interneurons are blocked [6].Clinically the effect of toxin on neuron last for approximately 4-6 weeks and may be irreversible until the regrowth of new terminal.

Clinical manifestations:

There are four clinical presentations of tetanus generalized, local, cephalic and neonatal. Generalized tetanus is the most common form and represents 80% of tetanus cases [7].Local tetanus results in painful spasms of muscle adjacent to wound site and may precede generalized tetanus. Cephalic tetanus is rare form of localized tetanus involving bulbar musculature thatoccurs with head injuries or infections such as otitis media. Neonatal tetanus is infantile forms of generalized tetanus usually occurs within 28 days of the birth. It accounts for 50% of deaths from tetanus [7]. The natural course of disease begins with a contaminated wound, in 20% of cases, no entry site can be found. The incubation period is generally 2-14 days but may be as long as months after the injury. An incubation period of <5 days carries poor prognosis as does an onset of <48 hours .[8] The first symptoms are commonly jaw / neck stiffness , spasms are mostly observe in first week of illness and continue up to 3 weeks whereas rigidity can persist up to 4-8 weeks . Autonomic instability peaks in second week and usually subsides after 3 rd.week; if patient survives there will be sequel of hemodynamic derangements [8].

After widespread dissemination of tetanus toxin the beginning of symptoms occurs, in half of case trismus in the presenting symptom. Headache restlessness irritability isearly symptoms often followed by stiffness. “risus sardonicus” the well-known facies of tetanus results from spasm of facial and buccal muscles. When paralysis extends to trunk the patient may have arched posture of extreme hyperextension of the body ophisthotonus posturing, rigidity of chest wall and abdominal muscles and diaphragm muscle paralysis leads to respiratoryfailure. Tetanus toxin does not affect sensory nervesor cortical function so patient remains conscious and even minute stimuli will exaggerate the spasms. Notable autonomic effects includetachycardia, dysrhythmia, labile hypertension,and diaphoresis. In the past acute respiratory failure was the leading cause of death from tetanus, with improved ventilator managements and intensive care sudden cardiac arrest often preceded by bradycardia is now primary cause of death from tetanus [9].

II. CASE SERIES:

Case1:

A 4 year old female child with a low socioeconomic status, with an incomplete immunization schedule according to her age (only BCG, OPV and three doses of pentavalent vaccine were given). She began her clinical presentation 6 days prior to hospital admission, after having a small laceration over the neck region. She was taken to local health center; first aid was givenand got domiciliary treatment of amoxicillin and paracetamol. Tetanus toxoid was not given. After 6 days she developed fever, generalized weakness, neck stiffnessand severe muscle spasms.

She was hospitalized in pediatric intensive care unit. On second day of admission she developed trismus, risus sardonicus with increase in intensity of muscular spasms. She was alert and vital signs were stable. She was clinically diagnosed as a case of tetanus, shifted to quiet dark room and treatment initiated with diazepam sedation, ventilator support and with administration of antibiotics (metronidazole and penicillin). Due to the clinical picture and incomplete immunization, tetanus was suspected and high dose of tetanus immunoglobulin (500IU) given intramuscularly as well as one dose of tetanus toxoid. Child was ventilated and sedated for 7 days. Later, severity of muscle spasms decreased, after 2 weeks of admission child spasms were completely decreased, during the hospital stay. Child developed nosocomial pneumonia with Acinetobacter for which appropriate antibiotic therapy was given. After 45 days of hospitalization, child recovered, and was discharged without any sequelae, totally integrated to her school and social environment.

Case2:

A 2 year old male child from remote area with low socioeconomic status, with an incomplete

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immunization schedule according to his age (only BCG vaccination done). Child was brought to emergency department with complaints of irritability, excessive crying with tightening of body of 8 days duration, tightening of jaw since 2 days. Child was hospitalized in pediatric intensive care unit, on detailed examination a small healed lesion was noticed over the left hand which was neglected by parents and no treatment was taken. Clinical investigation of complete hemogram, CSF analysis was done which was in normal range. Child was diagnosed with tetanus, with clinical features of trismus, muscle spasm and improper wound management and incomplete vaccination. Child was nursed in dark, quiet room, sedated with diazepam and muscle relaxant was given. Tetanus toxoid, tetanus immunoglobulin, antibiotics metronidazole and penicillin were given. After 2 weeks of hospitalization child recovered with no complications, so, child was discharged and counseled about vaccination.

Case 3:

An 8 year old male child from a remote area belonging to low economic status, where both the parents were illiterate, child was not vaccinated with any vaccine, he was home delivered and was not taken to any hospital till now. Child was brought to emergency department with complaints of abnormal posture along with arching of neck since one day. On examination, trismus, risus sardonicus and ophisthotonus posturing was present. There was no history of wound or trauma. Child was isolated and nursed in dark, quiet room, avoided light, noise and other disturbances. Child was sedated; ventilator support was given as child developed breathing difficulty due to spasm of diaphragmatic muscles. Tetanus toxoid and tetanus immunoglobulins were given. On the second day, child expired due to cardiac arrest.

Case 4:

A 9 year old female child presented to emergency department with complaints of severe muscle spasms, abdominal pain and stiffness all over the body of duration of 8 days. On examination, trismus, risus sardonicus, severe muscle spasms which were exaggerated with even minute stimuli. On detailed examination, purulent discharge was noted from left ear which was neglected by parents. On questionnaire, they belonged to low socioeconomic state and with incomplete immunization. Child was hospitalized in pediatric intensive care, tracheostomy was done, and ventilatorsupport was given. Child was sedated with midazolam infusion, treated with antibiotics (metronidazole and penicillin). Tetanus toxoid and tetanus immunoglobulin also given. Supportive management, tracheostomy tube was removed after 5 days; aseptic management was done for tracheostomy wound. For otitis media, ENT surgeon opinion was taken; appropriate antibiotic therapy was given according to culture sensitivity. After 15 days of hospitalization, her muscle spasms were completely regressed. The child was discharged after 7 weeks of hospitalization without any evidence of neuromuscular sequelae.

III. DISCUSSION:

The definition of tetanus according to WHO is based on the clinical features of acute onset, hypertonia, painful contractions of neck and jaw muscles and generalized spasms with no other apparent medical cause. Although there is usually a history of injury, tetanus may also occur in patients without any evidence of injury [4, 10]

The diagnosis of tetanus is strictly clinical; there is no laboratory test to confirm it. The above four cases presented with trismus, spasms, and body stiffness with history of incomplete immunization scheme. So, all these were diagnosed as tetanus clinically, irrespective of history of trauma.

Unlike other diseases tetanus is entirely preventable by immunization [11]a five dose regimen of tetanus toxoid provides adequate immunity. Routine tetanus vaccination is recommended for adults every 10 years [13]

With the introduction of tetanus vaccine the incidence of tetanus has been significantly reduced. In our clinical cases it was noted that none of our patients were vaccinated properly which is very alarming because despite the continuous efforts of health sector, the lack of immunization was associated with low socioeconomic level, also associated to a house located in remote area with difficult access to health services, illiteracy of parents and early wound management was not done.

In May, 2015, India has achieved another significant public health milestone of maternal and neonatal tetanus elimination [13]

The strategies which are responsible for successful elimination are increased coverage of maternal tetanus immunization, promote institutional deliveries, hand washing techniques, safe umbilical cord practices.

It is highly important to apply improvements in vaccination strategies as tetanus is a completely preventable disease, still incidence of tetanus occurring due to incomplete immunization scheme. It is important to publish the clinical cases

in order to increase awareness and seriousness of the picture, and to decrease the resistance of population to vaccination, to finally eradicate the disease.

IV. CONCLUSION

Tetanus is a serious, highly lethal and preventable disease with high morbidity and mortality. Treatment is very costly as compared to vaccination which is of low cost. Proper wound care and complete vaccination is the only option to reduce the burden of the disease.

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