

Case Series

A CASE SERIES ON TETANUS IN CHILDREN BETWEEN 5 YEARS TO 12 YEARS

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ABSTRACT

Tetanus is a life-threatening disease caused by *Clostridium tetani*. In spite of effective vaccination availability, cases of tetanus are seen, especially in developing countries. We hereby present a case series of 5 cases of tetanus seen in children between the age of 5 years to 12 years. 3 cases had history of trauma prior to development of spasms, one case had history of ear discharge. 4 patients presented with severe tetanus of which 3 were unimmunized. 4 patients were treated with oral diazepam without any cardiorespiratory depression and were discharged. In our case series one patient required midazolam infusion with ventilation support. This patient had a short incubation period of 3 days and was unimmunized. The patient succumbed to septic shock. In resource limited settings, conservative management with oral diazepam helps to control spasms without complications of intravenous infusions of diazepam, muscle relaxants.

Keywords: Tetanus, *Clostridium tetani*, Modified Patel, Joag score.

INTRODUCTION

Tetanus is a vaccine preventable disease and is not transmitted from person to person.^[1] Tetanus is caused by *Clostridium tetani*. Tetanus can be classified as neonatal and non-neonatal tetanus (including maternal tetanus).^[2] Most non neonatal cases of tetanus are associated with traumatic injury, often a penetrating wound injury by dirty object like nail, splinter, fragment of glass or unsterile injection. Tetanus may complicate abscesses, otitis media, unsterile surgical procedures, burns, and animal bites.^[2] Incubation period for tetanus ranges from 2 days to 14 days, but may be longer (few months).^[2] There are several scoring systems for grading the severity of tetanus. One of these is Modified Patel and Joag's criteria.^[3] Management of tetanus includes eradicating the microorganisms using antibiotics like Metronidazole, Penicillin-G, neutralizing the toxin by tetanus immunoglobulin, sedation, mechanical ventilation, muscle relaxation or paralysis.^[1,4] Vecuronium or other cardiovascular inert neuromuscular blockers are preferred. Other drugs used in refractory spasms include dantrolene, ketamine, propofol, botulism toxin.^[5,6]

CASE 1

6-year-old female child presented with generalized rigidity, trismus, difficulty in swallowing in casualty.

On the basis of clinical features diagnosis of tetanus was made. There was history of intermittent ear discharge. On examination child was conscious, oriented. Rigidity of neck, limbs, abdomen was present. Child had intermittent episodes of trismus. The Modified Patel and Joag criteria score on admission was 12 (Grade -severe). The child was kept in a quiet room. Intravenous catheter, Ryle tube and foley's catheter was inserted. Tab Diazepam in dose of 40mg/kg/day, every 3 hourly was started through Ryle's tube. Maintenance Intravenous fluids were started. Injection Tetanus immunoglobulin 3000 IU was given. Patient required intermittent injection Midazolam for excessive spasms. Daily Patel and Joag scoring was done. Lateral position was given to prevent aspiration. Dose of diazepam was increased to 80 mg/kg/day in view of increasing spasms over 10 days after admission. Number of spasms gradually decreased after 15 days of admission. Patel and Joag score on day 15 of admission was 6 (Grade-moderate), hence diazepam dose was gradually decreased (by 10%) every weekly. RT feeding was started on day of admission 4. RT feeding was gradually increased. On day 21 of admission child had Patel and Joag score of 3 (Grade-mild). Child was managed without ventilation and any complications of high dose of diazepam (like respiratory depression). Physiotherapy was done

regularly. Injection Td was given to child on discharge. Nutritional rehabilitation was done. Parents were counselled about regular immunization.

CASE 2

12-year-old male child had complaints of generalized spasms, trismus. There was history of trauma to sole of left foot by rusted nail 5 days before the onset of symptoms. The child was immunized for age as per history given by parents (last dose given at 10 years of age). On examination child had generalized spasms, trismus. It was unclean wound. Child received injection Tetanus immunoglobulin 3000 IU. Ryle's tube, Foleys catheter was inserted. Injection Midazolam was given intermittently. Maintenance IV fluids were started. On admission Patel Joag's score was 14 (Grade -severe). Tab Diazepam in dose of 60 mg/kg/day was started every 3 hourly. Child had multiple episodes of spasms. Dose of Diazepam was increased to 100mg/kg/day and Injection Phenobarbitone (5mg/kg/day) was also added. Child was given palliative care- lateral position, regular change in position. Child had multiple episodes of high fever spikes. On Respiratory system examination- air entry was decreased and crepitations were present bilaterally. Chest Xray was suggestive of collapse in right upper zone. Child required oxygen support. Antibiotics were stepped up to Injection Meropenem, Vancomycin from Injection Ceftriaxone in view of multiple fever spikes with pneumonia. Regular Chest physiotherapy was continued. Nebulization with 3% NS was given, gentle oral and nasal suction was done. Child showed clinical improvement gradually with clearing on chest X ray. Modified Patel Joag score was 8 (Grade Moderate) on week of illness 3. RT feeds were started. Child developed dynamic contractures at both knee and ankle joints as seen in figure 2. Tablet Baclofen 5 mg BD was started with passive physiotherapy. Dose of Baclofen was gradually increased to 10 mg TDS. Dose of Diazepam was tapered from 4th week of illness as the episodes of spasms, trismus decreased. Child was able to walk with support. Parents were counselled about regular physiotherapy.

CASE 3

6 years old male child presented to emergency department with complaints of trismus, abdominal rigidity. There was no history of ear discharge, no history of any trauma. Child was immunized for age. Clinical features were suggestive of tetanus. Child received Injection Tetanus 0.5 ml, tetanus immunoglobulin 500 IU after admission. Patel's Joag score was 6(Grade -moderate). Ryle tube, intravenous line, foley's catheter was inserted under aseptic precautions. Diazepam in dose of 40mg/kg/day every 3 hourly was started through Ryle's tube. Feeds through Ryle's tube was started on day 2 of admission. Spasms increased over 4 days

post admission, Patel Joag's score -11(Grade severe). Dose of diazepam was increased to 60 mg/kg/day. The spasms were controlled. Dose of Diazepam was tapered since day 12 of admission. Regular physiotherapy was started, child was able to walk without support.

CASE 4

8 years old male child presented to emergency department with complaints of generalized spasms, respiratory distress. There is history of injury to hand by rusted nail 3 days prior to presenting complaints. The child was unimmunized. Clinical diagnosis of tetanus was made. Child was sedated by injection midazolam. On examination the child had tachycardia with tachypnea, was unable to recognize parents. Patel and Joag's score on admission was 14 (severe). Tab Diazepam (80mg/kg/day) in 8 divided doses was started through Ryle's tube. Child was kept in dark room, Ryle tube, foley's catheter was inserted. Within 8 hours of admission, respiratory distress increased and child was not maintaining saturation on oxygen by nasal prongs. Opacity in left lower lobe was seen on chest X ray, as shown in figure 1. In view of persistent spasms, Midazolam infusion was started and child was intubated. Child had multiple fever spikes, hence antibiotics were stepped up to Meropenem and Vancomycin. Child had hemoglobinuria on day of admission 1. Renal function tests, liver function tests were deranged. Child had altered RT aspirate, had signs of shock requiring NS bolus and inotropic support. Child clinical condition deteriorated. Patient developed catecholamine resistant shock. Child succumbed on day of admission 3. Unimmunized status and a short incubation period, predisposed the child to severe tetanus and its complication.

CASE 5

8-year-old female child brought to OPD with complaints of abdominal pain, tightening of all the four limbs since 1 day. On examination trismus, abdominal rigidity, hypertonia of all limbs was present. Child was unimmunized, received only birth dose vaccination. On admission child had fever, tachycardia. Modified Patel and Joag's score was 12(grade-severe). Child was given injection midazolam intermittently. Child was kept in a dark room, Ryle's tube, foley's catheterization was done. Tab diazepam (60mg/kg/day) every 3 hourly was started through ryle's tube. Injection Tetanus toxoid, immunoglobulin was given. Spasms were controlled by day of admission 2. RT feeds were started on day 2 of admission. Diazepam dose was tapered since day 5 of admission by 10% every 3 days as there were no spasms. Regular physiotherapy was done. Modified Patel and Joag's score on day of admission 7 was 2. Child was managed without need of intravenous diazepam, muscle relaxants.

	CASE 1	CASE 2	CASE 3	CASE 4	CASE 5
Age	6 years	12 years	6 years	8 years	8 years
Gender	Female	Male	Male	Male	Female
Immunization status	Unimmunized(received only birth dose vaccines)	Immunized for age(last vaccination given at 10 years)	Immunized for age	Unimmunized	Unimmunized
Wound injury or history of otitis media	History of ear discharge present	Trauma to left foot by rusted nail.	No history of trauma	History of trauma to hand by rusted nail	No history of trauma or ear discharge
Patel Joag score on admission	12	14	6	14	12

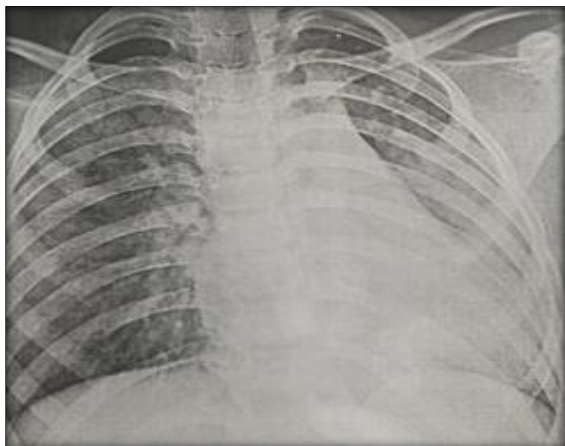


Figure 1: CASE 4, Opacity involving left lower lobe



Figure 4: CASE 5 Child had severe tetanus, trismus can be seen



Figure 2: CASE 2, Dynamic contractures at knee joint and ankle joint



Figure 3: CASE 3 Case of moderate tetanus, recovered without any complications

DISCUSSION

Tetanus is more prevalent in developing countries. Low primary vaccine coverage and lack of booster doses contributes to high incidence of tetanus in developing countries.^[7] The male preponderance is explained by the fact that they spend more time outdoors and are more prone to injuries. In our case series also male preponderance can be seen. In our case series severe tetanus was seen in 4 cases of which 3 were unimmunised. Sedation dose was given as per the modified Patel and Joag score, for mild grade-diazepam dose of 20mg/kg/day (every 3 hourly), moderate grade-40mg/kg/day, severe grade-60mg/kg/day were used.^[8] Complications associated with tetanus include rhabdomyolysis leading to AKI and death.^[2] ARDS in tetanus patients may occur due to VAP, recurrent aspiration during spasms, sepsis, pulmonary embolism.^[2,9] In our case series two patients developed aspiration pneumonia, of which one was intubated. One patient with severe tetanus developed rhabdomyolysis with AKI and sepsis requiring inotropic support. Other children were managed on oral diazepam with intermittent doses of injection midazolam. Doses as high as 100mg/kg/day were tolerated orally without any cardiorespiratory depression. Large doses of intravenous diazepam should be avoided as propylene glycol which is used a solvent can cause hyperosmolarity and lactic acidosis.^[10] Spasms were controlled in 4 patients by oral diazepam, did not required midazolam infusion, muscle relaxants. Intravenous site complications like

thrombophlebitis, IV extravasation, pain at IV site were less in our patients as they did not require benzodiazepine infusion. To prevent aspiration pneumonia, bed sores, position of patient was

changed regularly, lateral positioning, nursing care played a vital role. Whenever required gentle oral suction was done.

PRINCIPALS OF MANAGEMENT OF TETANUS	
Stopping production of tetanus toxoid	Antimicrobial therapy – Benzathine penicillin, Metronidazole.
Neutralizing Tetanus toxoid	Tetanus immunoglobulin(500-3000 IU)
Spasms control	Patient should be kept in dark, quiet room, minimal stimulus Benzodiazepines-Midazolam, Diazepam, Lorazepam Muscle relaxants, Mechanical ventilation
Tetanus toxoid	2 doses to be given 4-6 weeks apart
Conservative management	Preventing bedsores, ventilator associated pneumonias, aspiration.

CONCLUSION

Tetanus is diagnosed clinically. Primary immunization, wound care and proper post exposure prophylaxis with tetanus toxoid play important role to prevent tetanus. Tetanus immunoglobulin should be given as apart of wound management in those patients whose immunization status is not known, received less than 3 doses of tetanus toxoid, immunodeficient patients irrespective of type of wound.^[11] Dose of tetanus immunoglobulin used tetanus prophylaxis in wound management is 250 IU-500 IU.^[11] Use of tetanus immunoglobulin in wound management can prevent severe tetanus. In our case series modified Patel and Joag scoring was used for deciding dosing and titration of sedatives. Enteral feeding was started early in our patients without any complications. Oral diazepam in high doses can control spasms without cardiorespiratory depression in tetanus patients, thus preventing side effects caused by continuous infusion of benzodiazepines and muscle relaxants. Conservative management, proper nursing care prevents complications like aspiration pneumonia, sepsis, bed sores. In resource limited setting like our's even severe tetanus patients were managed with oral diazepam and supportive care, had good recovery.

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