# The protocol for Magnesium Therapy in Tetanus

This protocol is suitable for all patients diagnosed as tetanus having generalised muscle rigidity with or without spasms. Patients should be managed in a high dependency unit or ICU with immediate access to ventilatory support if needed.

**In the WARD**

**CONFIRM DIAGNOSIS -**

**History of injury –**Not always present since the injury is often trivial

**History of immunization -** Tetanus cannot be excluded if immunization has been done more than 7 years prior.

**Clinical Features** -Diagnosis is made on the basis of clinical features which have a typical progress of events starting with the distribution of the cranial nerves and then on to generalized rigidity which is greater in the trunk than the limbs.

**Spatula test -** Ask the patient to open the mouth and insert a tongue depressor right back to touch the back of the pharynx. If tetanus the patient will clamp down on the blade. If not tetanus he will gag. This is a very specific test for tetanus.

**Negative lab investigations -**

**Level of Consciousness -** should not be altered in tetanus

**ASSESSMENT OF SEVERITY**

**Incubation period** (period between injury and first symptom) if <14 days predict severe tetanus (with spasms).

**Onset time - (period between first symptom and first spasm)** If < 72 hours predict A Longer periods of either do not guarantee of mild disease severe tetanus

**Age > 60 years & Co morbid factors increase the morbidity and mortality of the disease.**

**If the spasms have set in transfer to the ICU.**

**MANAGEMENT IN THE WARD**

**Aims - Avoid exhaustion due to spasms -** transfer to ICU if spasms have set in

**Prevention of Pulmonary aspiration during spasms.**

1. Start I.V. fluids and do not feed till NG tube is inserted and tracheostomy is done

2. **Arrange to send the patient to the OTas soon as possible** for the following
   Perform surgical debridement of the wound,
   Insertion of nasogastric tube, and
   tracheostomy. **All These should be performed under general anaesthesia**
3. Give antitoxin (10,000 units IM and 10,000 units infiltrated around the wound) after ST as soon **as the diagnosis is made to neutralise the circulating toxin. It has no action once the toxin is bound to the nerves.**

Immunoglobulin should be given instead if available as 500 iu..

4. **Give intravenous metronidazole 500mg 8 hourly for 10 days** to eradication of the organisms.Penicillin is contraindicated since it is a GABA antagonist and will potentiate the tetanus toxin
5. **Toxoid first dose as soon as the diagnosis is made** and the second dose after one month and the third after 6 months. The disease does not confer immunity.

**Transfer to HDU / ICU**

**IN THE HDU /ICU**

**a) OMIT ALL SEDATIVES.**

b) Establish urine output and maintain at >0.5 ml.kg.$^{-1}$h$^{-1}$.

c) Commence intravenous magnesium therapy with

- Loading dose of 5G (80 mg.kg$^{-1}$) in 30 min. and
- Maintenance dose commenced with
  2 g.h$^{-1}$ if <60 years and
  1g.h$^{-1}$ if ≥60 years or moderate tetanus (no spasms).

  Increments of 0.5 g (<60 yrs) or 0.25g (≥60 yrs) six hourly (the serum level takes 6 hours to achieve new level) till spasms are controlled. If spasms are very severe the increment can be increased.
- Titrate to the control of spasms and /or degree of rigidity acceptable to the patient. (Note that If the rigidity is severe the patellar reflex often cannot be elicited)

If the patellar reflex is suppressed and spasms are not controlled continue to increase the dose but monitor respiration more carefully.

If spasms are uncontrolled in the presence of respiratory inadequacy (respiratory rate > 30/min or TV < 4ml/kg) support ventilation but continue to titrate dose to spasms.

- Once spasms have been controlled attempt to reduce the dose by $0.25g.h^{-1}$, to ensure that the minimum effective dose is being given, but make sure that the degree of rigidity is acceptable to the patient.
- If unacceptable hypotension (<70mm systolic) or heart rate of <40 bpm occur stop magnesium. For further details see below.

**4. Monitor**

a. Hourly urine output
b. Ability to cough, patellar reflex, respiratory rate, tidal volume, arterial blood gases and chest X-ray if indicated.
c. Non invasive blood pressure, ECG, pulse oximetry, 12 lead ECG every third day and daily if magnesium concentrations exceed therapeutic levels.
d. Sedation score
e. Serum magnesium daily, more frequently if signs of overdose
f. Clinical signs of hypocalcaemia, serum calcium every third day if possible and X-ray of hand before and after therapy

**If serum magnesium measurements are not available the dosage could be assessed by monitoring clinical signs <u>carefully.</u>**

**The elderly group show signs of suppression of patellar reflex, respiratory inadequacy and even cardiac depression before 4 mmol /l are reached and therefore require support much earlier.**

**5. Interventions**

a) If respiratory rate is >30breaths.min$^{-1}$ or the tidal volume <4ml.kg.$^{-1}$, support ventilation temporarily, give chest physiotherapy and suction clearance. If respiratory inadequacy persists continue support

b) If hypotensive (<70 mm.Hg systolic) stimulate patients, and if bradycardic (<40beats.min$^{-1}$) give atropine.

c) If unresponsive, send blood for serum $Mg^{2+}$, **stop magnesium**, and give intravenous calcium gluconate. When stable continue at a lower dose. If spasms recur supplement with relaxants and ventilatory support.

d) If blood pressure is >170 mm.Hg. systolic or heart rate >120 beats.min$^{-1}$ for > 1 hour, give intravenous morphine.

**6. Supportive therapy**

Regular suction clearance and careful management of tracheostomy applying dry dressings 4 hourly.

Give humidified gases via a tracheostomy mask to reduce the pull on the tracheostomy tube by tubing

Physiotherapy for lungs ( at least 3/day) and limbs

Subcutaneous heparin if patient cannot be mobilised

Keep up constant communication to keep up the morale of the patient.

- Supportive therapy

1. Tracheostomy care:

   - Maintain humidification
   - Suctioning can induce spasms. It may have to be done regularly if secretions are profuse.
   - Check the trancheostomy cuff pressure every 8 hourly
   - Careful management of tracheostomy site, applying dry dressings 4 hourly.

- Supportive therapy

2. Tracheostomy care:
    - Maintain humidification
    - Suctioning can induce spasms. It may have to be done regularly if secretions are profuse.
    - Check the tracheostomy cuff pressure every 8 hourly
    - Careful management of tracheostomy site, applying dry dressings 4 hourly.
2. Adhere to ventilator care bundle
    - Head up tilt – 30 degrees
    - LMWH(enoxaparin) 1mg/kg subcutaneously if no contraindication
    - Gastric Ulcer prophylaxis
    - Oral care - Chlorhexidine mouth washes at least 3 times a day
3. Feeding:
    - Start feeding **after** tracheostomy , through the NG tube
    - Energy requirement- 35kCal/kg/d (can go up to even 40-45kCal/kg/d)
    - Continuous drip NG feeding is the best mode
    - Constipation is a problem. Advocate laxatives and fiber to the diet.
    - Monitor SE, Blood sugar, S.albumin, Urinary urea
4. Chest & limb physiotherapy - May need sedation for the physiotherapy
5. Maintain constant communication with the patient to keep up the moral of the patient.

6. Attempt mobilising the patient in the 2nd week
7. Attempt weaning from magnesium therapy in the third week
8. 6Fill the communicable disease surveillance forms for tetanus

**Dr Deepthi Attygalle and Dr N Rodrigo**

**References for Management**

1.Magnesium sulphate for control of spasms in severe tetanus – D Attygalle and N Rodrigo - *Anaesthesia 1997,*52:952-62

2. Magnesium as first line therapy in the management of tetanus - Dr D Attygalle and N Rodrigo - *Anaesthesia Vol 57 Number 8 August 2002 pages 811-17*

*3.* New trends in the management of Tetanus – Deepthi Attygalle and Nalini Rodrigo – *Expert review of Anti infective Therapy February 2004, Vol 6 no. 1, pages 73-84*