Protocol for Management of Magnesium Toxicity

Magnesium sulphate is the drug of choice for seizure prophylaxis in pre-eclampsia patients. It is mechanism of action is mediated via NMDA receptors in the hippocampus and by antagonizing calcium-mediated cerebral vasoconstriction. The therapeutic plasma level is 4.8-8.4 mg/dL. Magnesium sulphate has an extremely good safety record in pregnancy. It is vital, however, that the patient is monitored for signs of toxicity. If there is any suspicion, a plasma level should be checked (2 h after loading dose and every 6h during maintenance therapy).

Magnesium can be used, but only after ensuring that:
- The patellar reflex is present
- Respirations are not depressed
- Urine output the previous 4hr exceeded 100mL

Signs of toxicity are as follow:

<table>
<thead>
<tr>
<th>Magnesium Level (mg/dL)</th>
<th>Clinical Signs</th>
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</thead>
<tbody>
<tr>
<td>9-12</td>
<td>Loss of patellar reflexes, feeling of warmth, flashing</td>
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<tr>
<td>10-12</td>
<td>Slurred speech, somnolence</td>
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<tr>
<td>15-17</td>
<td>Paralysis of skeletal muscle and apnoea</td>
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<tr>
<td>30-35</td>
<td>Cardiac arrest</td>
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</tbody>
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Management plan

- Stop administration of magnesium
- Call for help including anaesthetist and Obstetrician
- **Air way**
  - Assess
  - Maintain patency
  - Apply oxygen 15 l/min via thigh fitting face mask
  - Attach pulse oxymeter
- **Breathing**
  - Assess
  - Assist
  - Protect airway
- **Circulation**
  - Assess pulse and BP
  - Tilt to left
  - CPR
  - Put on ECG monitor
  - Treat periarrest arrhythmia
  - I.V access. Send blood for CBC, U&Es, and urgent plasma magnesium level
  - Treat hypotension
- Give 10 ml of 10% Calcium gluconate i.v over 2-5 min if magnesium toxicity is likely
- Do not give any further magnesium until plasma level is known to be within or below the therapeutic range
- Continuously monitor fetal heart by CTG and consider timing and method of delivery
- Keep record chart to include PR, BP, RR, SaO2 and treatments given

**Remarks**

**Give 10 ml of 10% calcium gluconate i.v over 2-5 min if magnesium toxicity is likely**

Calcium antagonizes the action of magnesium at a cellular level. It is very effective in reversing the clinical effects of magnesium toxicity. The administration can be repeated every hour, if needed, up to 8 injections in a 24 hour period.

**Do not give any further magnesium until plasma level is known to be within or below the therapeutic range**

Because magnesium is very effective in prevention of eclamptic seizures, suspicion of toxicity should be confirmed by immediate biochemical analysis and where toxicity is excluded magnesium treatment can be restarted.

**The most common causes of toxicity are, iatrogenic over dosage, deterioration of renal function, which can be common with severe preeclampsia.**

Magnesium sulphate comes in ampoules of 10, 20 and 50% solutions. Calculation for working with various concentrations must be done carefully.