Safe Prescribing: Vitamin D toxicity as a result of inadvertent overdose

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1. Introduction
Vitamin D toxicity is rare; most of the reported cases were in adults and due to intake of high doses. In the last 5 years, there were few case reports of hypervitaminosis D in children due to dosing or manufacturing error. US Institute of Medicine produced guidance on tolerable upper intake level (UIL) in adults and children.

2. Clinical Presentation
4 year old child with back ground history of Autism presented with the following sequential symptoms
Constipation for 6-8 weeks
Loss of appetite for 4 weeks
Polydipsia of 1.5L during the day for 3 weeks
Lethargy for 3 weeks
Vomiting for 2.5 weeks

3. Naturopathy Products
He was taking the below supplements.
- Liqui-D3 2000 IU/drop, 1ml (~30 drops) daily for 4 months
- Cod Liver oil 5ml OD
- Calcium Citrate 40mg TDS for 2 weeks
- Purified Silver 50µg OD
- Lipase Enzyme Complex 1400 units with meals
- AFP digestive enzymes 1-6 caps per day
- Trace Minerals (Iodine 100 µg, Zinc 15mg, Selenium 70µg, copper 1mg. Mg 2mg, chromium 200 µg, molybdenum 100µg, boron 1µg, vanadium 250µg, Silica 10mg, Fat soluble Vitamin C 10mg)
- Achturus Bromelain 500mg with meals
- Sodium Chlorite Mineral solution 28%
- Marine salt Hcl 4%
- Camel milk 2cups a day

4. Investigations

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<th>Age</th>
<th>Dose D1</th>
<th>RNI</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>D5</th>
<th>D6</th>
<th>D7</th>
<th>D8</th>
<th>D9</th>
<th>D10</th>
<th>D11</th>
<th>Range</th>
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<tbody>
<tr>
<td>0-6 mo</td>
<td>300 IU</td>
<td>30 IU</td>
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<td>1-18 mo</td>
<td>400 IU</td>
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<tr>
<td>≥ 9 years</td>
<td>400 IU</td>
<td>40 IU</td>
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5. Treatment
1. Dietary Ca restriction
2. Hyperhydration 2.6 - 3.5L/m² from day 3-8 then 2.3 L/m² till day 12
3. Furosemide 1.5 mg/kg/day from day 2-8, weaned over 2 days and stopped.
4. Calcitonin 40 units IM BD from day 2-4, then IV 10mg/kg on day 4, 6.
5. Pamidronate 0.5mg/kg IV OD day 5-7

6. Vitamin D Course

7. Discussion
Plasma concentration of 1,25 (OH)₂D is regulated at a fairly constant level through both synthesis and catabolism. As 25(OH)D level continues to rise, substrate driven output of 1,25(OH)₂D is no longer regulated appropriately.

A differential diagnosis of 24 hydroxylase deficiency is being considered.

Conclusion:
We report a case of inadvertent overdose of concentrated Colecalciferol preparation, upto 60,000 IU per day, resulting in intoxication. Calcitonin brought reduction in calcium levels but there was rebound hypercalcaemia. Pamidronate infusion had sustained effect on regulating calcium levels.

References
1. Vitamin D toxicity, policy and science; Reinhold Vieth; J Bone Miner Res 2007;22:52;V64–V68.
2. Institute of Medicine, Food and Nutrition Board. Dietary Reference Intakes for Calcium and Vitamin D. Washing-
3. 25-Hydroxyvitamin D-24-hydroxylase (CYP24A1); Its important role in degradation of vitamin D; G. Jones et al. / Archives of Biochemistry and Biophysics 523 (2012) 9-18