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.

Serum levels of 25(OH)D above 500 nmol/L are deemed toxic.

NICE

Age	RNI
0-6 mo	340 IU
6mo-3yr	280 IU
> 65yrs	400 IU

Prevention dose- RCPCH

Age	Dose
0- 1 mo	300– 400 IU daily
1-18 mo	400-1000 IU daily

Tolerable UIL

Age	Dose
0- 6 mo	1000 IU
7-12 mo	1500 IU
1-3 years	2500 IU
4-8 years	3000 IU
≥ 9 years	4000 IU

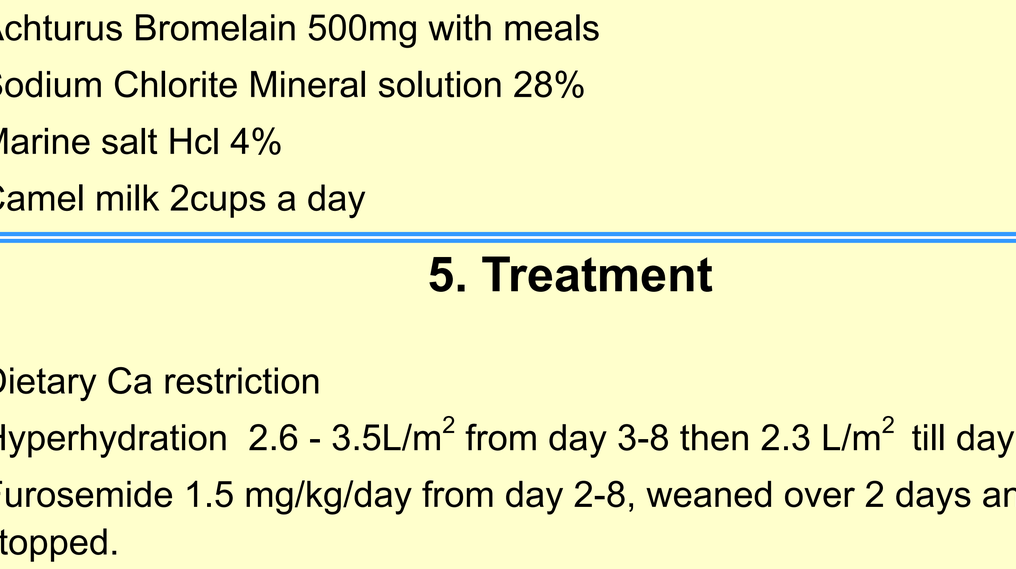
3. Naturopathy Products

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

5. Treatment

1. Dietary Ca restriction
2. Hyperhydration 2.6 - 3.5L/m^2 from day 3-8 then 2.3 L/m^2 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



References

1. Vitamin D toxicity, policy and science; Reinhold Vieth; J Bone Miner Res 2007;22:S2;V64–V68.
2. Institute of Medicine, Food and Nutrition Board. Dietary Reference Intakes for Calcium and Vitamin D. Washington, DC: National Academy Press, 2010.
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

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

4. Investigations

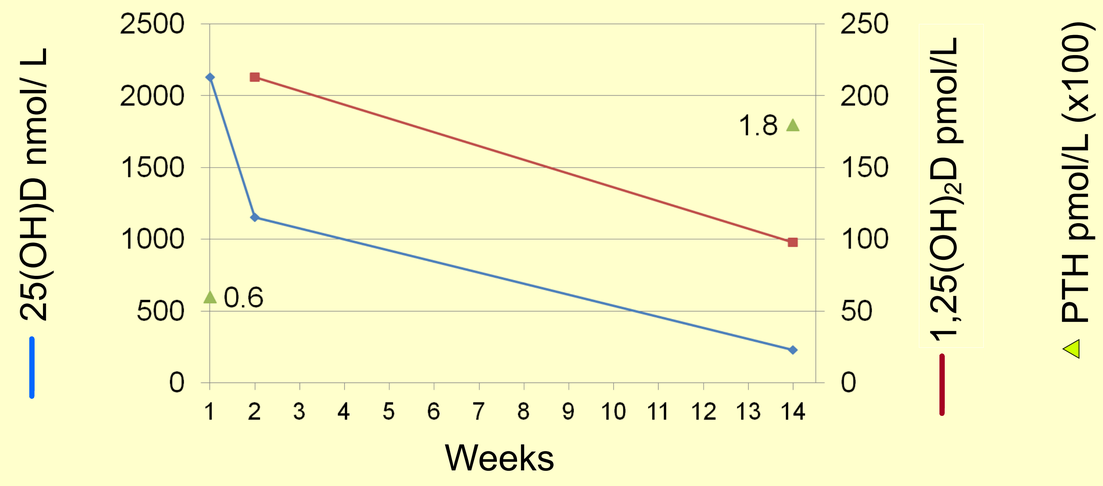
	D1	D2	D3	D4	D5	D6	D7	D7	D10	D12	Range
Na mmol/L	130	135	137	138	150	143	143		140	149	133-146
K mmol/L	4.4	3.3	2.6	3.1	3.1	3.2	3.5		3.4	5.2	3.5-5.3
Urea mmol/L	9.7	4.6	3.2	3.4	5.6	4.7	5.0		1.7	3.3	2.5-7.8
Creat µmol/L	67	58	53	66	83	97	73		32	31	27-42
Ca mmol/L	4.08	4.28	3.15	3.84	4.09	4.46	3.51	3.13	3.02	2.3	2.2-2.6
PO4 mmol/L	1.1	1.0	0.7	1.0	1.1		1.03	0.79	0.99	0.71	0.8-1.5
ALP unit/L	145	137	133		140		109	94	97	92	55-350
Mg mmol/L	1.0	0.7	0.6		0.5				0.72	0.62	0.7-1.0
PTH pmol/L		0.6									1.6-6.9
25OHD nmol/l		2130		1890			1154				80-150
1,25(OH)$_2$ D pmol/L							213				<143
U Ca mmol/L				4.5				1.4	1.3	1.1	
U Cr mmol/L								0.7	1.0	1.1	

ECG - normal sinus rythm, QT interval

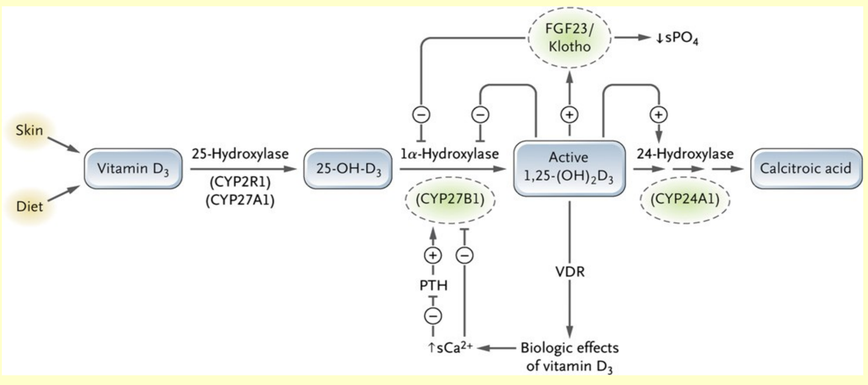
MRI Brain - No cerebral calcification

USS Kidneys - Mild Nephrocalcinosis

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.