CASE REPORT

Severe hypercalcaemia in a child secondary to use of alternative therapies

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SUMMARY

We describe a case of a 4-year-old boy who presented with acute vomiting, weight loss, loss of appetite, polyuria and polydipsia. Initial investigations revealed a very elevated corrected calcium level which peaked at 4.46 mmol/L. He had a prior diagnosis of autism and his mother had consulted an alternative therapist who had recommended many supplements, including calcium and vitamin D. He required treatment with hyperhydration, calcitonin, furosemide and several doses of pamidronate before his calcium level returned to the normal range 2 weeks later.

BACKGROUND

Complementary and alternative medicines (CAM) are commonly used in the paediatric population,¹ but as this case demonstrates, there can be significant adverse effects which may go unrecognised due to lack of monitoring, recognition and experience with these therapies.

CASE PRESENTATION

This was a 4-year-old boy who presented to our accident and emergency department with a 3-week history of vomiting, loss of appetite, constipation, polyuria, polydipsia and loss of 3 kg in weight in the previous 2 weeks. His only significant medical history was of autism spectrum disorder (ASD). He was on no regular prescribed medications and there was no significant family history. He was the only child of his parents who were fit and well.

INVESTIGATIONS

Initial basic blood tests were performed which revealed a corrected calcium level of 4.08 mmol/L (normal range: 2.20–2.60 mmol/L), and in view of this and the history of vomiting and weight loss, further investigations were arranged to exclude common causes of hypercalcaemia such as hyperparathyroidism and malignancy. He had an ultrasound scan of the abdomen and MRI brain which were both normal. He also had an ECG to look for changes secondary to hypercalcaemia such as QT shortening or Osborn waves, and this was also normal. Vitamin D level was checked and was 2130 nmol/L (normal range: 50–150 nmol/L) and parathyroid hormone was 0.6 pmol/L (normal range: 1.6–6.9 pmol/L). The rest of his blood tests was unremarkable.

DIFFERENTIAL DIAGNOSIS

Several days into his admission his mother disclosed that for a number of months he had been taking 12 different holistic supplements recommended to the

family by a naturopath to help with his autism. These supplements included vitamin D (2000 IU OD), calcium magnesium citrate (containing 80 mg calcium), cod liver oil (containing 1000 IU vitamin D), camel milk (containing ~600 mg calcium daily), silver, biocare lipozyme, achetur bromelain, zinc, trace minerals, epsom bath salts, AFP peptizyde and sodium chloride. In view of other investigations being normal and the evidence of vitamin D toxicity on his blood results, it was felt that the supplements he was taking were the most likely explanation for his hypercalcaemia.

TREATMENT

He was given aggressive fluid rehydration but his calcium level did not improve, so calcitonin and furosemide were added on the advice of the tertiary paediatric endocrine team. Pamidronate was later given and calcium level initially responded well to this but then further increased up to 4.46 mmol/L. He was transferred to the tertiary endocrine unit where he was given a further two doses of pamidronate and his fluids and furosemide were weaned. By discharge, 2 weeks later, his corrected calcium was 2.18 mmol/L (figure 1).

Since the major mechanism responsible for severe hypercalcaemia is the increased bone reabsorption from activation of osteoclasts, bisphosphonates are the treatment of choice as they inhibit the osteoclast activity. Pamidronate and zoledronic acid are approved by the European Medicines Agency and Food and Drugs Administration for the treatment of hypercalcaemia of malignancy, both having shown effectiveness in clinical trials,² but there are little data available on treatment of other causes of hypercalcaemia. It is not clear why our child had an initial rise in serum calcium levels following the first pamidronate treatment, but it could be related to the toxic vitamin D levels leading to ongoing calcium reabsorption in the gut and a delayed response to pamidronate.

OUTCOME AND FOLLOW-UP

The patient is under follow-up with the endocrine team and with the specialist calcium and bone team and has had no further problems since stopping the supplements. His parents were devastated that something they had given to their son with good intent had made him so unwell. The safeguarding team became involved as well as the police to investigate the naturopath who had advised the therapies.

DISCUSSION

The use of CAM is common within the paediatric population and probably greatly underestimated by

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Figure 1 Trend in calcium levels during admission.

most paediatricians. A study in Wales¹ surveyed 500 children in inpatient and outpatient settings presenting to a tertiary paediatric unit and found that 41% had used CAM in the previous year. Many families view these therapies as safer 'natural' options; however, there is significant potential for adverse effects. A recent Australian study³ evaluated reported adverse effects of CAM over a 3-year period. They recorded 39 adverse events, including four deaths. Sixteen of the adverse events were not directly related to the CAM but caused by decision to use CAM over conventional medical options. Direct adverse effects were widely varying, but the most common included gastrointestinal symptoms, bleeding and seizures.

Moreover, families often under-report the use of complementary therapies to medical practitioners because they do not want to admit to the use of non-conventional options or because they do not consider this relevant information to disclose during the medical consultation. In Crawford *et al's* study,¹ 66% of users did not disclose the use of CAM to their doctor.

Some preceding medical conditions can cause increased susceptibility to vitamin D toxicity such as primary hyperparathyroidism⁴ and vitamin K depletion,⁵ but we have not identified any specific reasons why our child should have been at higher risk. His underlying diagnosis of autism does, however, make him more likely to use CAM. One American study⁶ looked specifically at CAM use in 112 children with ASD where 74% reported use. Reasons for increased use were dissatisfaction with conventional treatments and also the feeling that CAM practitioners took a more hands-on approach and considered more emotional and physical aspects of care. Some parents also reported a sense of empowerment by making the choice of what treatments to give their children. Among families of children with ASD surveyed by Hanson *et al*,⁶ over 75% of families chose therapies based on their perception of safety and absence of side effects. Another study reported that almost one-third of children being referred with suspected ASD were already being treated with dietary therapies by their parents even before diagnosis.⁷ Although families often report that they use CAM because of fear of side effects with conventional medicine, there is limited data regarding side effects of CAM practices themselves. Other supplements our patient was taking also have potential for adverse effects, but there are minimal reliable research data available on what these may be which adds to the difficulty in recognising them. Side effects may range from direct systemic or topical toxicity, to allergic reaction, to the presence of contaminants and to interactions with prescribed medications. Nutritional supplements are not regulated as drugs, so there is little oversight regarding quality control.⁸

In summary, the available literature suggests that CAM use is highly prevalent in the paediatric population particularly in children with chronic illnesses, including ASD. Although families may report benefits with these treatments, there is no regulation of their use and, as our case demonstrates, there can be significant adverse effects. The parents of our patient did not disclose the use of CAM until a few days into the admission and this is in keeping with studies which show that the majority of parents will not spontaneously disclose this information to medical practitioners. It therefore needs to become routine practice to gather this information as part of the history taking process in all patients, as it may explain symptoms they are experiencing or affect the treatment decisions made.

Learning points

- ▶ There is a general belief that complementary therapies are 'natural' and therefore cannot cause harm, but there are many reported cases of complications, including fatalities, and probably many others which are not reported to medical practitioners or recognised as being attributable to CAM.
- ▶ We probably underestimate the use of CAM, but studies suggest that it is particularly prevalent in cases such as autism where there are limited conventional medical treatment options and advice regarding complementary therapies is not regulated.
- ▶ The high prevalence of CAM use means that practitioners should make asking about their use a routine part of the medical history so as to detect adverse effects and interactions with prescribed medications.

Contributors Case study written up by CB and supervised by consultant AM who were also both clinically involved in the case.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Crawford NW, Cincotta DR, Lim A, *et al*. A cross-sectional survey of complementary and alternative medicine use by children and adolescents attending the University Hospital of Wales. *BMC Complement Altern Med* 2006;2:16.
- 2 Minisola S, Pepe J, Piemonte S, *et al*. The diagnosis and management of hypercalcaemia. *BMJ* 2015;350:h2723.
- 3 Lim A, Cranswick N, South M. Adverse events associated with the use of complementary and alternative medicine in children. *Arch Dis Child* 2011;96:297–300.
- 4 Vieth R. Vitamin D supplementation, 25-hydroxyvitamin D concentrations, and safety. *Am J Clin Nutr* 1999;69:842–56. <http://ajcn.nutrition.org/content/69/5/842.full> (accessed 20 Jun 2016).
- 5 Masterjohn C. Vitamin D toxicity redefined: vitamin K and the molecular mechanism. *Med Hypotheses* 2007;68:1026–34.
- 6 Hanson E, Kalsh LA, Bunce E, *et al*. Use of complementary and alternative medicine among children diagnosed with autism spectrum disorder. *J Autism Dev Disord* 2007;37:628–36.
- 7 Levy SE, Mandell DS, Merhar S, *et al*. Use of complementary and alternative medicine among children recently diagnosed with autistic spectrum disorder. *J Dev Behav Pediatr* 2003;24:418–23.
- 8 Levy SE, Hyman SL. Complementary and alternative medicine treatments for children with autism spectrum disorders. *Child Adolesc Psychiatr Clin N Am* 2008;17:803–20.

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