Case Report

Self administered cattle selenium supplement

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Case report

A 52-year-old female New Zealand European dairy farmer presented a week after the onset of a sore throat, dysphagia, lethargy, associated with a painful knee, which had been intermittently stiff and sore for two years.

Examination revealed only a mild pharyngitis. She was treated with simple analgesics and advised to rest. A throat swab and knee x-ray were arranged. The swab was sterile; she did not attend the x-ray appointment.

Two days later she developed a sudden onset of severe spasmodic lumbar pain, which had begun on rising from bed. She had a restricted range of movement of her lumbar spine and her paraspinal muscles were tense and tender to touch.

She was treated with a non-steroidal anti-inflammatory and a short course of benzodiazepine as muscle relaxant. She was advised to return in three days if she was not very much improved.

Two weeks later she re-presented having now developed a cramping pain in her right flank, made worse with coughing and any movement. Her throat was no better, her right knee was still painful, she had developed a slightly itchy patch of erythema about 5cm across on her abdomen, she was feeling increasingly lethargic. She had managed to go line dancing during the week but had been restricted by generalised myalgia and exertional dyspnoea.

Full blood count, liver function tests, blood glucose, rheumatoid factor, uric acid, mid stream urine were arranged and revealed only a slightly elevated ALT at 65U/l (NR 0-45U/l), she arranged the previously recommended knee x-ray which showed 'an impression of an erosion on the lateral aspect of the tibial plateau'. The radiologist speculated that the patient might have gout or rheumatoid arthritis.

One week later she felt that her dysphagia was worsening, she was having difficulty with solids and liquids due to pain in her throat, tongue and the floor of her mouth. At this point the possible psychological nature of these varied unexplained symptoms was considered; she admitted to having family pressures and the possibility of somatisation was discussed.

A few days later she returned and volunteered the information that for the past four years she had been taking four drops a day of cattle selenium sulphate solution and she wondered whether this could be associated with her symptoms. Her serum selenium levels were measured at 1.75umol/l (NR 0.45–1.4 umol/l)

The myalgia, lethargy, dysphagia, and dyspnoea resolved completely within a few weeks of stopping her self-medication.

Discussion

Selenium supplementation of animal feeds is necessary in New Zealand since the soil is deficient in the element and insufficient intake lowers immune responses, reproduction, milk production, growth, and can lead to white muscle disease in both sheep and cattle.

It is recommended that a 500kg animal have 1mg of selenium a day.

This patient was taking approximately 0.5 ml of a solution of 5mg/ml, roughly what is required for a 250kg cow and about five times the recommended daily human dose.

Leaflets from the local pharmacist state categorically that *'selenium is an essential trace mineral'* and that *'low levels of selenium are linked to a higher risk for cancer, cardiovascular disease, inflammatory diseases and other conditions associated with free radical damage, including premature ageing and cataract formation.'*

The over the counter cost of selenium supplements (50–100ucg) is around $50.00 for 100 tablets, but veterinary surgeons prescribe a solution for addition to stock feeds, the cost of which is around $12.00 for 30ml. There has been speculation in the past that self-medication with these compounds is not uncommon[1] and Farquhar in a letter to the *NZMJ* reports of a farmer using cattle selenium solution for acute treatment of arthritis.[2] This is the only report of long-term self-directed overdose in the literature.

Despite the pharmacy leaflets, the role of selenium in human disease is unclear, although it is an essential mineral in the enzyme glutathione peroxidase.[3] Deficiency has been speculated to be important in a number of diseases including Keshan's disease (cardiomyopathy),[4]

Kashin Beck disease (osteoarthritis),[5] myositis,[6] cancer,[7] heart disease,[8] and asthma.[9]

Recommended daily doses vary between 50 and 100mcg per day,[10] and normal dietary intake varies between 20 and 300mcg per day.[10]

Chronic overexposure to selenium occurs in industrial situations where it is used in electronic and photocopier components, ceramic manufacturing, stainless steel production, gun blueing and rubber vulcanisation.

Reported effects of this exposure include fatigue, pallor, irritability, garlic odour of breath, nasopharyngeal and bronchial irritation and gastrointestinal disorders.[11]

Chronic dietary poisoning with selenium in humans has been reported as causing loss of hair, skin and nail lesions, tooth decay, gastrointestinal disorders, garlicky breath and neurological symptoms including fatigue irritability, lightheadedness, tremor, hyperreflexia and paraesthesia.[11]

This patient had a recorded selenium plasma level of 1.75umol/l (NR 0.45–1.4umol/l) i.e. 0.138mg/l. Asymptomatic workers in selenium factories had recorded levels of between 120 and 350mg/l with concentrations of over 400mg/l in symptomatic individuals. Levels of 0.5mg/l to 18mg/l were found in the serum of fatalities.[11] Acute overdosage with selenium has been reported in 20 cases;[12] deaths reported are due to circulatory failure, pulmonary oedema, or bowel infarction.

This case...reinforces the recommendation that GPs ask about over the counter medications

At the time of this patient's presentation, Dr M Bearsley of the National Poisons Centre, Otago University, commented that doses over 5mg per kg body weight of selenium have some potential for toxicity, that 0.2–0.5mg total daily dose is unlikely to be hazardous and that although this patient had some features of chronic selenium poisoning, since her serum levels were similar to asymptomatic individuals this would suggest some other causality. However, her return to normal health after stopping supplementation of her diet with selenium solution suggests that it was implicated in her symptomatology.

This case illustrates why the promotion of supplements needs to be carefully monitored and reinforces the recommendation that GPs ask about over the counter medications, particularly when symptoms are complex and do not fit into a recognised pattern.

References

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Continuity of Care

'A sustained partnership between patients and clinicians' is held by the Institute of Medicine (IOM) to be a critical element of primary care. This sustained partnership is commonly called continuity of care. It is a cornerstone for realizing other aspects of primary care, as defined by the IOM, including integration of care, accountability for a large majority of personal health care needs, and practicing in the context of family and community.

The ability of patients and clinicians to achieve this sustained partnership is under attack. Health care system changes are resulting in forced discontinuity of care. This disruption differentially affects vulnerable patients. If the trend is not reversed soon, a generation of patients and clinicians will live without the everyday experience of longitudinal, trusting, healing relationships. Not knowing the possibilities inherent in these relationships, we will not make the best decisions about individual health care or systems redesign.

– Stange KC. Editorial. In this issue: Continuity of care. Annals Fam Med 2003; 1:130–131