



Vegan Diet Induced Myopathy

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Authors' contributions

This work was carried out in collaboration among all authors. Author VC designed the study, wrote the protocol, and wrote the first draft of the manuscript. Authors SV and SS managed the analysis, revisions and conceptualization of the study. Author RR managed the literature searches and the final drafting process. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

Background: Secondary hyperparathyroidism can present for the first time as myopathy in some patients. Strict vegans are at risk of vitamin D deficiency resulting in secondary hyperparathyroidism. A myopathic presentation may lead to investigations and misdiagnosis of neuromuscular disease, rather than a metabolic bone disease.

Methods: We report a young lady presenting with severe progressive limb girdle pattern myopathy, with brisk reflexes and peripheral neuropathy. Electrophysiology confirmed the presence of myopathy and neuropathy, and laboratory evaluation revealed vitamin D deficiency and elevated parathormone levels.

Results: She was supplemented with vitamin D, and on follow up was found to have a near complete improvement.

Conclusion: Hence it is imperative to evaluate for vitamin D deficiency in all susceptible patients, especially with a history of strict vegetarianism.

Keywords: Parathormone; myopathy; secondary hyperparathyroidism; electrophysiology; neuropathy.

1. INTRODUCTION

Secondary hyper-parathyroidism is the result of increased PTH secretion to compensate for hypocalcemia secondary to vitamin D deficiency or chronic kidney failure. They are usually asymptomatic or present as bone syndromes, e.g. osteomalacia or osteodystrophy. However, presentation as myopathy is rare. Vegans can have secondary hyperparathyroidism secondary to vitamin D deficiency [1] and vitamin D deficiency per se can cause disabling myopathy [2]. This case report highlights a recently converted strict vegan presenting with myopathy with emphasis on two unusual features of hyperparathyroid myopathy, namely brisk DTRs and its association with sensory neuropathy.

2. CASE VIGNETTE

A 23-year-old lady presented with gradual onset symmetric progressive proximal weakness of lower limbs over the previous two years with no significant past medical or family history. She had changed to a vegan diet two years back and was following a strict vegan diet which was devoid of all animal products including meat, eggs and dairy products.

Her motor examination revealed a limb girdle pattern of weakness, hypotonia, bilateral minimal thigh wasting, brisk Deep tendon reflexes and sensory neuropathy for all modalities of both lower limbs bilaterally. Laboratory investigation revealed normal CPK, thyroid, vasculitis profile and low levels of calcium and vasculitis profile. Her MRI Brain and Spine was normal. Vitamin D and parathyroid levels were investigated and vitamin D levels were significantly low with elevated iPTH. Her Alkaline phosphatase was also elevated. Electromyogram confirmed the myopathic process and NCS revealed axonal sensorimotor neuropathy. Patient was treated with calcium supplementation and vitamin D 60000 IU once a week for 8 weeks and discharged. At the end of one month she came for follow up walking without any support signifying improved power in her lower limbs.

3. DISCUSSION AND CONCLUSION

The incidence of hyperparathyroidism secondary to vitamin D deficiency can be related to varying degrees of vegetarianism. Lacto-vegetarians (vegetarian diet which includes dairy products, but excludes eggs) are at greater risk of vitamin D deficiency than ovo-lacto-vegetarians (vegetarian diet which includes dairy products

and eggs) [3]. Conventionally vegan diet has been linked to low Vitamin b12 levels and poor exposure to sunlight to low vitamin D levels. With the general prevalence of low vitamin D levels, vegans are at a higher risk to develop clinically significant vit D deficiency, considering that plants are a poor source of Vit D [4].

Vitamin D deficiency related myopathy has a proximal distribution, pain secondary to muscular effort and associated waddling gait [5]. Besides proximal weakness and atrophy, examination of patients with hyperparathyroidism often reveals brisk muscle stretch reflexes with flexor plantar responses, and there are rare reports of spasticity and extensor plantar responses [6]. In addition, 29% to 57% of patients experience stocking-glove loss of pain or vibratory sensation and decreased muscle stretch reflexes suggestive of an underlying peripheral neuropathy [7-9]. Our patient had both features of Brisk deep tendon reflexes and sensory neuropathy which is relatively unusual. The muscle weakness in vitamin D deficiency develops very gradually, and is frequently misinterpreted and over evaluated.

Elevated levels of parathyroid hormone are associated with impaired energy metabolism secondary to cyclic AMP (cAMP) activation of calcium channels, initiated by parathyroid hormone, raising the intracellular calcium to a level sufficient to increase activation of intracellular proteases, thus, tipping the molecular homeostatic balance in favor of muscle degradation [10,11]. Vitamin D may also play a role in muscle weakness and has been shown to have a direct effect on muscle, by increasing ATP concentration in muscle and facilitating the uptake of calcium by sarcoplasmic reticulum and mitochondria [12]. The myopathy associated with osteo-malacia responds well to vitamin D and calcium replacement. Our patient also showed excellent response to vitamin D supplementation.

In conclusion, the importance of working up for endocrine myopathies is stressed, as timely recognition of the disease shall improve the outcomes of these patients.

LEARNING POINTS

Vegan diet can result in severe vitamin D deficiency which can manifest as proximal myopathy.

Patients with secondary hyperparathyroidism can have sensory neuropathy along with myopathy.

Brisk reflexes in a myopathy patient should arouse the possibility of metabolic causes like Hyperparathyroidism.

The importance of a detailed nutritional history in patients with progressive myopathy with-out family history is emphasised.

CONSENT

As per international standard or university standard, patients' written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Førland ES, Lindberg MJ. [Severe macrocytic anaemia and secondary hyperparathyroidism in a vegan]. *Ugeskr Læger*. 2015;177(33).
2. Chandrasekaran S, et al. Occurrence of disabling myopathy secondary to hypovitaminosis S, Narone. *UC.IJRCL*. 2013;1(1):CS2
3. Dinu M, Abbate R, Gensini GF, Casini A, Sofi F. Vegetarian, vegan diets and multiple health outcomes: A systematic review with meta-analysis of observational studies. *Critical Reviews in Food Science and Nutrition*. 2017;57(17):3640–3649.
4. Crowe FL, Steur M, Allen NE, Appleby PN, Travis RC, Key TJ. Plasma concentrations of 25-hydroxyvitamin D in meat eaters, fish eaters, vegetarians and vegans: results from the EPIC-Oxford study. *Public Health Nutr*. 2011;1:340-6.
5. Rasheed K, Sethi P, Bixby E. Severe vitamin d deficiency induced myopathy associated with rhabdomyolysis. *N Am J Med Sci*. 2013;5(5):334-336. DOI: 10.4103/1947-2714.112491
6. Carnevale V, Minisola S, Romagnoli E, D'Erasmus E, Bragoni M, Rosso R. Concurrent improvement of neuromuscular and skeletal involvement following surgery for primary hyperparathyroidism. *Journal of Neurology*. 1992;239:57.
7. Staff NP, Windebank AJ. Peripheral neuropathy due to vitamin deficiency, toxins, and medications. *Continuum (Minneapolis, Minn)*, Oct;20(5 Peripheral Nervous System Disorders). 2014;1293-1306.
8. Brent P. Goodman, diagnostic approach to myeloneuropathy; continuum: Spinal cord, root, and plexus disorders. 2011;17(4).
9. Turken SA, Cafferty M, Silverberg SJ, De La Cruz L, Cimino C, Lange DJ. Neuromuscular involvement in mild, asymptomatic primary hyperparathyroidism. *The American Journal of Medicine*. 1989;87(5):553–557.
10. Baczynski R, Massry SG, Magott M, El-Belbessi S, Kohan R, Brantbar N. Effect of parathyroid hormone on energy metabolism of skeletal muscle. *Kidney Int*. 1985;28:722-7.
11. Bardin T. Musculoskeletal manifestations of chronic renal failure. *Curr Opin Rheumatol*. 2003;15:48-54.
12. Curry OB, Basten JF, Francis MO, Smith R. Calcium uptake by the sarcoplasmic reticulum of muscle from vitamin D deficiency in rabbits. *Nature*. 1974;249:83-4.

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