Acid maltase deficiency presenting with a myopathy and exercise induced urinary incontinence in an 8 year old male.

Pompe's disease, or type II glycogenosis, was first described in 1932 and was shown to be due to a deficiency of the lysosomal enzyme acid-alpha-1,4-glucosidase (acid maltase) in 1963. Usually the disease presents in infancy with hypotonia, respiratory difficulty and cardiac failure. The same enzyme deficiency may present in adults with a myopathy and symptoms can begin as late as the sixth decade. Respiratory muscle involvement is common, may be the presenting feature and is said to distinguish acid maltase deficiency from other limb girdle myopathies. Recently we have identified a case of adult acid maltase deficiency with an unusual presentation. A 68 year old man first noticed difficulty with walking at the age of 65, no neurological symptoms could be identified before this. He complained of progressive painless, mild leg weakness, difficulty rising from a chair and from sitting. For several months he had experienced urinary incontinence which occurred without warning and despite voiding before exercise, after a minimum of 20 minutes walking and not at any other time. There were no symptoms of prostatism, faecal incontinence, upper limb weakness or breathlessness.

In examination cranial nerves and neck strength were normal. His standing posture was abnormal with an exaggerated lumbar lordosis due to truncal weakness. He could not sit up from lying with the arms folded and had difficulty rising from a low chair. There was mild weakness of shoulder abduction but otherwise the upper limbs were normal. The left quadriceps was wasted and he had a mild distal and moderate proximal leg weakness of an asymmetric distribution, worse on the left. The reflexes were reduced but preserved and sensation normal. The general examination, including the prostate was normal.

Plasma creatine kinase was raised at 429 U/L (normal 24–161). EMG of the leg muscles including the left rectus femoris showed no definite abnormality. A quadriceps muscle biopsy demonstrated marked vacuolar degenerative changes in the sarcoplasm of the muscle fibres with prominent positive staining for acid phosphatase in relation to the vacuoles. Many of the vacuoles contained fine granular material, some of which contained abundant glycogen. On electron microscopy some of the glycogen deposits were membrane bound (lysosomal) [fig]. Muscle glycogen content was increased to 3·38 mg/100 mg wet weight (controls, n = 12; 0·34 ± 0·23). Acid alpha glucosidase activity was reduced in muscle, leukocytes and cultured skin fibroblasts (table). Pulmonary function tests (lying and sitting), ECG, chest radiograph, abdominal ultrasound, IVU and a bone scan were all normal. A videocystometrogram, performed in the supine position at a filling rate of 20 ml/min, showed gross detrusor instability (maximum subtracted detrusor pressure 70 cm water) with total incontinence occurring at a capacity of 250 ml. There was no bladder neck incompetence or stress incontinence demonstrated on straining and voiding was unobstructed. His urinary incontinence responded well to treatment with an anticholinergic drug.

All forms of glycogenosis type II are inherited as an autosomal recessive trait. Until the infantile variant was described, the diagnosis of acid maltase deficiency clinically affects only skeletal muscle, and this disorder may be mistaken for polymyositis or a genetically determined myopathy of unknown aetiology. Most reported cases present between the second and fourth decade with symptoms generally preceding presentation by several years. The oldest previously described case was 17 years old. Our patient is the oldest reported case indicating that this diagnosis should be considered in patients as late as the seventh decade, who have a painless myopathy, even in the absence of respiratory compromise. Residual fibroblast alpha-glucosidase activity is generally less than 2% of controls in infantile cases but between 10-29% of controls in cells from adults. 

The activity in this case was remarkably low despite the mild phenotype. Biochemical and phenotypic heterogeneity has been observed by others.

Our patient had normal respiratory function but an unusual pattern of incontinence, which has not been previously described in this disease. The relationship between the onset of his myopathy and the development of urinary incontinence are not coincidental. Many patients with detrusor instability remain asymptomatic, probably because they augment urethral closure pressure by increased striatal muscle activity in the sphincter mechanism. We postulate that the inability to withstand increases in detrusor pressure only occurred because of striated pelvic floor muscle fatigue associated with exercise. An alternative explanation is that his detrusor overactivity was due to a neurogenic mechanism. There is some evidence that in the adult form of acid maltase deficiency a muscle component may contribute to muscle weakness because of involvement of spinal motor neurons. Although a high protein, low carbohydrate diet has been proposed for the treatment of this condition, with some evidence of improvement in studies of single cases, our patient's disability was mild and his age may not.
mean that death will be unrelated to his myopathy.

3 Engel AG. Acid maltase deficiency in adults: studies in four adults of a syndrome which may mimic muscular dystrophy or other myopathies. *Brain* 1970;93:599-60.
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