NDT Plus (2008) 3: 151–153
doi: 10.1093/ndtplus/sfn016
Advance Access publication 3 March 2008

NDT PLUS
Nephrology Dialysis Transplantation

Case Report

Spinal cord compression from a brown tumour despite maximal medical therapy with cinacalcet and sevelamer

Chris Wiebe, Julie Ho, Barry Cohen and Clara Bohm

Department of Nephrology, University of Manitoba, Manitoba, Canada

Keywords: brown tumour; cinacalcet; secondary hyperparathyroidism; spinal cord compression

Background

Secondary hyperparathyroidism is a common complication of end-stage renal disease (ESRD), which occurs as a result of hyperphosphataemia, hypovitaminosis D and hypocalcaemia. Chronic hyperparathyroidism can result in osteitis fibrosis cystica, also known as brown tumours. Spinal cord compression from a brown tumour is a rare emergency and of the eight reported cases in the literature, this represents the first case while undergoing treatment with sevelamer and cinacalcet. Although cinacalcet may have a role in the metabolic control of hyperparathyroidism, caution needs to be taken in delay or avoidance of parathyroidectomy in severe cases, as it may cause delays in necessary therapy.

Case report

A 33-year-old obese aboriginal woman with ESRD secondary to type II diabetes who had been on haemodialysis for 7 years presented on 9 February 2006 with a 3-day history of back pain and progressive leg weakness after a minor fall. She had a known history of severe hyperparathyroidism despite treatment with calcium carbonate 500 mg four times daily, calcitriol 1 mcg three times weekly and sevelamer up to 8 g per day. She had been scheduled for a parathyroidectomy 10 months previously. Her parathyroidectomy was subsequently cancelled after her parathyroid hormone level (PTH) had decreased from 1616 pg/mL (normal 7–50 pg/mL) to 629 pg/mL with the addition of cinacalcet (90 mg orally once a day) over a 3-month period. However, despite maximal doses of sevelamer, calcium carbonate, calcitriol and cinacalcet, her PTH was 615 pg/mL when she presented with spinal cord compression. Physical examination demonstrated normal vitals and cardiac, respiratory and abdominal examinations were also noncontributory. Neurologic examination revealed bilateral hip flexor weakness (left 2/5, right 3/5), patchy saddle anaesthesia and minimal rectal tone. Sensation and proprioception were intact distally. Plantar reflex was flexor on the left, and the right side was not tested due to the presence of a cast for a non-pathological ankle fracture. Laboratory results included calcium 1.83 mmol/L (7.32 mg/dL), phosphate 1.29 mmol/L (3.99 mg/dL), albumin 37 g/L (3.7 g/dL) and alkaline phosphatase of 970 u/L. MRI revealed multiple lesions involving T1 (first thoracic), T7–T11, and L1–S1 (first lumbar to first sacral) vertebrae (Figure 1a). Significant spinal cord compression was identified at the T7 and T11 levels (Figure 1b). Open surgical biopsy revealed haemosiderin-containing macrophages, collagenous tissue and abundant isomorphic giant cells consistent with a brown tumour (Figure 1c). The patient underwent urgent surgical spinal cord decompression and parathyroidectomy. As the lesion was highly vascular, only a partial laminectomy was performed and the T7 level and the remainder of the lesions were treated conservatively. Postparathyroidectomy her PTH rapidly decreased to 26 pg/mL by 21 March. Her hospital course was complicated by an intensive care unit admission for non-malignant, hemorrhagic pericardial tamponade. Follow-up MRI 80 days later showed significant improvement at all spinal cord levels with some mild residual cord compression at T9–T11. The patient's symptoms have improved but she remains wheelchair bound.

Discussion

Osteitis fibrosis cystica is a pathological state of increased osteoclastic resorption of calcified bone with replacement by fibrous tissue. This is accompanied by foci of haemorrhage and cyst formation [1]. Aggregates of osteoclasts, reactive giant cells and hemorrhagic debris occasionally form masses that may be mistaken for neoplasms and have been called brown tumours. Although cinacalcet has been shown to partially or completely correct calcium, phosphate and PTH levels associated with hyperparathyroidism, these are only surrogate outcomes and there is no direct evidence to

Correspondence and offprint requests to: Chris Wiebe, Department of Nephrology, University of Manitoba, Manitoba, Canada. E-mail: umwieb18@cc.umanitoba.ca

Table 1.

Case reports	Date	Age	Gender	Type of hyperparathyroidism	Renal function	Neurologic symptoms	Spine level	Calcium level (mmol/L)	Outcome
Bohlam *et al.*	1986	69	F	Secondary	ESRD	Paraparesis	T8	4.5	Died
Masutani *et al.*	2001	39	F	Secondary	ESRD	Paraplegia	T4	3	Walking unaided
Pumar *et al.*	1990	24	F	Secondary	ESRD	Paraparesis	T8	N/A	N/A
Fineman *et al.*	1999	37	F	Secondary	ESRD	Paraparesis and numbness	T9	2.6	Walking with cane
Vandenbussche *et al.*	2004	37	F	Secondary	ESRD	Paraparesis	T8	N/A	Walking unaided
Shaw *et al.*	1968	58	F	Primary	23 mL/min	Paraparesis	T10	3.7	Walking with walker
Siu *et al.*	1977	64	F	Primary	16 mL/min	Paraplegia	T10	3.4	Remained paraplegic
Kashkari *et al.*	1990	51	F	Primary	N/A	Paraparesis	T6–7	3.4	Complete recovery
Current case	2006	33	F	Secondary	ESRD	Paraparesis	T7, T11	1.83	Wheelchair

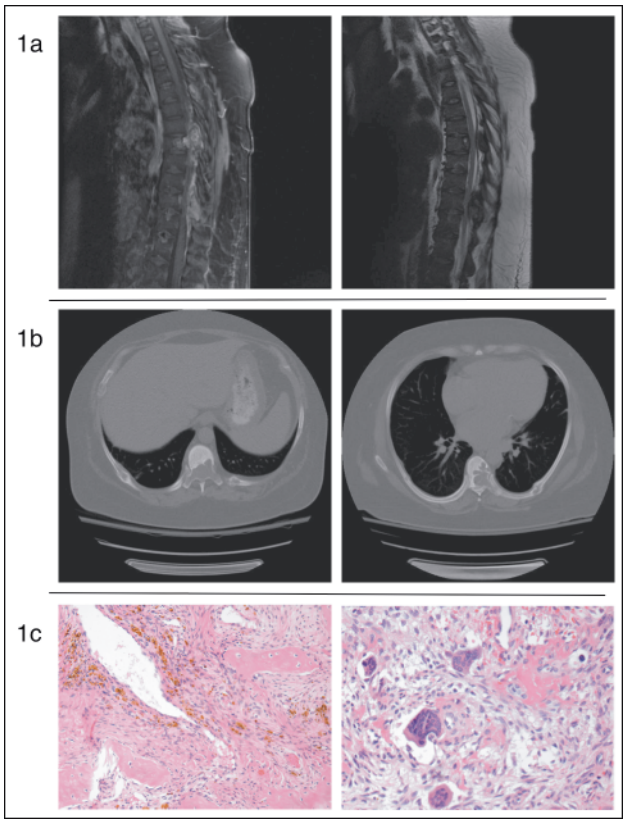

Fig. 1. (**a**) Saggital MRI findings at presentation T1 weighted (left), and T2 weighted (right). (**b**) Axial CT findings at presentation of the 11th thoracic vertebral level (left), and 7th thoracic vertebral level (right). (**c**) Pathologic specimen obtained by surgical biopsy showing haemosiderin-stained macrophage (left), and Giant cells (right).

support a decrease in hyperparathyroid-related bone disease [2]. In our casethe addition of cinacalcet did not prevent the development of brown tumour complications despite the fall in the calcium, phosphate and PTH. Conversely, the decrease in these surrogate markers led to a delay in definitive management with parathyroidectomy, subsequently resulting in spinal cord compression.

There have been five reported cases of brown tumours from secondary hyperparathyroidism [3–7] resulting in spinal cord compression and an additional three cases due to primary hyperparathyroidism [8–10] (Table 1). Cinacalcet use has not beendocumented in any of these previously reported cases. All eight cases were female with a median age of 45 years (range 24–69 years) and all involved the thoracic spine. Six cases experienced paraparesis and two had paraplegia. Neck or back pain was common to all patients. Calcium levels were reported in six of the eight cases with a median level of 3.4 mmol/L (13.6 mg/dL; range 2.6–4.5 mmol/L, 10.4–18.0 mg/dL). PTH and phosphate levels were not consistently reported. Only three of the eight patients were able to walk unaided post-operatively; two patients required an assist device to walk; one patient remained paraplegic; one patient died from other medical complications; and there is incomplete information regarding the recovery of one patient. Given the small number of cases available, it is not possible to comment on the overall prognosis associated with spinal cord compression related to brown tumours, but this case contributes additional dimension to clinical outcome information on a rare condition.

This patient was only 12 years old when she was diagnosed with type II diabetes, which, although rare, occurs more commonly in the obese aboriginal patient population. At the time of writing, her diabetes was controlled with glyburide.

To our knowledge this represents the first case of spinal cord compression secondary to a brown tumour in the setting of sevelamer and cinacalcet use. This suggests that even with maximal medical therapy patients may develop serious complications from secondary hyperparathyroidism. Presumably, had the patient had earlier parathyroidectomy, spinal cord compression may have been avoided. Although cinacalcet may have a role in reducing the number of parathyroidectomies performed in the ESRD population, there remains little evidence that it reduces hard clinical outcomes related to secondary hyperparathyroidism. Clearly more needs to be learned about the natural history of hyperparathyroid-associated bone disease in the cinacalcet, sevelamer era. Nephrologists must weigh the risk and benefits of parathyroid surgery against the efficacy of cinacalcet in reducing surrogate markers of metabolic bone disease when deciding how to treat dialysis patients with severe hyperparathyroidism.

Conflict of interest statement. None declared.

References

1. Hruska KA, Teitelbaum SL. Renal osteodystrophy. *N Engl J Med* 1990; 333: 166–174
2. Goodman WG, Hladik GA, Turner SA *et al*. The calcimimetic agent AMg 073 lowers plasma parathyroid hormone levels in hemodialysis patients with secondary hyperparathyroidism. *J Am Soc Nephrol* 2002; 13: 1017–1024
3. Pumar JM, Alvarez M, Perez-Betallon A *et al*. Brown tumor in secondary hyperparathyroidism, causing progressive paraplegia. *Neuroradiology* 1990; 32: 342
4. Bohlman ME, Kim YC, Eagan J *et al*. Brown tumor in secondary hyperparathyroidism causing acute paraplegia. *Am J Med* 1986; 81: 545–547
5. Vandenbussche E, Schmider L, Mutschler C *et al*. Brown tumor of the spine and progressive paraplegia in a hemodialysis patient. *Spine* 2004; 12: 251–255
6. Fineman I, Johnson P, Di-Patre P *et al*. Chronic renal failure causing brown tumors and myelopathy. *J Neurosurg* 1999; 90: 242–246
7. Masutani K, Katafuchi R, Uenoyama K *et al*. Brown tumor of the thoracic spine in a patient on long-term hemodialysis. *Clin Nephrol* 2001; 55: 419–423
8. Shaw MT, Davies M. Primary hyperparathyroidism presenting as spinal cord compression. *Br Med J* 1968; 4: 230–231
9. Siu K, Sundaram M, Scholz C *et al*. Primary hyperparathyroidism presenting with acute paraplegia. *Aust N Z J Surg* 1977; 128: 674–676
10. Kashkari S, Kelly TR, Bethem D *et al*. Osteitis fibrosa cystica (brown tumor) of the spine with cord compression: report of a case with needle aspiration biopsy findings. *Diagn Cytopathol* 1990; 6: 349–353

Received for publication: 29.12.07
Accepted in revised form: 28.1.08