Case 5841

Eurorad

Parathyroid Carcinoma Presenting as Lower Back Pain

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Patient: 43 years, male

Clinical History:

Lower back pain and pain in the left leg in an otherwise fit gentleman. Ten months later he lost 13 kg and had worse pain. MRI revealed widespread metastasis with significant disruption to S1. Investigations revealed primary hyperthyroidism Ultrasound-scan of the neck,T-99m-Sestamibi-scan,skeletal-survey, bone-scan and F-18-FDG-PET scan revealed multiple brown tumours.

Imaging Findings:

This gentleman presented with a two-year history of left sided lower back pain and pain in the left leg. MRI findings were insignificant.He received two sets of facet joint injections and physiotherapy which completely relieved the pain. The pain returned ten months later, emanating from the region of the left sacroiliac joint. He lost 13 kg in weight. The new MRI-scan showed widespread metastasis and cystic changes (see figure 1) with significant invasion of the anterior part of L1 and almost complete obliteration of the left first sacral neural exit foramen which appeared to account for his symptoms. Open biopsy and decompression of the left lumbo-sacral-canal revealed brown tumours secondary to hyperparathyroidism. His corrected serum Calcium, alkaline phosphate, parathyroid hormone (PTH) level and 24hr urinary Ca excretion were raised. An ultrasound-scan of the neck showed a parathyroid adenoma. A technetium-99m-Sestamibi-scan confirmed this with multiple additional areas of increased uptake in the bony skeleton. A skeletal survey and bone scan revealed further brown tumours in the hands, feet, femora and both patellae. A huge parathyroid tumour was excised completely and frozen section showed a parathyroid tumour consistent with an adenoma. Full histological analysis revealed a low grade parathyroid carcinoma. Excision was complete but there was evidence of capsular and vascular invasion. F-18-FDG-PET scan demonstrated multiple metabolically active lesions in the areas of the brown tumours. Post-operative MRI, 5[1] /2 months after operation, revealed partial resolution of all the brown tumours both in terms of marrow signal and size (see figure 2)

Discussion:

In 90% of patients with hypercalcaemia the cause will be either hyperparathyroidism or malignancy. These may be distinguished by whether the parathyroid hormone level is elevated or not. Primary hyperparathyroidism affects 1 in 1000 adults in the UK[1] and may be present for months or even years before the diagnosis is made, with serum calcium levels usually below 3.0mmol/L. Symptoms are absent or mild at this level. The presentation is frequently more dramatic in malignancy with greater elevation of the serum calcium to 3.5 mmol/L or greater, and more pronounced symptoms. Osteitis fibrosa cystica is an infrequent manifestation of hyperparathyroidism and occurs due to subperiosteal bone resorption. Skeletal changes are now only identified in approximately 5% of patients with hyperparathyroidism. It is unusual in the spine and has not previously been reported to occur at multiple non-contiguous spinal levels. Brown tumours in the spine have been described as causing spinal cord and cauda equina compression. Fortunately this patient did not develop any neurological deficit, despite the volume of tumour in the sacral spinal canal. Surgery is the definitive treatment for primary hyperparathyroidism and is recommended in patients with skeletal or renal complications, or in those who are symptomatic (see table 1, The National Institutes of Health guidelines for parathyroidectomy[2]). It should aim to remove the abnormal parathyroid gland(s) and, in the spine, decompress and stabilise where necessary. Kashkari et al[3] reported that needle aspiration biopsy is a safe and rapid method of diagnosing osteitis fibrosa cystica. Analysis of such specimens is difficult, however, and may well be affected by local pathological knowledge or resources. In our case both the CT guided biopsy and open biopsy provided the same histological result, but the differential diagnosis was not suggested until a musculo-skeletal pathologist saw the second sample. Most reported cases of spinal involvement are in patients with secondary hyperparathyroidism related to chronic renal failure.[4,5,6,7,8,9] In this case primary hyperparathyroidism secondary to parathyroid carcinoma presented with multi-level spinal involvement. An excellent result was achieved following parathyroidectomy, with resolution of the spinal disease-inkeeping with previous reports suggesting that cancellous bone makes a prompt recovery, bone mineral density doubling from as early as the end of the first week [10]. Follow-up 13 months after demonstrated a residual L1 deformity which was stable with no other signs of brown tumours in his spine. The sacral cysts had almost completely resolved. We believe that this is the first presentation of a case of non-contiguous multiple level spinal involvement. The possibility of such "Skip lesions" should be considered when interpreting lesions in the spine caused by a primary pathology elsewhere. It could be due to a cause other than metastasis.

Differential Diagnosis List: Parathyroid Carcinoma Presenting as Lower Back Pain

Final Diagnosis: Parathyroid Carcinoma Presenting as Lower Back Pain

References:

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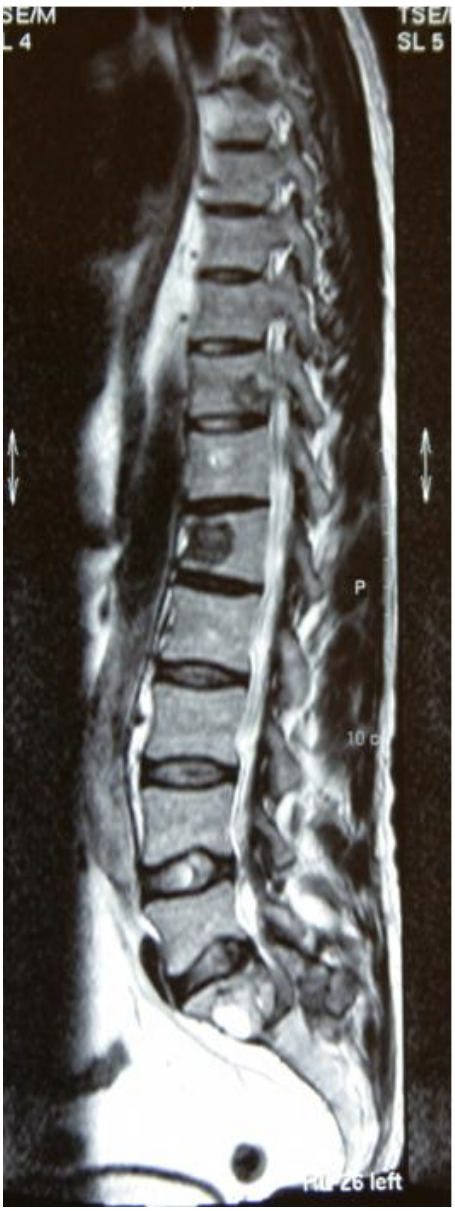
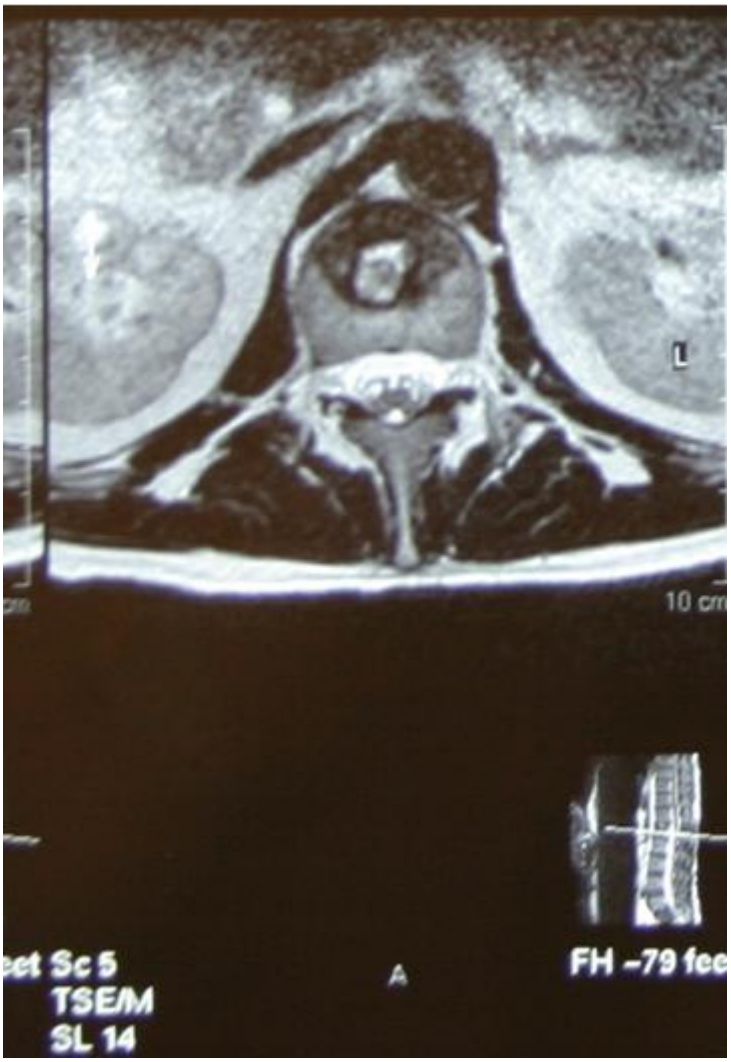
Figure 1

a



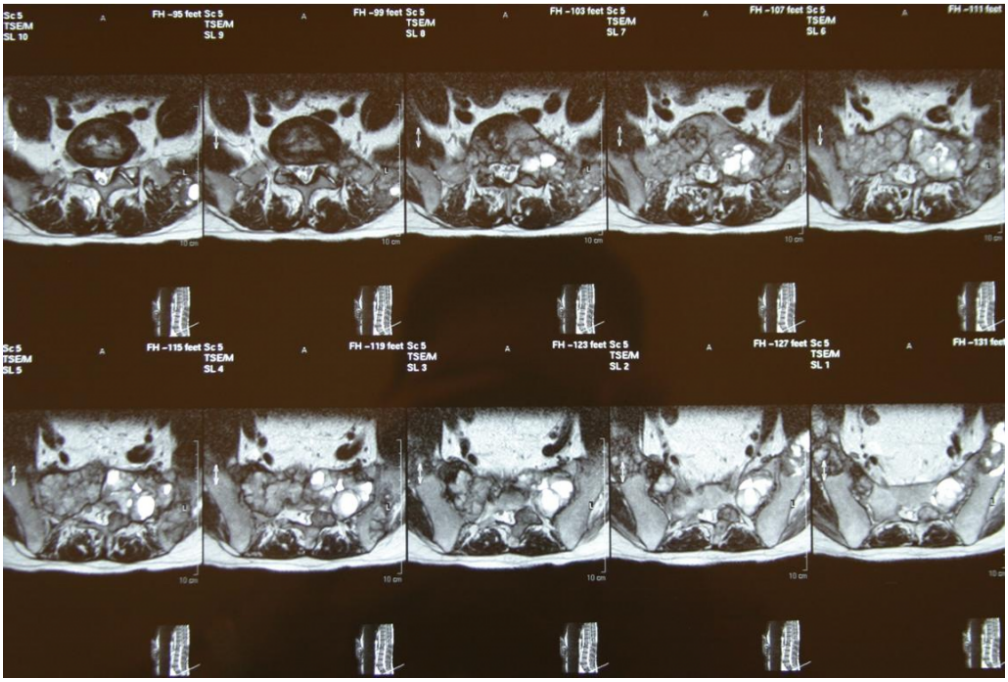
Description: Fig 1a; Sagittal T2 MRI showing the involvement at T11, L1, L5 and S1 **Origin:**

b



Description: Fig 1b; Axial T2 MRI at L1 **Origin:**

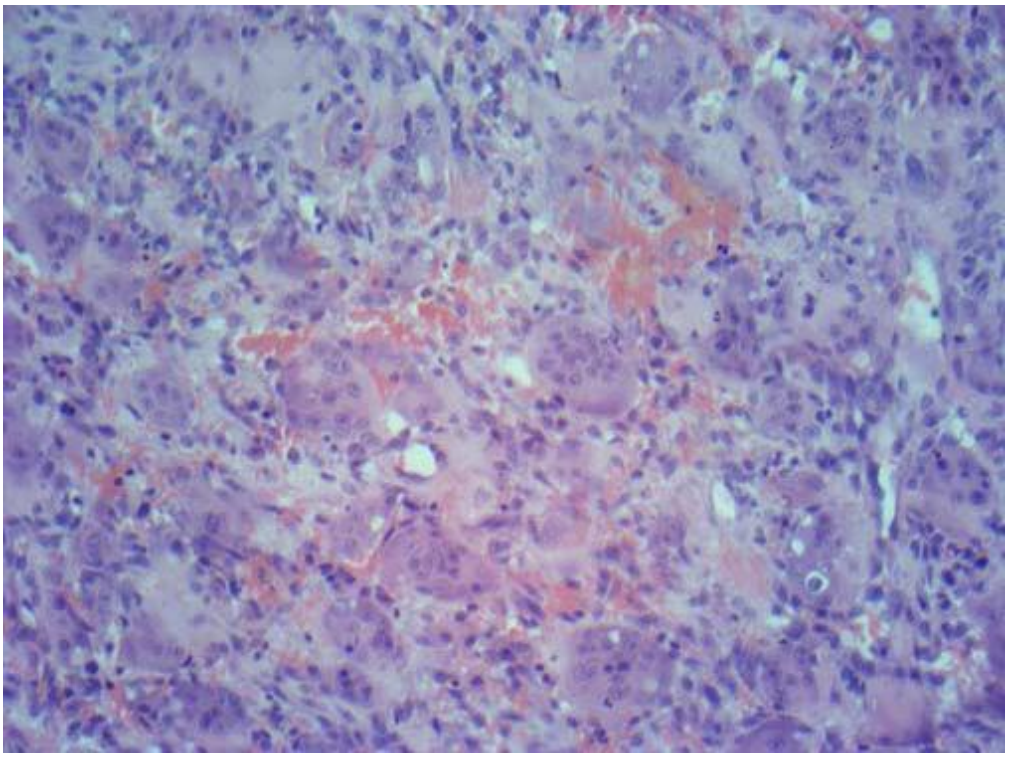
c



Description: Fig 1c; Axial T2 MRI at L5/S1 **Origin:**

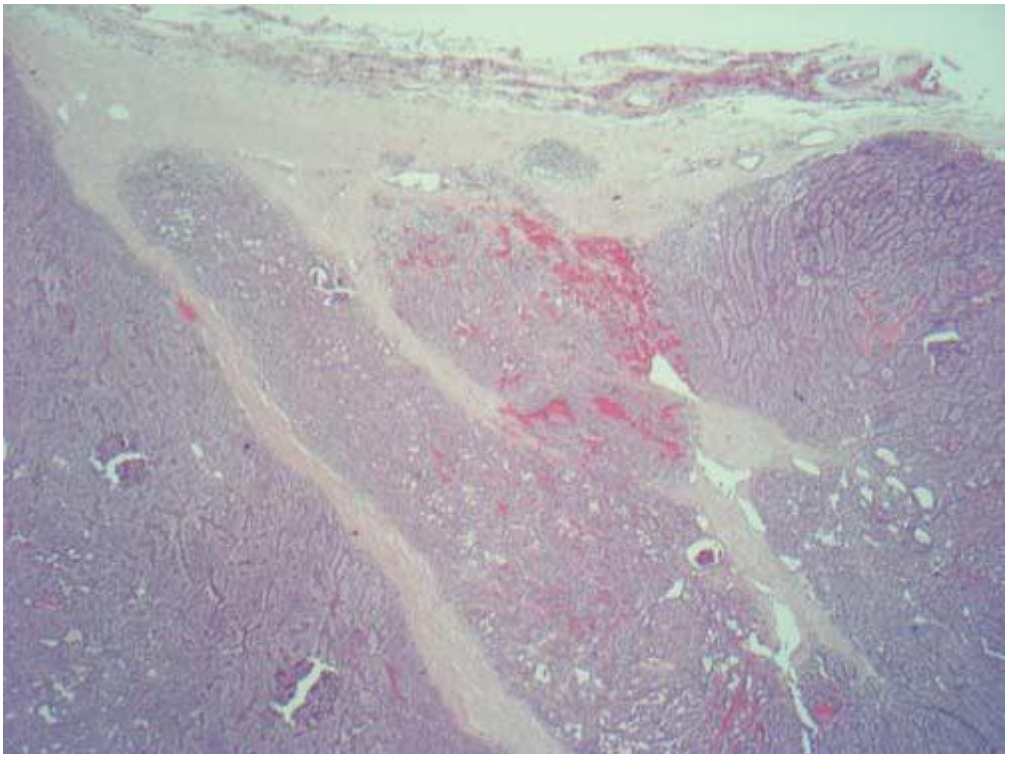
Figure 2

a



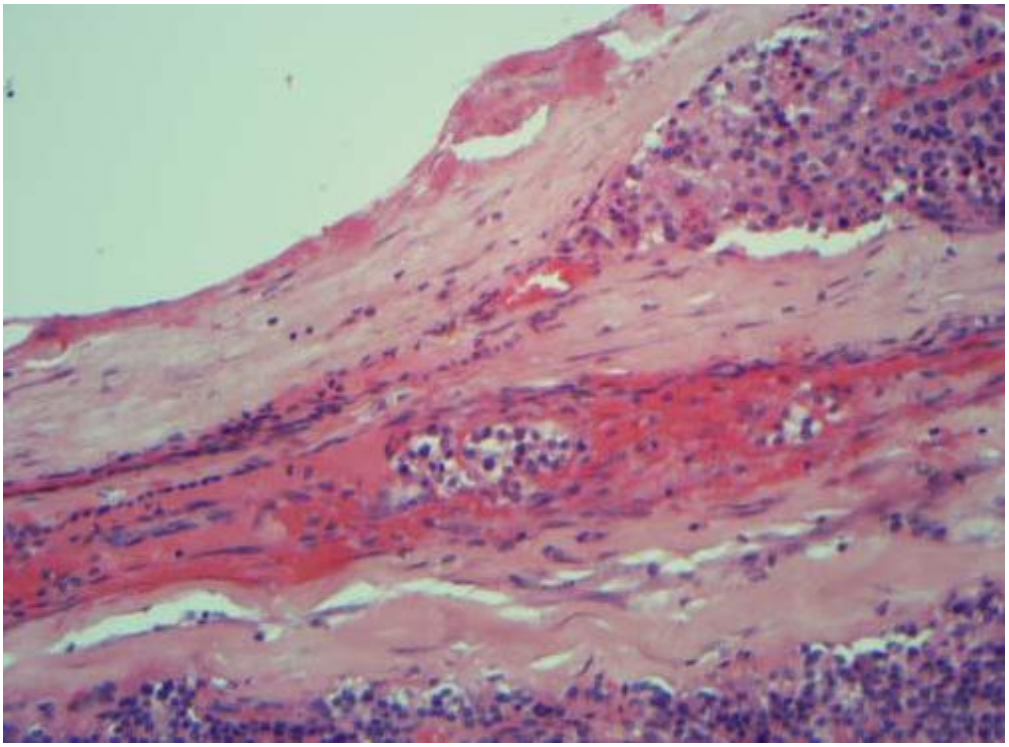
Description: H&E x200: Giant cell tumour (osteitis cystica) from sacral canal biopsy **Origin:**

b



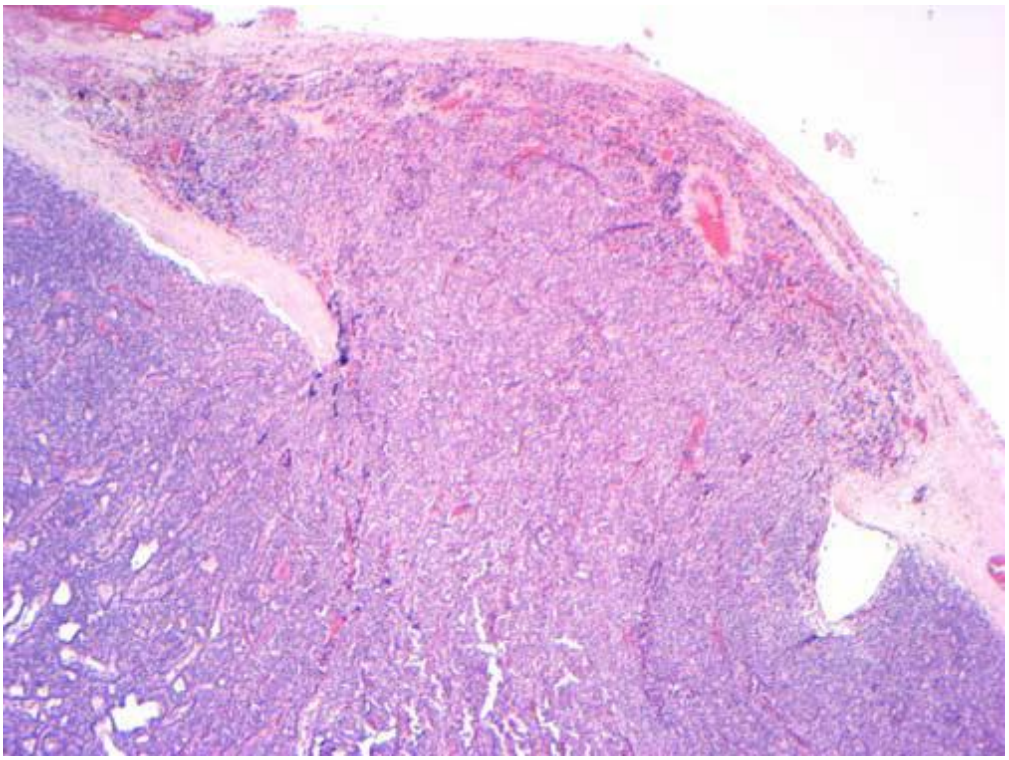
Description: H&E x40: Low power view of parathyroid tumour capsule and parenchyma showing broad fibrous bands (a suspicious feature). **Origin:**

c



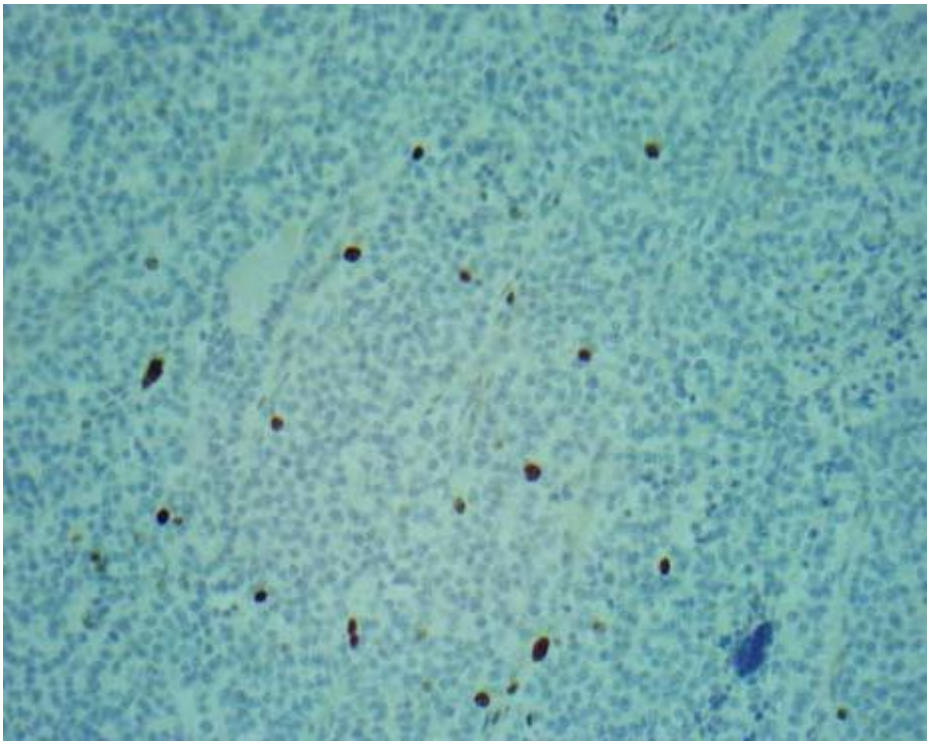
Description: H&E x200: Vascular invasion. **Origin:**

d



Description: H&E x100: Capsular invasion. **Origin:**

e



Description: MIB1 immunostain x200: This proliferation marker shows a relatively low proliferation index. Adenomas and carcinomas vary in their proliferation indices with considerable overlap This is of little help in making the distinction. **Origin:**

Figure 3

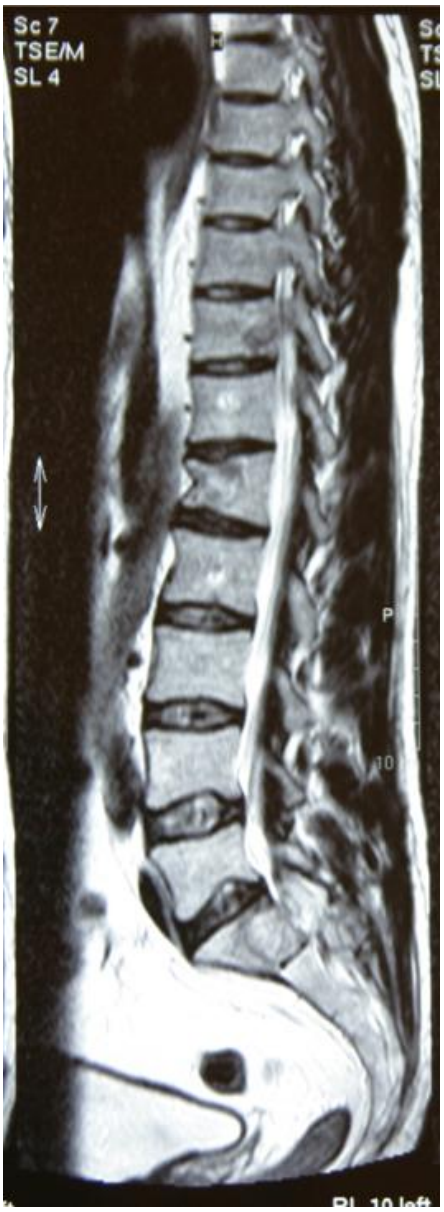
a

Age < 50 years
Unexplained decline of creatinine clearance by 30%
Serum calcium level > 3 mmol/L
Marked hypercalciuria with calcium level > 10 mmol in 24-hour urine collection
Cortical bone mineral density > 2 standard deviations below the mean for age-matched control subjects
Patient requests surgery
Patient unable to be followed up for monitoring

Description: Table 1. National Institute of Health guidelines for parathyroidectomy **Origin:**

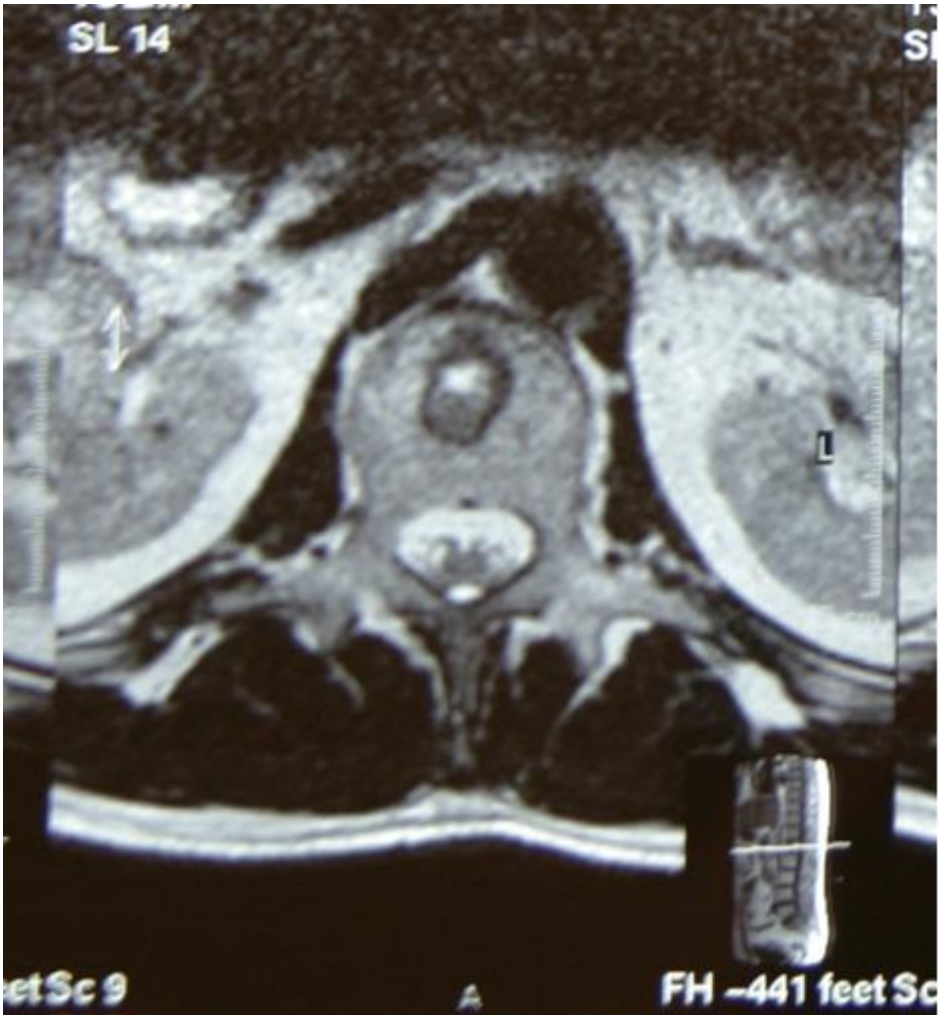
Figure 4

a



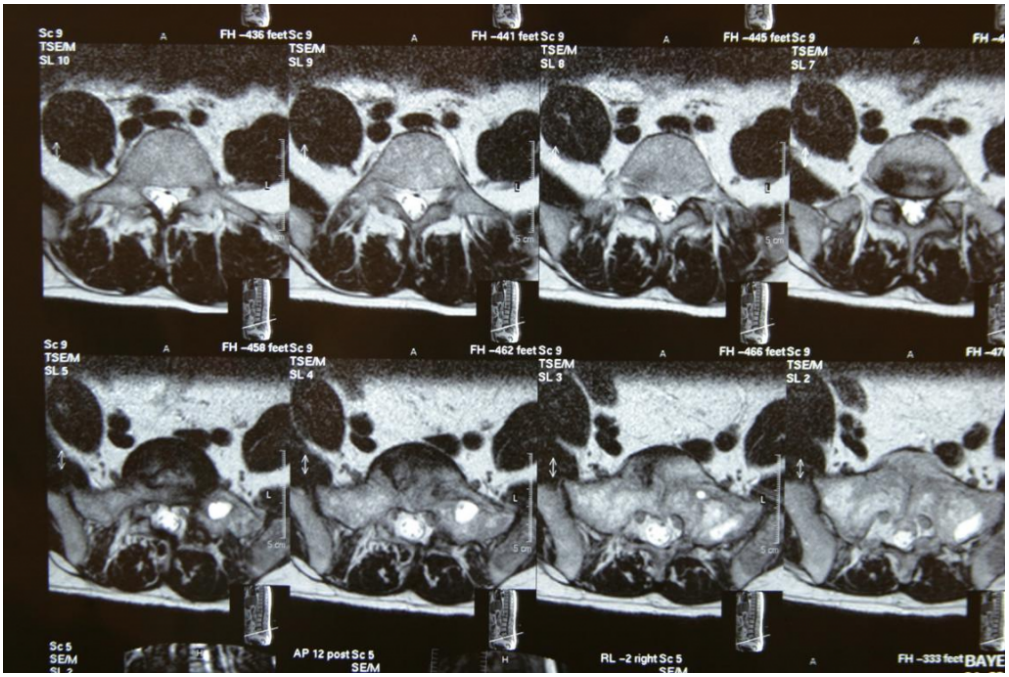
Description: Fig 2a: Sagittal T2 MRI demonstrating Spinal involvement at L1 (collapse) and in the sacrum (cystic change) **Origin:**

b



Description: Fig 2b: Axial MRI demonstrating brown tumour in the body of L1 **Origin:**

c



Description: Fig 2c: Axial MRI demonstrating OFC in the sacral ala on the left. **Origin:**