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Nephroquiz
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Presumed osteosarcoma

Ralph Kettritz[1,2], Nilufar Mohebbi[1,3], Theresa Claus[1,4], Ute Kettritz[1], Wolfgang Schneider[1,2] and Friedrich C. Luft[1,2]

[1]Franz-Volhard Clinic, Helios-Kliinikum Berlin, Berlin, Germany, [2]Experimental and Clinical Research Center and Max-Delbrück Center for Molecular Medicine, Berlin, Germany, [3]Division of Nephrology, University Hospital Zurich, Zurich, Switzerland and [4]Department of Nephrology, University Hospital RWTH Aachen, Aachen, Germany

Correspondence and offprint requests to: Friedrich C. Luft; E-mail: luft@charite.de

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Case report

A 76-year-old dialysis patient developed sudden pain in his left arm. He consulted an orthopaedic surgeon who determined a fractured left humerus with an osteolytic lesion (Figure 1). The patient was referred to our department for further evaluation of a possible osteoscarcoma. He had required haemodialysis treatment for 4 years because of an unknown renal disease that left him with small end-stage kidneys. The patient had come to Germany from Russia, spoke only Russian and was relatively non-adherent to his dialysis treatments and medications. The physical examination revealed a systolic murmur, a functioning dialysis access, a painful immobilized left arm, but no other musculoskeletal lesions. Pertinent laboratory findings included some residual renal function, serum creatinine 345 µmol/L, calcium 2.78 mmol/L, phosphate 1.41 mmol/L, C-reactive protein 99 mg/L and parathyroid hormone 286 pg/mL.

We consulted our orthopaedic surgeons who were convinced that the patient had a malignant tumour. They requested a magnetic resonance imaging scan (Figure 2) and suggested a wide excision with insertion of a humoral head prosthesis. We obtained a bone scan (not shown) that was interpreted as showing a lesion in the humeral head, as well as probable metastases in the left distal femur and left mid-tibial shaft and skull. We negotiated a compromise and agreed to settle on a biopsy of the humeral lesion together with plate fixation to stabilize the humerus. Before we transferred the patient to surgery, we performed a ^{99m}Tc-MIBI parathyroid gland scintigraphy. That study raised the possibility of a parathyroid adenoma. The surgeons performed, as promised, a limited biopsy of the humeral lesion. We had alerted the pathology department of our suspicion. The

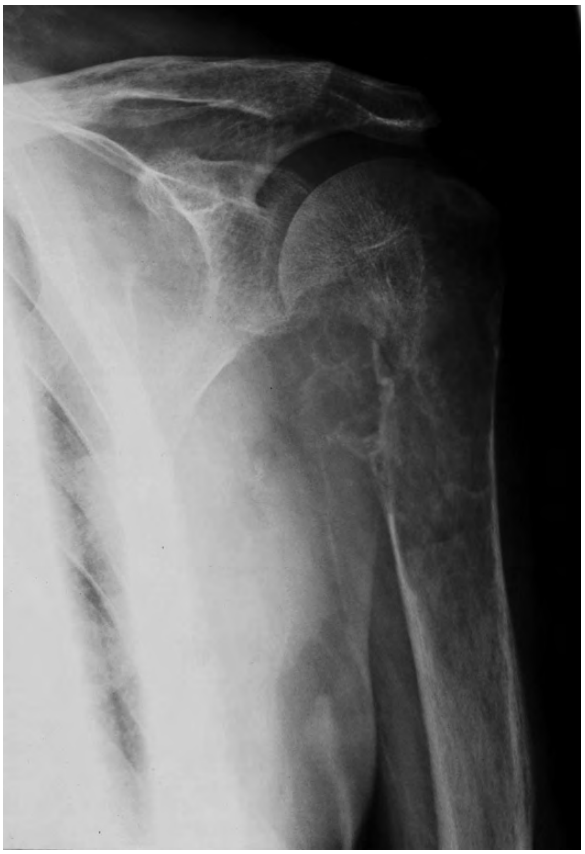

Fig. 1. Roentgenogram of the left shoulder shows a destructive process immediately below the humeral head. The cortical bone is disrupted suggesting a malignant process.

pathologist claimed that had he not known the patient's prior medical history, he would have diagnosed a malignant bone tumour on the basis of the frozen section.

What is your diagnosis?

We were convinced that the patient had a 'brown' tumour. Brown tumours are a sequel to primary or secondary hyperparathyroidism. They occur in about 3% of patients with the former and, thanks to improved dialysis care, are becoming unusual in patients with the latter.

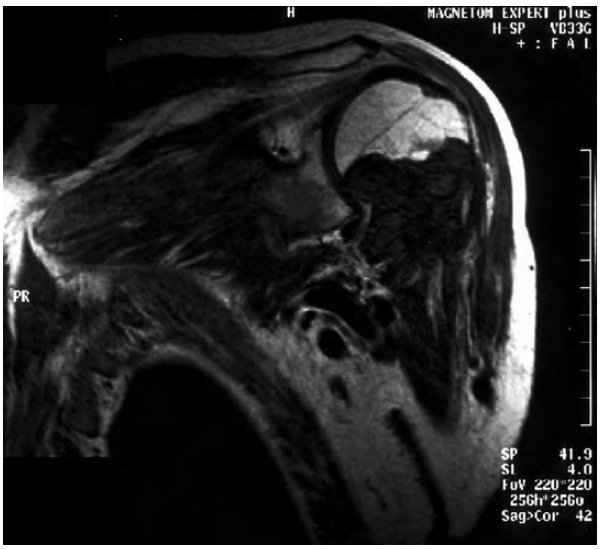

Fig. 2. MRI of shoulder region showing a soft tissue tumour with remarkably low signal intensity in T_1-weighted spin-echo MRI.

We reported on another patient with primary hyperparathyroidism with 'pain in the arm' earlier [1]. The mandible is commonly involved. Interestingly, the mandible was not mentioned by our nuclear medicine consultant as a possible area of involvement in this patient. Mourad *et al*. [2] described a mandibular brown tumour in a dialysis patient who responded to intravenous alfacalcidol. We elected to treat our patient with cinacalcet. As a result, the parathyroid hormone concentration decreased from 286 to 83, 68 and 62 pg/mL over a 4-week period, respectively. The efficacy of cinacalcet in secondary hyperparathyroidism is convincing [3]. Conceivably, our patient needed a parathyroidectomy, a procedure shown to be effective in dialysis patients with a maxillary brown tumour [4]. However, our patient refused that procedure and anything else to do with us for that matter. He left the hospital against medical advice. His referring nephrologist is continuing cinacalcet as best he can in this recalcitrant patient.

The lesson here is the strong histological similarity between brown and malignant tumours. First, hyperparathyroidism does not 'protect' from osteosarcoma, and several convincing examples of both diagnoses are present in the literature [5]. Secondly, (Figure 3A–D) the differential diagnosis is by no means trivial. Osteoclast-like giant cells may dominate the histologic pattern not only in conventional giant-cell tumours, but also in many tumour-like lesions of bone. The pathologist is greatly assisted by clinical information in such patients. If the pathologist knows that the patient has (primary or secondary) hyperparathyroidism, the diagnostic possibilities are limited accordingly. Finally, we wish to draw attention to the occurrence of an osteosarcoma in the maxilla of a brown bear (*Ursus arctos*), presumably another form of brown tumour [6]. We believe that this finding gives an entirely different dimension to the diagnostic ramifications of brown tumours.

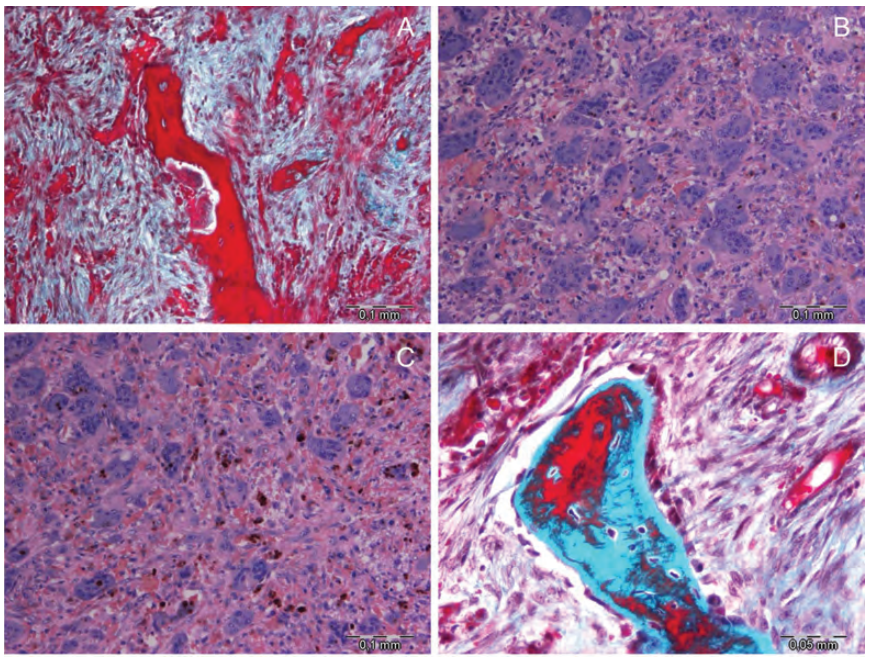

Fig. 3. (**A**) Lacunar bone reabsorption with intense osteitis (Goldner trichrome stain). (**B**) Brown tumour with numerous multinucleated osteoclastic giant cells (H&E stain). (**C**) Brown tumour, giant cells and numerous haemosiderin-laden macrophages with their brown pigmentation (H&E stain). (**D**) Reactive bone formation within a brown tumour. Visible is a wide osteoid seam of osteoblasts; the bone appears red (Goldner trichrome stain).

Teaching point

Bone tumours in dialysis patients are brown tumours until proven otherwise. Colleagues outside our specialty need to be alerted to brown tumours in patients with renal failure.

Conflict of interest statement. None declared.

References

1. Kettritz R, Göbel U, Geipel D *et al*. A pain in the arm. *Nephrol Dial Transplant* 1998; 13: 1593–1594
2. Mourad G, Argiles A, Vela C *et al*. Control of severe hyperparathyroidism and regression of a brown tumour after treatment with i.v. alfacalcidol in a uraemic patient. *Nephrol Dial Transplant* 1995; 10: 552–554
3. Block GA, Martin KJ, de Francisco AL *et al*. Cinacalcet for secondary hyperparathyroidism in patients receiving hemodialysis. *N Engl J Med* 2004; 350: 1516–1525
4. Jutte PC, Rosso R, de Paolis M *et al*. Osteosarcoma associated with hyperparathyroidism. *Skeletal Radiol* 2004; 33: 473–476
5. Salzer-Kuntschik M. Differential diagnosis of giant cell tumor of bone. *Verh Dtsch Ges Pathol* 1998; 82: 154–159
6. Momotani E, Aoki H, Ishikawa Y *et al*. Osteosarcoma in the maxilla of a brown bear (Ursus arctos). *Vet Pathol* 1988; 25: 527–529

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