Case Report and Review of the Literature

Metastatic mesenchymal chondrosarcoma

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Abstract

Mesenchymal chondrosarcoma is an entity first described in 1959 by Lichtenstein and Bernstein.[1] It is rare and comprises approximately 1% of all chondrosarcomas, with a peak incidence in the second and third decade of life.[3] There is a comparable male-to-female sex ratio with two-thirds of cases arising from bone and a third from the soft tissues mainly in central areas such as the head and neck or the axial skeleton. We present a case of this highly malignant lesion arising from skeletal muscles of the thigh having already metastasised to multiple unusual areas.

Case report

A 41-year-old woman with no remarkable past medical history presented initially to her primary care physician with a painless, slow-growing mass on the medial aspect of her left thigh (appearing as a benign lesion). Two years later the mass grew bigger and she started experiencing numbness, a tingling sensation of the left leg, followed by pain and cold intolerance. She was then referred to a surgeon who diagnosed a second mass from the thyroid gland associated with weight loss, loss of appetite, palpitations and hypochromic microcytic anaemia with gradual thrombocytopaenia. A left thyroid lobectomy was done and the histological features suggestive of mesenchymal chondrosarcoma (MC) were established.

On presentation to our orthopaedic oncology services she had metastases to the right shoulder and pancreas, and a painful thigh primary that looked malignant. Due to encasement of the superficial femoral vessels, her distal pulses dwindled in character and volume as compared to the contralateral extremity. Plain radiography demonstrated a tumour arising from the soft tissues with associated calcifications (stippled in nature) and a soft tissue component. Angiographic findings were those of a lesion with a vascular component to it in close relationship with the superficial femoral artery (*Figure1*).

The tumour showed an increased uptake on the pool phase of the technetium-99 and MiBi scan with associated lesions in the neck and retroperitoneal regions (*Figure 2*).

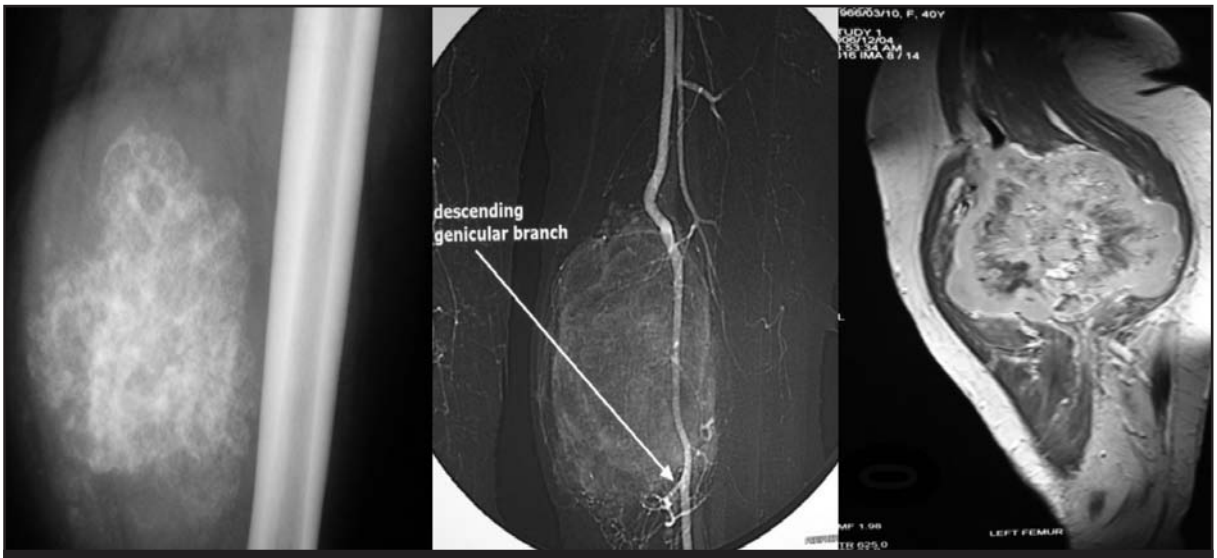

Figure 1. Radiological images revealing a tumour with 'stippled' calcifications, encasement of the superficial femoral artery and an MR that shows tumour invasion of skeletal muscle

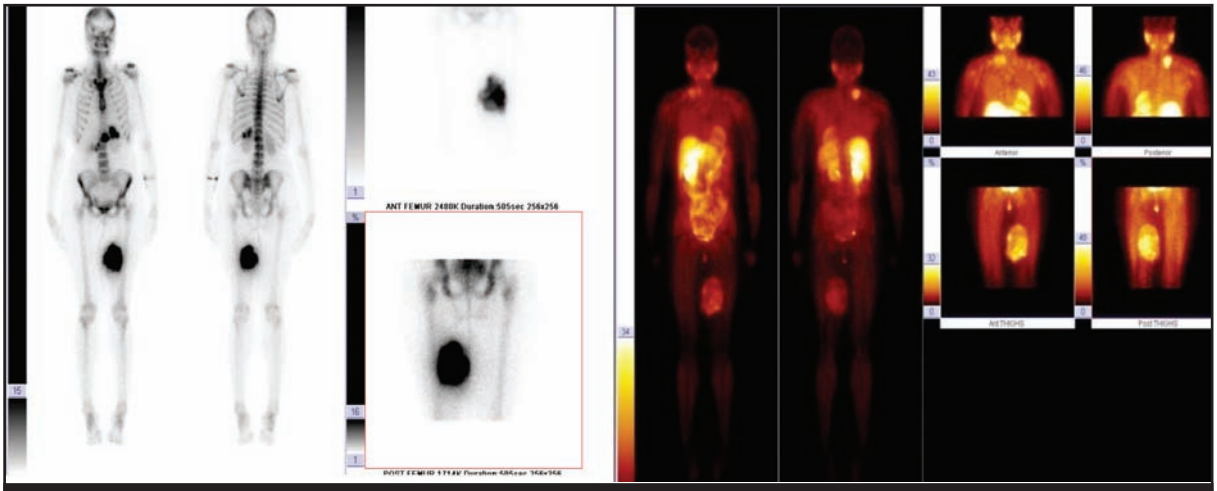

Figure 2. Tech99 and MiBi scan

Surgical excision of the tumour was done by a team comprising vascular and orthopaedic surgeons. En block resection was performed with a 10 cm segment of superficial femoral artery replaced by a graft harvested from the long saphenous vein.

Grossly, the tumour was well-circumscribed with a heterogeneous cut surface composed of white fibrous areas, cartilaginous areas and dark brown haemorrhagic areas (*Figure 3*). The tumour measured 21 x 14 x 11 cm in size.

Histologically, the tumour showed a biphasic pattern made up of solid areas of round and spindle-shaped mesenchymal cells interspersed with islands of well-differentiated cartilage. The mesenchymal component often exhibits a haemangiopericytic pattern with multiple vascular spaces (*Figure 4*).The tumour cells were immunohistochemically reactive for CD99 and negative for S100.

A week later the patient was ambulant with marked improvement of the lower limb symptoms. She was subjected to radiation therapy for all other inoperable lesions. At re-evaluation 6 months postoperatively, she had no recurrence of the thigh tumour and the other lesions, although still present, had diminished in size.

Mesenchymal chondrosarcoma is a rare entity originally described in the literature as a biphasic tumour consisting of spindle cell mesenchyme mixed with areas of chondroid differentiation

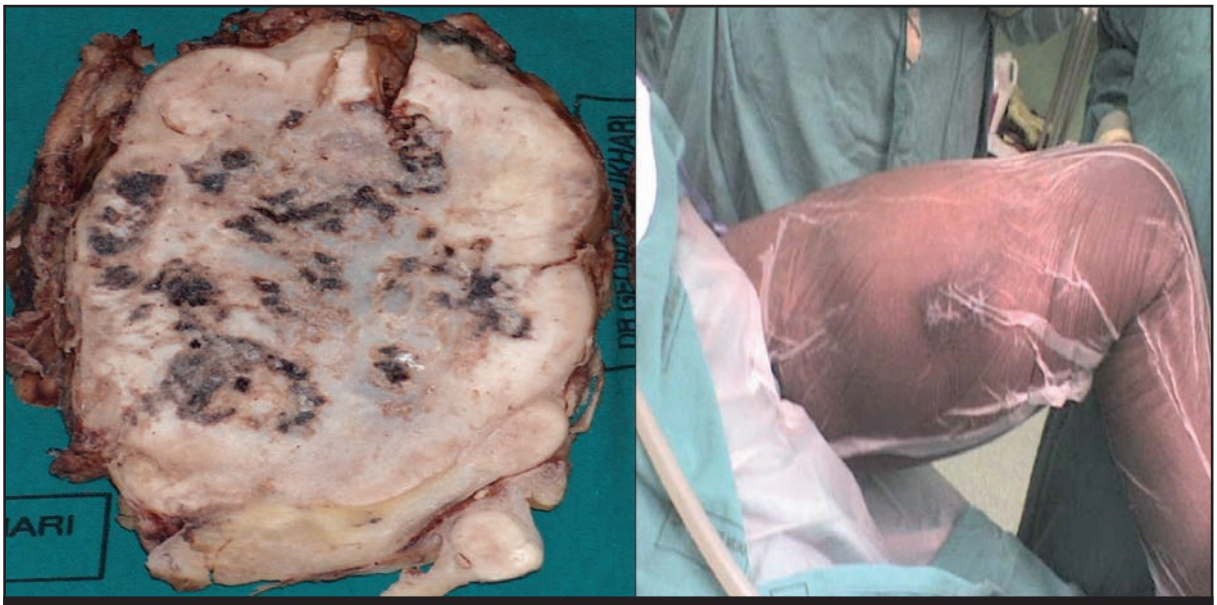

Figure 3. Gross specimen and pre-operative imaging of the lesion showing areas of cartilage matrix largely in the centre associated with vascular and fibrous portions

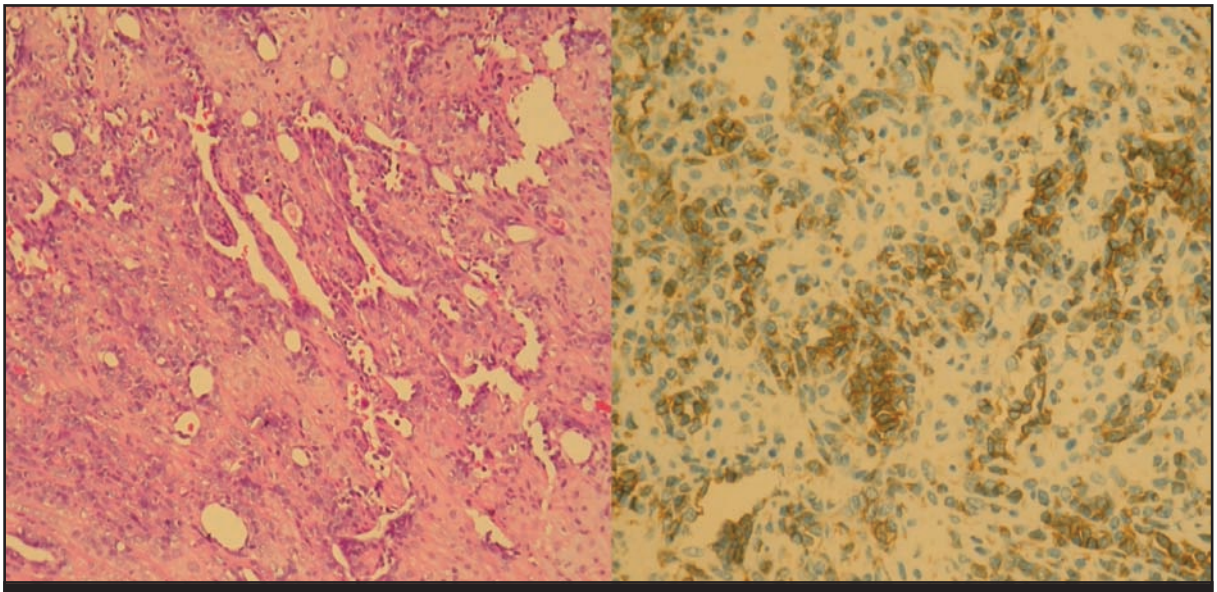

Figure 4. Haemangiopericytoid growth pattern (left) and immunohistochemical stain for CD99 showing positivity in tumour cells (right)

Discussion

Mesenchymal chondrosarcoma is a rare entity originally described in the literature as a biphasic tumour consisting of spindle cell mesenchyme mixed with areas of chondroid differentiation. Of the few cases that have been reported in the literature, the head and neck area is the most commonly involved. It is a subtype of chondrosarcoma, a term that includes a heterogeneous group of lesions with varied clinical behaviour and morphological features that share the common feature arising from ossified cartilage or cartilaginous rests.[1] The cells are uniform, round to spindle shaped and resemble those of Ewing's tumour with a perivascular arrangement of cells which results in a haemangiopericytoma pattern of cellular arrangement.[2] This lesion comprises 1% of all chondrosarcomas and has a very wide range of distribution with a peak incidence in the second decade of life.[3]

Molecular pathology of mesenchymal chondrosarcoma has been evaluated with respect to differentiating it from other small cell sarcomas. Muller and co-workers[4] have found that it expresses type II collagen which differentiates it from other small cell sarcomas such as Ewing's, synovial sarcoma and haemangiopericytoma.

These investigators also noted that mesenchymal chondrosarcoma that is largely composed of small cells lacked the S-100 protein expression which is atypical of other chondrosarcomas. It has also been established that mesenchymal chondrosarcoma expresses Sox-9 gene, a regulator in mesenchymal cell differentiation, which is not the case with other small cell tumours.[5] Huvos *et al*[6] histologically classified mesenchymal chondrosarcomas into two groups: the haemangiopericytoid variant and the less well-differentiated small cell variety.

A small or insufficient biopsy specimen obtained from where chondroid matrix is absent results in several other small cell neoplasias becoming part of the differential diagnosis. These tumours include haemangiopericytoma, synovial sarcoma, PNET, neuroblastoma, rhabdomyosarcoma, small cell osteosarcoma, leukaemic deposits (granulocytic sarcoma) and malignant lymphoma.[3,7-10]

As with other bony sarcomas, surgery remains the primary treatment modality for mesenchymal chondrosarcoma regardless of anatomic site. In a true oncologic en block resection, the intended tissue margins of excision should be designed to extend well beyond the actual tumour, as it may exhibit small pseudo pod-like projections into the surrounding soft tissues.[11]

The benefit of neo-adjuvant modalities for MC has not been proven. However the use of preoperative radiotherapy prior to radical resection has been shown to reduce tumour bulk.[7,12] Postoperative radiotherapy has been reported to increase survival rates although the studies done did not have statistically significant numbers of patients.[13,14] The overall survival rate at 5 and 10 years is 55% and 27% respectively.[3] Nussbeck *et al*[15] have suggested that proliferative activity, as measured by specialised immunohistochemical staining, may be an important prognostic factor. MiBi has also been shown to be of prognostic relevance[16] while cell type is of no prognostic importance.[11]

Table I: Some hints on molecular genetics and the differentials of mesenchymal chondrosarcoma[17]

Differential diagnosis	Genetic make-up
Haemangiopericytoma	Not well established
Synovial sarcoma	t(X;18)
Neuroblastoma	N-myc amplification predicts prognosis
Rhabdomyosarcoma	t (2;13) in 50% and t(1;13) in 20%
Small cell osteosarcoma	Variable
Leukaemic deposits	Positive for CD45, CD43 and myeloproxidase; negative for CD20
Malignant lymphoma	Data still lacking
PNET	t (11;22)(p22;q12) found in 90% of cases

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