

# Giant cell tumour in the foot of a skeletally immature girl: a case report

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## ABSTRACT

We present a case of delayed diagnosis of a benign giant cell tumour (GCT) of the third metatarsal in a skeletally immature girl. The patient underwent *en bloc* excision of the tumour. The tumour had replaced the third metatarsal and had infiltrated the surrounding soft tissue and the second and fourth metatarsal bases. Deep, lateral and medial margins were all involved. A high index of suspicion is needed when evaluating any tumours of the foot, because the compact structure of the foot may delay diagnosis. Early detection is important for avoiding amputation, as the hindfoot and midfoot are classified as one compartment and radical resection is impossible to achieve. Tumours grow faster in the foot than in other bones. GCT in this location and age-group are rare and should be considered in the differential diagnosis of a destructive bony lesion in skeletally immature patients.

**Key words:** giant cell tumor of bone; metatarsal bones

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## INTRODUCTION

A giant cell tumour (GCT) is uncommon and usually occurs around the knee, in the second to fourth decades of life, slightly more often in females than males.<sup>1</sup> A GCT in the foot of a skeletally immature patient is rare. We report an 8-year-old girl with a locally aggressive GCT of the left third metatarsal.

## CASE REPORT

In February 2008, an 8-year-old girl presented with a 6-month history of pain and swelling over the dorsum of her left foot and beneath her sole. Walking and dancing exacerbated the pain and her gait was modified (externally rotating her foot and taking more weight through the heel). There was no history of constitutional disturbance, trauma, or a foreign body.

She had been diagnosed with osteomyelitis of the third metatarsal at another hospital, based on plain radiography. She had completed an extended course of oral antibiotics, but her symptoms failed to resolve and the lysis became more extensive. Magnetic



**Figure** The third metatarsal shows (a) an increased signal in magnetic resonance imaging, (b) cortical destruction in radiography, and (c) replacement of bony elements by soft tissue in computed tomography.

resonance imaging showed a malignant lesion of cartilaginous origin (Fig. a).

She was referred to our hospital. Routine serological tests showed a haemoglobin level of 129 g/l, a platelet count of  $394 \times 10^9/l$ , a white cell count of  $7.5 \times 10^9/l$ , an erythrocyte sedimentation rate of 12 mm/h, a C-reactive protein level of <5 mg/l, and a lactate dehydrogenase level of 63 U/l. Plain radiography showed almost complete destruction of the third metatarsal with thinning of the remaining cortices (Fig. b). Computed tomography displayed a well-defined mass and complete replacement of bony elements by soft tissue (Fig. c). Distally the growth plate appeared disrupted. The centre was of low density, suggestive of fluid and thus an aneurysmal bone cyst. Differential diagnoses included a rapidly growing cartilaginous lesion or an Ewing sarcoma. Chest radiographs showed no metastatic lesion. The radiology findings were consistent with an aggressive (stage-3) lesion.<sup>2-4</sup>

A percutaneous needle biopsy performed via the dorsum of the foot revealed histology consistent with GCT, with areas of aneurysmal bone cyst-like tissue. The patient underwent an *en bloc* excision of the tumour via a curvilinear incision over the dorsum of the foot. The tumour had replaced the third metatarsal and infiltrated the surrounding soft tissue and the

second and fourth metatarsal bases. Deep, lateral and medial margins were all involved. The mitotic count was high (22 per 10/HPF). No sarcomatoid features were present. The final histology confirmed a benign GCT. The patient was followed up with magnetic resonance imaging every 3 months. There was no evidence of recurrence after one year.

## DISCUSSION

Approximately 5% of bone tumours and 20% of benign bone tumours are GCT. The proportion is even higher in some Asian populations.<sup>5</sup> Most GCTs are benign; only one to 3% are malignant initially,<sup>6</sup> but a small number become malignant later (usually seen in recurrent cases or after radiotherapy).<sup>7</sup> 50% of GCTs arise around the knee, most often in the distal femur and proximal tibia, followed by the distal radius and then the sacrum. Typically, GCTs are metaphyseal in location but tend to be metaphyseal in skeletally immature patients.<sup>8,9</sup> The phalanx, metacarpal, maxilla, and metatarsal are rarely affected (only 6 of 2129 cases in 4 series).<sup>1,10</sup> GCTs are rarely found in the metatarsal bones,<sup>11-16</sup> and tend to be more aggressive than those in other bones.<sup>10</sup>

The incidence of GCT is highest in the second to fourth decades of life (with a peak in the third); only about 1% of GCTs occur in the first decade of life.<sup>1</sup> In one series only 1.8% of 326 GCTs occurred in skeletally immature patients,<sup>9</sup> but the rate can be as high as 7.5%.<sup>17</sup> Our patient represents a rare combination of unusual location and young age; only one such case has been reported.<sup>12</sup>

The usual symptoms of a GCT are swelling, warmth or erythema. Pain may occur independently of weight bearing, and pathological fractures may occur in 15% of cases.<sup>5,18</sup> A high index of suspicion is needed when evaluating any tumours of the foot, because the compact structure of the foot may delay diagnosis.<sup>18</sup> Histological analysis of biopsy tissue is necessary for diagnosis, as radiological images are

not conclusive.<sup>8,19</sup>

Early detection is important when evaluating foot tumours of any kind in order to avoid amputation. The Enneking staging system classifies the hindfoot and midfoot as one compartment. Therefore, radical resection is impossible to achieve, necessitating amputation.<sup>3</sup> It is necessary to do a succinct work-up of any mass in the foot and physicians should not be lulled into a false sense of security by the slow growth of the tumour. Both benign and malignant tumours of the foot grow faster than in other bones. Early diagnosis is difficult because of the rarity of GCT in this location and age-group.<sup>18</sup> GCT should be considered in the differential diagnosis of a destructive bony lesion in skeletally immature patients.<sup>8,17</sup>

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