Unusual presentation of more common disease/injury

Osteochondroma mimicking deep vein thrombosis in a young cricketer

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Osteochondromas are bony outgrowths covered by thin cartilaginous caps, accounting for 35% of all benign bone tumours. The majorities are solitary and usually arise at the metaphysis of long bones. They may be associated with bursa formation, while vascular complications are rare. We report a 34-year-old man who presented with a 2-week history of pain, stiffness and swelling of the left lower leg following a cricket match. Clinically, a deep vein thrombosis (DVT) was suspected but D-dimer test was negative. Initial Doppler ultrasound scan (USS) was reported as showing a haematoma and possible DVT. A repeat Doppler USS did not detect a DVT, however the popliteal vein appeared collapsed and a pedunculated osteochondroma of the proximal tibia was found. An MRI confirmed this and also showed an extensive oedema around the calf muscles tracking distally in all compartments, most likely the result of a ruptured bursa.

BACKGROUND

It is important to be aware that in a young otherwise fit individual who does not match the usual risk profile for deep vein thrombosis (DVT), other non-vascular abnormalities such as osteochondroma may be the cause of symptoms. Our case illustrates that ultrasonographers should be alert to the appearance of these cases as initial ultrasound scan (USS) was misinterpreted as showing a compressive haematoma which on subsequent imaging by a musculoskeletal specialist was found to be the cartilage cap of an osteochondroma.

CASE PRESENTATION

A 34-year-old male patient presented to his general practitioner (GP) with a 2-week history of increasing pain, swelling and stiffness of the left lower leg following a cricket match. He did not recall any incident of direct trauma. The patient's GP suspected DVT on examination. There was no known relevant medical history although 5 years previously while getting a body massage he had experienced discomfort in the left calf but had not given it any further consideration. One month previous to the current presentation the patient also had a routine full medical examination for work-related reasons during which the practitioner reported a lump in the back of his left calf which he clinically diagnosed as a lipoma. There were no follow-up investigations on this occasion. The patient was an otherwise healthy and active young sportsman.

He ran 5 miles a day, played cricket regularly and 5-a-side football occasionally.

INVESTIGATIONS

An initial D-dimer test carried out by the GP was slightly raised. However, a repeat test 1 day later was negative. Initial duplex USS of the leg veins carried out in hospital was reported as showing possible DVT as a result of a haematoma compressing the popliteal vein. Four days later he was reviewed by a consultant rheumatologist who referred him for an ultrasound examination by a consultant radiologist. This USS was reported as showing no evidence of DVT or haematoma but instead a lobulated mass in the posteromedial aspect of the knee which was reported as an osteochondroma compressing the popliteal vein. An MRI scan and bone scan were subsequently carried out. MRI confirmed the presence of a pedunculated osteochondroma arising from the proximal tibia posteromedially and measuring 35 mm in length. Extensive oedema was also demonstrated surrounding the osteochondroma and tracking down the muscle planes and soft tissues of the calf distally towards the ankle. This was reported as suggestive of a ruptured bursa. The possibility of sarcomatous change of the cartilaginous cap could not be excluded and therefore an isotope bone scan was recommended. The whole body isotope bone scan demonstrated abnormal soft tissue uptake in the left calf compatible with the oedema seen on the MRI scan. There was no abnormal uptake on the site of the osteochondroma and no abnormal uptake in the rest of the skeleton.

DIFFERENTIAL DIAGNOSIS

Osteochondroma differential table

Imaging Modality	Osteochondroma	Osteochondrosarcoma	Popliteal cyst	DVT
Plain Film X-ray	Bony exostosis visualised but not cartilage cap unless calcified	Bony exostosis visualised but not cartilage cap unless calcified	Not visualised	Not visualised
Ultrasound	Cartilage cap and cortical outline of bony exostosis	Cartilage cap and cortical outline of bony exostosis	Hypoechoic cyst	Hypoechoic filling defects within a vein
CT	Bony exostosis and cartilage cap. Cartilage cap appears as an area of low density	Bony exostosis and cartilage cap. Cartilage cap appears as an area of low density which may be heterogeneous	May appear as an area of low density	Filling defects seen if venous contrast-enhanced study
MRI	Depending on imaging sequences, cartilage cap and bony exostosis are well demonstrated as well as any surrounding haematoma and soft tissue oedema. Cartilage cap low-signal T1/high signal T2	Cartilage cap may appear heterogeneous due to malignant change and may enhance	Low-signal cyst (fluid) on T1/high-signal on T2	Filling defects within a vein on MR angiography
Contrast Enhancement	No contrast enhancement at CT or MRI unless sarcomatous change within cartilage cap	Enhancement of cartilage cap and any other areas of malignant invasion	Low-signal cyst (fluid) on T1/high-signal on T2	Non-enhancing filling defects within a vein
Scintigraphy	No uptake unless bone fracture or malignant change within the cartilage cap which may also spread to bone	Radioisotope uptake in areas of malignancy and spread	Not visualised	Not visualised
PET	No increased activity	Increased activity of malignant areas	Not visualised	Not visualised

TREATMENT

The patient was started on Warfarin therapy following initial duplex USS which was reported as showing possible DVT.

After a second USS discovered an osteochondroma, later confirmed by MRI, the patient was referred for surgery. The osteochondroma was successfully excised. Histological analysis confirmed a benign osteochondroma (figures 1 and 2).

Figure 1 Ultrasound scan (1a): demonstrates the tip of the osteochondroma (short arrow) with cartilage cap (long arrow) and surrounding muscles. Whole body isotope bone scan (1b): demonstrates normal uptake throughout the axial skeletal, therefore no evidence of bone metastases. There is uptake in the soft tissues of the left calf consistent with the soft tissue oedema seen on the MRI scans. Protocols: (1a) Philips iU22 ultrasound scanner. Scans using linear array probe 17-5 MHz. (1b) Gamma Camera used was SMV (Sopha Medical Vision) DST. xli (SMV no longer exists and has been taken over by General Electric). 550–Q6 600 MBq of Tc-99m hydroxymethylene diphosphonate administered intravenously, scan performed 3 hours post-injection. Whole body scanning protocol was used with travel speed of 10cm/min. For the static images of the lower limb we use a count acquisition of 500 k/cts.

OUTCOME AND FOLLOW-UP

A follow-up leg Doppler USS showed no evidence of DVT and anticoagulation therapy was stopped. The patient has made a good postoperative recovery.

DISCUSSION

Osteochondromas, or exostoses, are bony outgrowths covered by a thin cartilaginous cap. They are the most common (accounting for 35%) of all benign bone tumours. The majority are asymptomatic, solitary and usually arise at the metaphysis of long bones.^{1 2} Vascular complications of osteochondroma are rare and include venous compression and DVT.^{2 3}

It is known that the most common non-vascular abnormality seen in the popliteal fossa is a benign swelling of the semimembranous bursa, called a Baker's cyst. These cysts have been known to mimic the symptoms of a lower leg DVT. A study by Langsfeld *et al* reviewed 3072 patients who underwent venous duplex USS to rule out DVT. Ninety-five patients (3.1%) were found to have a Baker's cyst, only 7 of which had a coexisting DVT. In 10 of these cases there was a ruptured cyst and 6 had cysts that compressed the popliteal vein.⁴ Bursa formation is a known possible feature of osteochondromas,⁵ thus we propose that the symptoms mimicking DVT in the case we presented were caused by the osteochondroma compressing the popliteal vein, and the fluid and oedema within the soft tissue and muscle planes of the calf were caused by rupture of a bursa associated with the osteochondroma.

The thickness of the cartilaginous cap in the case we presented measured over 1.5 cm and appeared lobulated. This raised suspicion that it had undergone malignant change. Malignant transformation is seen in 1% of solitary osteochondromas. Continued lesion growth and a hyaline cartilage cap greater than 1.5 cm in thickness, after skeletal maturity, suggest malignant transformation.⁶ However, pathology analysis following complete

Figure 2 MRI scan (2a, b, c, d, e, f): demonstrates a pedunculated osteochondroma (short arrows) with a lobulated cartilage cap measuring over 1.5cm in thickness (long arrows). Extensive oedema tracking down distally from the cartilage cap in the soft tissues and muscle planes is also shown (2e). The gradient echo sequence (2b) was most useful for demonstrating the cartilage cap in clearest detail compared to the other image sequences and the authors therefore recommend that it is included on all MRI examinations for osteochondromas. Protocols: (2a) Axial T1 TSE (Turbo Spin Echo) MRI scan. TR (repetition time)=900 ms, TE (echo time)=28 ms. Slice thickness=8 mm. (2b) Axial T2 Gradient Echo MRI scan. TR=1010 ms. TE=29 ms. Slice thickness=8 mm. (2c) Axial STIR (Short Tau Inversion Recovery also called Turbo Inversion Recovery) MRI scan. TR=6900 ms. TE=28 ms. TI (inversion time) =160 ms. Slice thickness=8 mm. (2d) T1 TSE MRI scan. TR=538 ms. TE=14 ms. Slice thickness=5 mm. (2e) Sagittal STIR MRI scan. TR=4730 ms. TE=26 ms. TI=150 ms. Slice thickness=5 mm. (2f) Sagittal T1 postgadolinium fat saturated MRI scan. TR=502 ms. TE=14 ms. Slice thickness=5 mm. Contrast agent used was 7.5 ml Gadovist.

surgical excision in this case did not show any evidence of malignant transformation. This raises a question as to the reliability of radiological measurement for predicting the chances of malignant transformation. An isotope bone scan, carried out to look for any evidence of abnormal local uptake of radioisotope or metastases, was also negative.

Learning points

- ▶ Osteochondroma causing vascular complications such as compression or deep vein thrombosis (DVT) or resulting in bursa rupture should be considered in the unusual presentation of suspected DVT in an otherwise healthy, young and active individual.
- ▶ Ultrasonographers should be alert to the appearance of these cases at ultrasound.
- ▶ The diagnostic imaging modalities of choice for osteochondroma are CT scan, plain x-ray, and MRI.

Competing interests None.

Patient consent Obtained.

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