The use of ultrasound-guided wire localisation in orthopaedics

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The use of ultrasound-guided wire localisation of lesions is not well described in the orthopaedic literature. We describe a case of an impalpable schwannoma of the femoral nerve and another of sacroiliitis with an associated pelvic abscess. In both, surgical localisation was difficult. Peri-operative ultrasound-guided wire localisation was used to guide surgery and minimise tissue damage, thereby optimising the results and recovery of the patient.

Ultrasound-guided needle localisation is used to facilitate the excision of breast lesions which are impalpable, particularly those that are not seen during mammography.¹ The procedure is performed under local anaesthesia and provides real-time imaging of the lesion and guidance of the needle, resulting in fewer complications. It allows focused surgery to be performed which reduces the operating time and minimises trauma to surrounding tissues.¹ We describe how this localisation technique can achieve the same benefits for deep or inaccessible lesions in the musculoskeletal system, as demonstrated by two separate cases.

Case reports

Case 1. A 63-year-old woman presented with a six-month history of pain in the left thigh aggravated by squatting. On examination Tinel's sign was positive along the course of the femoral nerve but a lesion could not be palpated. There was no significant past medical history and hip radiographs were normal. MRI of the thigh showed a mass in the mid-anterior compartment (Fig. 1). The lesion measured 2 cm in diameter and was considered to be consistent with a neuroma, possibly relating to a branch of the femoral nerve.

After discussion with the regional soft-tissue tumour unit it was recommended that the lesion should be excised at our unit. A radiological opinion was sought regarding removal of the tumour because of its small size and deep location. Fine-wire localisation with ultrasound guidance was suggested.

Ultrasonographic identification of the tumour and insertion of the wire were performed in the radiology department under local anaesthesia

before surgery. Using an aseptic technique and following local anaesthesia (4 ml of lignocaine 1%), a small incision was made in the skin. A 19.5 gauge $\times$ 9 cm introducer needle was passed under ultrasound guidance to lie just superficial to the lesion, with care taken not to puncture it (Fig. 2). Once the position of the needle tip had been confirmed, the wire was extruded from the needle tip under gentle pressure and deployed in the soft tissue. The barbed configuration of the wire fixed it to the surrounding soft tissue. Ultrasound examination confirmed the position of the wire. Then, under general anaesthesia, a longitudinal incision was made centred on the implanted wire marker. The wire was followed into the thigh musculature and a mobile lump 1 cm in size was seen arising from a branch of the femoral nerve. This was resected. The patient made an uneventful recovery and had relief from symptoms. Histological examination confirmed that the lesion was a benign schwannoma.

Case 2. A 15-year-old boy presented with a history of worsening pain around the right sacroiliac joint for one week. He was pyrexial with malaise and raised inflammatory markers. There was no history of trauma and no significant past medical history. On examination, he was most comfortable recumbent with his right hip flexed; pain was elicited on springing of the pelvis. Initial pelvic radiographs were unremarkable. MRI of the pelvis showed changes of infective right sacroiliitis with an apparent abscess 2 cm in size near the inferior aspect of the joint (Fig. 3). Antibiotic medication was started with Flucloxacillin 500 mg qds orally.

Arrangements were made for incision and drainage of the abscess. Initially, a posterior

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Fig. 1

Axial T1-weighted MR scan of the lower pelvis and both thighs showing a well-defined, high-signal lesion in the anterior compartment of the left thigh (arrow).

Fig. 2

Longitudinal ultrasonogram showing the hypoechoic rounded nodule arising from the nerve (N) with the localisation wire, represented by the linear hyper-echoic structure (arrows) with its tip superficial and adjacent to the nodule.

approach to the hip was used, but the abscess could not be located. A radiologist then attended who demonstrated its presence by ultrasound scanning. Using the posterior approach already made and a similar technique to that in case 1, a localisation wire was passed into the abscess. The wire was used to determine the site for a second incision

Fig. 3

Oblique coronal STIR MR scan of the pelvis showing a predominantly high signal in the right hemipelvis (large arrow). High signal is also seen within the right sacroiliac joint consistent with fluid secondary to sacroiliitis (small arrow).

behind the sacrum allowing location and drainage of the abscess. *Staphylococcus aureus* sensitive to flucloxacillin was cultured. He made an uneventful recovery and at follow-up six months later was asymptomatic.

Discussion

Ultrasound-guided wire localisation is well established in breast surgery. There is little information regarding the use of this technique in orthopaedics. Two small series have described its use to aid the excision of soft-tissue tumours, including neuromas² and intramuscular haemangiomas,³ with good results. An example of the use of the technique outside breast surgery is the excision of a thyroglossal cyst.⁴ It has also been used by the authors in excision of a branchial cyst and cervical lymph nodes.⁵

In lesions which are small or impalpable, diagnosis and surgical management may be challenging. This was demonstrated in the case of the schwannoma, which is rare in an extracranial location⁶⁻¹⁰ and in that of the pelvic abscess, which was difficult to access without image guidance. During ultrasound-guided wire localisation, high-resolution ultrasound is used to guide a small-bore (18 or 19.5 gauge) needle either into, or in close proximity to, the lesion under investigation. The needle has a granular coating over its tip (Echotip Cook Ireland Ltd, Limerick, Ireland), which acts to deflect the ultrasound beam, making it echogenic and readily visible sonographically.¹¹ Within the needle there is a central hookwire, the tip of which opens out when extruded from the needle tip and fixes the wire in this position (Fig. 4). The wire is thickened distally to give improved

Fig. 4

Photograph of the Echotip needle (large arrows) with the hookwire extruded and its tip opened (small arrow), which fixes it to the surrounding tissue.

intra-operative manipulation allowing assessment of the fixation of the lesion to surrounding tissues. Real-time ultrasonographic examination facilitates accurate positioning of the needle and subsequent deployment of the wire. The introducer needle is retracted, leaving the wire *in situ*, which once deployed cannot readily be withdrawn back into the introducer. Care needs to be taken during placement of the wire when neoplastic lesions are suspected to avoid puncture and possible spillage of the tumour.

Radiological guidance has often been used in orthopaedics, but usually involves either image intensification or CT. In a similar case, reported by Giannoudis and Tsiridis,¹² the use of a percutaneous sacroiliac screw-insertion technique in the management of pyogenic sacroiliitis is described. A guide wire was inserted into the sacroiliac joint under image-intensifier control and the joint was then drained. The disadvantage of this technique is the use of radiation for imaging, particularly if the patient is young. Ultrasound guidance was possible in our case since the abscess lay within the soft tissues overlying the sacroiliac joint.

The two cases which we have described demonstrate the versatility of ultrasound-guided wire localisation, which can be performed pre-operatively, either under local anaesthesia in the radiology department or in theatre before excision of the lesion. Pre-operative accurate localisation of the wire increases the confidence of the surgeon, aids operative planning, reduces surgical trauma and improves tissue conservation.¹³ The technique is established in breast surgery and its adoption in orthopaedics should be encouraged, since it has the potential to reduce the risk of peri-operative complications and optimise the recovery of the patient.

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