Letters to the editor

The impact of magnetic resonance imaging in early diagnosis of hand osteomyelitis in patients with systemic sclerosis

Sirs,

Digital ulceration in systemic sclerosis (SSc) patients can lead to osteomyelitis, which, if untreated, can necessitate amputation (1-3). Yet osteomyelitis can be difficult to diagnose: when changes become apparent on x-rays, bone damage may be irreversible. In SSc patients, the diagnosis of osteomyelitis on x-ray can be difficult because finger contractures and acro-osteolysis can confound appearances (1).

Our clinical observation has been that in SSc patients, osteomyelitis is often diagnosed on magnetic resonance imaging (MRI) when x-rays are normal/inconclusive. To further investigate this, we undertook a retrospective health service-evaluation to assess whether MRI influences management and outcome in SSc patients with suspected osteomyelitis.

This was an evaluation of SSc patients at Salford Royal NHS Foundation Trust, a tertiary referral centre for SSc, who had MRI of one/both hands between 01/01/2007-30/06/2012. Patient records were reviewed to confirm the diagnosis and management relating to the MRI findings. MRI and hand x-ray findings were reviewed and each categorised into 3 groups: suggestive of osteomyelitis (bone oedema or bone marrow destruction, periosteal reactions and soft tissue/bone damage (4,5)), equivocal and not suggestive of osteomyelitis.

Of 340 patients, 18 had hand MRI scans during the 66-month period for suspected osteomyelitis on the basis of a combination of clinical features including local pain, swelling, bone tenderness, non-healing or discharging ulcers, and worsening of symptoms despite oral antibiotics. Blood tests such as a raised white blood cell count and raised C-reactive protein were also taken into account. Seventy-two percent (13/18) were female. Median age was 58 years (range: 32-90). In total, 27 MRI scans were performed specifically for suspected osteomyelitis. One patient had a repeat scan within the same episode and this was excluded. Of the remaining 26 MRI scans, 1 patient had bilateral scans (considered as 2 episodes). Another patient had 2 separate episodes. Three patients had 3 separate episodes. In 21 of the 26 episodes of suspected osteomyelitis (81%), x-rays had been performed prior to the MR scan (median time between radiograph and MRI:8 days, range:1-29 days). Eighteen episodes (69%) were associated with digital ulcerations: 5 fingertip or nail bed ulcers, 10 over the extensor aspect of the finger and 3 over a metacarpophalangeal joint.

The outcome of the 3 categories of MR scans are summarised in Table 1. Only one patient was confidently diagnosed as osteomyelitis on hand x-ray (as opposed to 10 on MRI).

Ten patients (83%) with MRI suggestive of osteomyelitis received prolonged antibiotic regimes (≥6 weeks). One patient's wound culture grew staphylococcus aureus and was sensitive to flucloxacillin and clinically improved after 17 days of flucloxacillin. A clinical decision was made that osteomyelitis was unlikely. The other patient self-discharged before completing the antibiotic regime. The fact that the majority of patients were hospitalised for intravenous iloprost and/or surgical debridement reflects our standard management of patients with non-healing SSc-related digital ulcers. Procedures such as digital sympathectomies and botulinum toxin injections were used to reduce digital ischaemia. Curettage was done to remove digital calcinosis.

All 18 patients undergoing MRI for suspected osteomyelitis improved clinically, although one patient with an MRI suggestive of osteomyelitis underwent partial amputation due to a gangrenous finger.

Regular monitoring of clinical signs and investigations guided antibiotic treatment in patients with equivocal MRI scans and only in one patient was prolonged antibiotic therapy felt necessary.

Although it is not possible to draw firm conclusions from a retrospective study such as this, nonetheless it seems likely that MR findings improved patient management by allowing targeted antibiotic therapy for those most at risk.

In conclusion, osteomyelitis is difficult to diagnose clinically and early bone infection may not be detected on x-rays (4,5). MR scans can reveal bone oedema in early osteomyelitis, thus allowing timely intervention before infection becomes established. This is especially relevant in SSc, in whom poor digital blood flow jeopardises clearing of infection. In our patients, early diagnosis was associated with good clinical recovery in all but one patient. Conversely, the ability of MRI to exclude osteomyelitis can prevent adverse effects associated with prolonged broad-spectrum antibiotic regimes, as well as extended hospital stays. Clinicians should have a low thresh-hold for requesting an MR scan in patients with SSc in whom osteomyelitis of the fingers is suspected.

Table I. Hand x-ray findings, management and outcome relating to the 3 categories of MR findings.

	MR suggestive of osteomyelitis[1] (12 episodes)	MR equivocal[2] (6 episodes)	MR - No suggestion of osteomyelitis (8 episodes)
Hand x-rays	10	4	7
Suggestive of osteomyelitis	1	0	0
Equivocal	3	3	3
No suggestion of osteomyelitis	6	1	4
Management			
Antibiotics ≥6 weeks	10	1	0
Intravenous iloprost	8	2	6
Surgical intervention[3]	6	2	5
- Amputation (for gangrenous finger)	1	0	0
- Botulinum toxin injection	1	0	0
- Curettage (for removal of calcinosis)	0	1	0
- Debridement	3	1	4
- Sympathectomy	0	0	1
- Washout in theatre	1	0	0
Outcome			
Clinical Improvement	11	6	8
Unknown	1 (self discharged)	0	0

[1]The MRI criteria for osteomyelitis included: bone marrow oedema, bone destruction, periosteal reaction, often with associated articular damage, soft tissue involvement and abscess formation and oedema breaching tissue planes.
[2]Mild or localised marrow oedema.
[3]Digital sympathectomies and botulinum toxin injections were performed to reduce digital ischaemia, and debridements were done to remove necrotic tissue and any underlying pustular lesions.

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