Imaging calcinosis in patients with systemic sclerosis by radiography, computerised tomography and magnetic resonance imaging

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Introduction

- Calcinosis is a very challenging clinical complication which occurs in up to 40% of patients with SSc, and is responsible for much of the pain and disability associated with the disease. Clinical images of calcinosis are provided in Figure 1.
- There is no currently known effective treatments for calcinosis.
- Objective methods are needed to facilitate clinical trials testing new avenues of therapy.

Aim

- The overall aim of this study was to compare radiography, computerised tomography (CT) and magnetic resonance imaging (MRI) to measure calcinotic lesions in patients with SSc, looking for important differences between the techniques, as a first step in examining these as outcome measures.

Method

- At the same study visit , on one hand, radiography, CT and MRI were performed.
- MRI images were obtained using a wrist or knee (1st patient only) coil.
- The number (all techniques), area (radiography) and volume (CT and MRI) were extracted by trained musculoskeletal radiologists, unaware of the other imaging technique findings.
- Descriptive and comparative statistics are used to describe the data.

Results: Patients

- 15 patients with SSc and a history of clinical calcinosis were recruited.
- All patients were female and the mean (SD) age was 63.5 (8.2) years.
- The majority (n=13) of patients had the limited subset of the disease.
- Mean (SD) duration of Raynaud's phenomenon (RP) and disease (from first non-RP feature) were 24.9 (13.5) and 18.3 (7.2) years, respectively.
- Most patients (n=9) had received treatment with oral vasodilatory therapies for RP and had a history of digital ulcers (n=9).
- 9 patients had received surgical debridement for calcinosis.

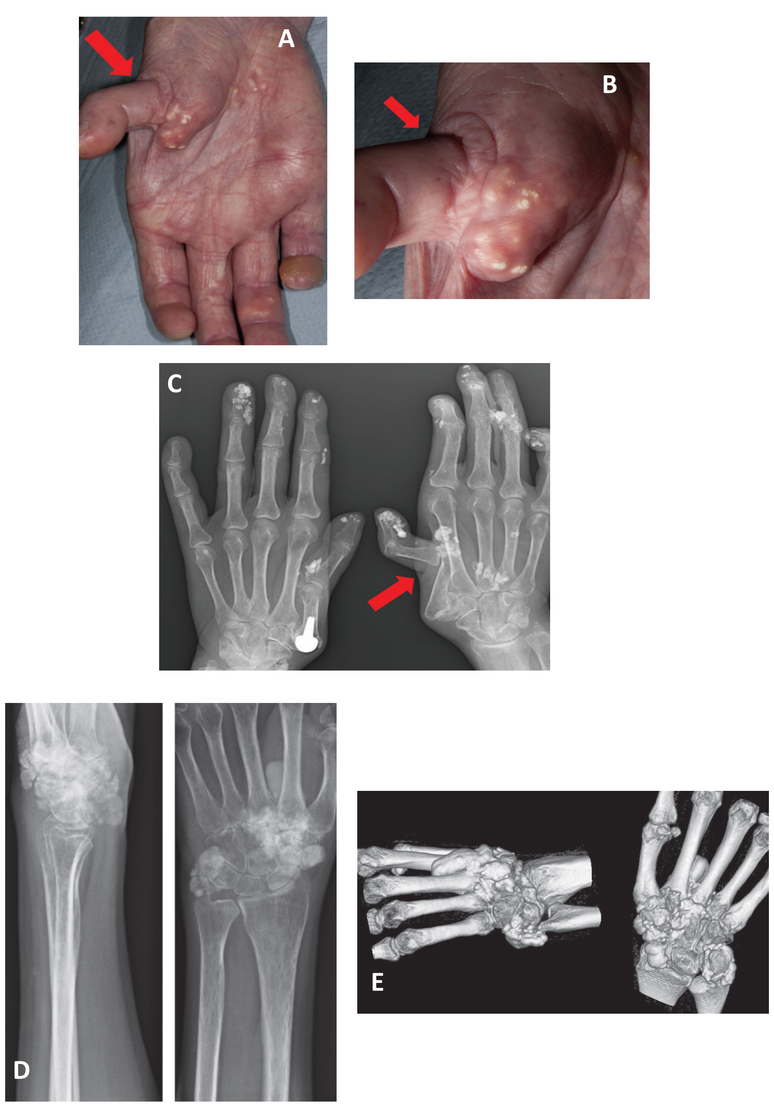

Figure 1. Calcinosis in SSc. Multiple areas of right hand calcinosis (A&B), which are easily seen on radiography (C). Arrows indicate right thumb calcinosis. Wrist calcinosis as seen on radiography (D) and CT (E). From Herrick and Gallas 2016.

Results: Imaging

- No significant difference (P=0.289) in the mean (SD) number of lesions (per hand) was seen between radiography: 5.4 (4.6), CT: 6.3 (6.5) and MRI: 5.2 (3.9).
- The index and then the thumb were the most commonly affected digits as observed by all techniques.
- Mean (SD) lesion volumes were systematically higher as measured by CT: 656.7 (1939.9) mm^3 compared to MRI: 442 (1083.2) mm^3. On average, the within-finger spread of volume was significantly higher (P=0.001) by 800.6 (1735.4) mm^3 by CT compared to MRI.
- For radiography, the mean (SD) area per lesion was 95.7 (200.9) mm^3 and finger was 117.1 (217.3) mm^3.
- Plain radiographic area was highly correlated (P=<0.0001) with area for both CT and MRI (rho=0.91 and 0.87, respectively).

Conclusion

- It was possible to measure calcinotic lesions by all three techniques of radiography, CT and MRI. However, there were important differences between MRI and CT, with volumes being systematically higher with CT.
- Radiography area was highly correlated with CT/MRI volume.
- The index and thumb were preferentially affected.
- Our findings provide further insight into the development of objective (imaging) outcome measures to facilitate future calcinosis clinical trials.

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