

Systemic Sclerosis-Related Digital Ulcers: Influence of Location, Calcinosis and Perfusion on Time to Healing

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Background

• Relatively little is known about pathophysiology of systemic sclerosis (SSc) related digital ulcers and of their healing.

Aim

• Our aim was to determine whether time to ulcer healing was related to location on the finger, the presence of underlying calcinosis, or perfusion.

Patients

• Patients attending for annual review at a specialist SSc clinic were asked to report any ulcers occurring within the following 12 months and if so to attend regularly for specialist wound care and comprehensive assessment including laser Doppler imaging (LDI) until ulcer healing.

Methods

• If more than one ulcer was present, then each ulcer was assessed and included in the study. The ulcer location was documented, photographed and an x-ray taken to identify the presence of any underlying calcinosis. To measure perfusion the ulcer site, an adjacent area of skin and an area of skin away from the ulcer (representing normal perfusion) were imaged using LDI, Figure 1. LDI data were measured as a ratio of perfusion at the ulcer site/normal (U) and adjacent/normal (A), where U or A <1 represents ischaemia and U or A >1 hyperaemia.

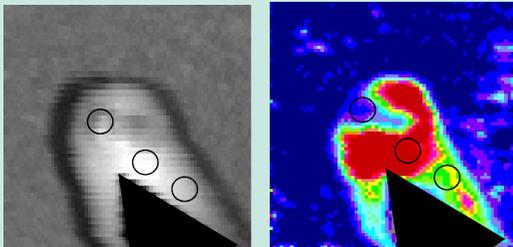


Figure 1: An example of a laser Doppler image showing the black and white image of the ulcer (left) and perfusion map (right). Red represents relatively high blood flow and blue low blood flow. Reduced blood flow at the tip of the finger, at the site of the ulcer can be clearly seen. The 3 circles represent the positions at which measurements of perfusion are made: at the ulcer site, adjacent to the site and distant from the site.

Results

Patient population

- 17 patients were recruited:
 - Their median age was 61, [range 41-88] years.
 - The duration of disease was 16 [1-44] years.
 - 82% were female, 18% were male.
 - 41% has limited cutaneous SSc.
 - 29% were anticentromere antibody positive.
 - 18% were anti-Scl70 positive.
 - 18% were smokers.

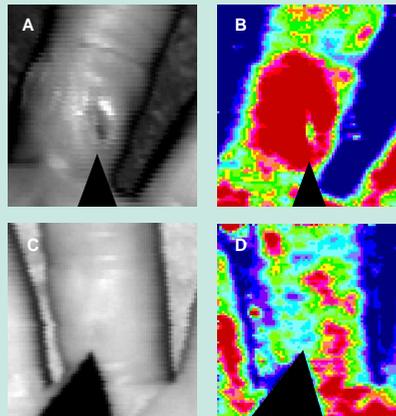


Figure 2: (A & B) laser Doppler image showing the black and white image of the ulcer (A) and perfusion map (B) at baseline. Reduced blood flow at the site of the ulcer can be clearly seen, surrounded by hyperaemia. (C & D) In the black and white image (C) the ulcer site can be seen to have healed. In the laser Doppler image the hyperaemia has reduced and the perfusion increased in the ulcer site (D).

Digital ulcers

- A total of 61 ulcers was documented (number of ulcers per patient ranged from one [8 patients] to 13).
- Location data were available for 54 ulcers:
 - 61% were on the right hand;
 - 15% occurred on a thumb;
 - 35% were digital tip;
 - and 65% were extensor surface.
- The median (95% confidence interval [CI]) time to ulcer healing was 62 (31-147) days for digital tip ulcers and 56 (36-78) days for extensor ulcers (p=0.41).

Calcinosis

- Site-specific calcinosis (clinical or radiographic) was reported in 33 ulcers (data available for 55 ulcers).
- Calcinosis was more common in digital tip (53%) and less common in extensor surface ulcers (23%).
- Time to healing was longer for those ulcers with underlying calcinosis (83 [33-216 days]) compared to no calcinosis (49 [35-62 days]), p=0.06).

LDI

- Median (range) LDI measurements (data available for 53 ulcers) for U and A at baseline were 0.79 (0.11-2.92), reflecting ischaemia, and 3.22 (1.22-24.01), reflecting hyperaemia, respectively.

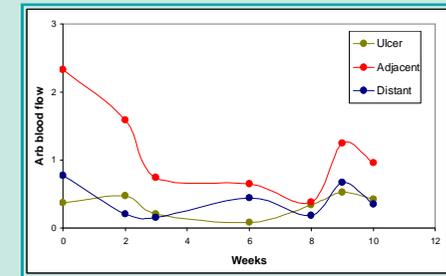


Figure 3: Perfusion, as measured from laser Doppler images of the ulcer in Figure 2 Over a 12 week period. The ulcer perfusion is shown in green, the area adjacent to the ulcer in red and the area away from the ulcer in blue. The hyperaemia seen in the adjacent area can be seen to decrease over the 12 week period.

- An example of an ulcer imaged at baseline and healing is shown in Figure 2. A timeline of ulcer perfusion is shown in Figure 3.
- 32 ulcers (60%) were ischaemic (U<1, 19 fingertip, 13 extensor). Ischaemic ulcer healing time was 97 (CI 56-138) days compared to 43 (30-56) days for non-ischaemic ulcers.

Conclusions

The location of digital ulcers and the presence of underlying calcinosis or ischaemia affect digital ulcer healing time, with digital tip ulcers, ulcers overlying areas of calcinosis and ischaemic ulcers taking longest to heal.

Acknowledgements

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