Ultrasound assessment of skin thickness on fingers: a tool for estimating overall severity of skin disease in systemic sclerosis?

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Dear editor,

Systemic sclerosis (SSc) is characterized by fibrosis in skin and internal organs and progressive vascular obliteration. The extent of skin involvement has a prognostic value as it is known to predict internal organ involvement and survival[1,2].

Modified Rodnan skin score (mRSS) is the established method for assessing skin disease in SSc patients[3]. High-frequency ultrasound (US), a readily available noninvasive technique, offers a potential value for quantitative and objective assessment of skin involvement[4,5].

In order to study the relevance of US for skin assessment in SSc, we conducted a cross-sectional analysis including 48 SSc patients who fulfilled the SSc classification criteria of the American College of Rheumatology[6] and 45 age and gender matched controls. SSc patients group included 42 subjects with limited cutaneous involvement and 6 with diffuse skin disease; 24 patients had clinically defined fibrotic phase of skin involvement, 22 oedematous and 2 atrophic.

Skin thickness (ST) was arbitrarily measured at the 2nd finger of both hands, of each subject, on the dorsal aspect of the proximal phalanx. A 6-15 MHz linear probe of a General Electric LOGIQ S8 US equipment was used, placed in a longitudinal plane, and measurements included the thickness of epidermis, dermis and subcutaneous tissue, measured together, in millimetres. The same observer, experienced in US, performed all measurements.

ST measurements were compared between patients and controls. Then, among SSc patients, the relationship between US measurements and specific clinical features was assessed. Defined variables included local and total mRSS as well as hand mobility in SSc (HAMIS) and SSc Severity Scale (SScSS). For comparison between groups, mean ST (mST) of combined right and left phalanx was used. Statistical analysis was performed using SPSS statistics 21.0 and included Mann-Whitney U-test, Kruskal-Wallis, Spearman correlation and multivariate linear regression. Statistical significance was set as p value <0.05.

A significant higher mST was found in SSc patients (3.17 mm [2.56 to 3.58]) (median [interquartile range]) compared with controls (1.89 mm [1.55 to 2.08]) (p<0.001). Among SSc patients group, ST strongly correlated with local mRSS assessed by palpation (Spearman s rho=0.698, p<0.001 and rho=0.645, p<0.001 for right and left sides, respectively). US mST also correlated with total mRSS (rho=0.568, p<0.001), HAMIS (rho=0.520, p<0.001) and SScSS (rho=0.524, p<0.001) and was higher in patients with diffuse skin subtype (p<0.05) or with history of digital ulcers (p=0.05). Although, in multivariate linear regression, only total mRSS was independently associated with the US measurements at the phalanx (p<0.05) (Table I). A higher mST was found in patients in the oedematous phase than in fibrotic or atrophic (p<0.001). Age, gender and disease duration were not associated with US mST (p>0.05).

Concerning our findings, we discuss the possibility of US assessment of one anatomical site, namely the finger proximal phalanx, to reflect not only the local skin involvement assessed by palpation but also overall skin involvement. Thus, besides being able to quantify ST, skin US may also have prognostic value, even if performed in one anatomical site, estimating skin disease severity. This assumption was also stated in some previous studies, but conclusions were not clear[4,5,7]. In addition, in our study, US assessment of ST on phalanx also identified patients in the oedematous phase of the disease which suggests that ST may also be related to the presence of oedema.

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TABLE I. MULTIVARIATE ANALYSIS: ASSOCIATION BETWEEN US MST OF PHALANX AND TOTAL mRSS, HAMIS, SScSS, HISTORY OF DU AND DISEASE SUBTYPE AMONG SSc PATIENTS

	Unstandardized Coefficient	Standardized Coefficient Beta	P value	95% confidence interval
Total mRSS	0.042	0.613	<0.05	0.003 – 0.081
HAMIS	0.008	0.077	ns	-0.075 – 0.092
SScSS	-0.049	-0.321	ns	-0.178 – 0.080
History of DU	0.204	0.146	ns	-0.282 – 0.690
Disease subtype	0.188	0.089	ns	-0.537 – 0.912

US mST: ultrasound mean skin thickness; mRSS: modified Rodnan skin score; HAMIS: hand mobility in systemic sclerosis; SScSS: systemic sclerosis severity scale; DU: digital ulcers; SSc: systemic sclerosis; ns: not significant.

Our study has some limitations namely the 15 MHz probe resolution and the measurements performed by a single observer. Nonetheless, our findings reveal an interesting role for skin US in SSc and we expect larger studies to be performed to help to draw definite conclusions. Ideally, the selection of other anatomical sites for US assessment may add relevant information.

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REFERENCES

1. Kang T, Abignano G, Lettieri G, Wakefield RJ, Emery P, Del Galdo F. Skin imaging in systemic sclerosis. Eur J Rheumatol 2014; 1:111-116.
2. Steen VD, Medsger TAJ. Improvement in skin thickening in systemic sclerosis associated with improved survival. Arthritis Rheum 2001; 44:2828-2835.
3. Clements PJ, Lachenbruch PA, Seibold JR, et al. Skin thickness score in systemic sclerosis: an assessment of interobserver variability in 3 independent studies. J Rheumatol 1993; 20:1892--1896.
4. Hesselstrand R, Scheja A, Wildt M, Akesson A. High-frequency ultrasound of skin involvement in systemic sclerosis reflects oedema, extension and severity in early disease. Rheumatology (Oxford). 2008; 47:84-87.
5. Kaloudi O, Bandinelli F, Filippucci E, et al. High frequency ultrasound measurement of digital dermal thickness in systemic sclerosis. Ann Rheum Dis 2010; 69:1140-1143.
6. Masi AT. Preliminary criteria for the classification of systemic sclerosis (scleroderma). Subcommittee for scleroderma criteria of the American Rheumatism Association Diagnostic and Therapeutic Criteria Committee. Arthritis Rheum. 1980; 23:581-590.
7. Moore TL, Lunt M, McManus B, Anderson ME, Herrick AL. Seventeen-point dermal ultrasound scoring system—a reliable measure of skin thickness in patients with systemic sclerosis. Rheumatology (Oxford). 2003; 42:1559-1563.