Capillary number in the “late” pattern correlates with the progression of organ involvement in systemic sclerosis

Systemic Sclerosis (SSc) is an autoimmune rheumatic disease characterized by vascular alterations and tissue fibrosis of multiple organs. Vascular structural alterations are detected early and seem to play an important role in SSc pathogenesis.

Microvascular damage is characterized by enlargement and distortion of capillary loops, micro-haemorrhages and progressive devascularization.

Peripheral microangiopathy can be recognized by nailfold videocapillaroscopy (NVC), a non invasive and safe method, that is well established in the investigation of patient’s with Raynaud’s phenomenon and SSc.

NVC technique identifies morphological patterns specific to various stages of SSc (‘Early’, ‘Active’ and ‘Late’ patterns).

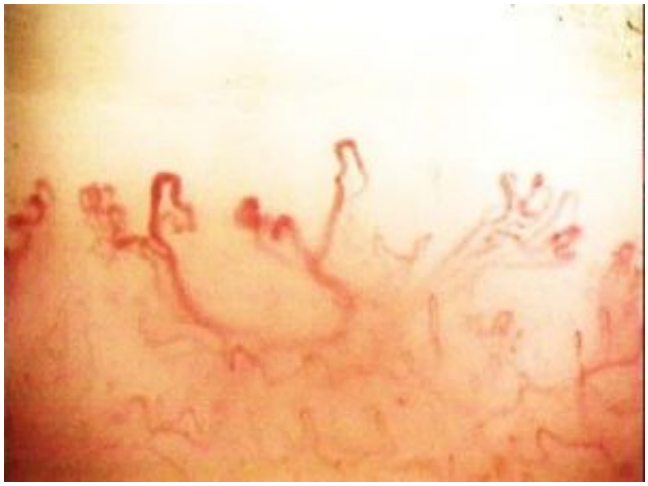

Fig. 1. Nailfold videocapillaroscopic «Late» pattern in systemic sclerosis patient with prevalence of abnormally shaped, angiogenetic capillaries and fibrotic reaction.

The ‘Late” SSc pattern (Fig. 1) is characterized by irregular enlargement of the capillaries, severe capillary loss with evident avascular areas, ramified or bushy capillaries and a severe disorganization of the normal capillary array, although giant capillaries and microhaemorrhages are almost absent.

The scleroderma patterns have been correlated with the different clinical manifestations of SSc, suggesting a possible relationship between capillary abnormalities, primarily the capillary number

(CN), and the extent of visceral involvement. Aim of this study was to assess for the first time possible correlations between absolute nailfold CN and organ involvement, in SSc patients with the “late” NVC pattern diagnosed at baseline and during a follow-up of five years.

In our study twenty-three patients (22 women, 1 male) affected by SSc according to the ACR/EULAR criteria, displaying the “Late” NVC pattern at baseline, were recruited and followed for 5 years. The most frequent type of SSc subset at baseline was the limited cutaneous form (lcSSc; 91%), while diffuse cutaneous SSc (dcSSc) was observed in 9% of cases. Esophageal manometry, pulmonary function tests with diffusing capacity of carbon monoxide (DLCO), chest x-ray, lung CT scan, electrocardiography (ECG),

Doppler echocardiography with systolic pulmonary arterial pressure (sPAP) measurement, echo color Doppler with renal arterial resistive index (RI) measurement were yearly performed to assess organ involvement. Presence of new digital ulcers (DUs) was assessed, as well as cumulative DU number per year.

Skin involvement was assessed by modified Rodnan skin score to classify SSc patients as affected by either lcSSc or dcSSc cutaneous SSc. NVC was performed to identify SSc patients with the “Late” pattern of microangiopathy, and to calculate the microangiopathy evolution score (MES). Absolute CN is calculated counting the capillary loops observable in the first (distal) row of the nailfold bed, along 1 mm per field, over 16 NVC fields (8 fingers, 2 fields per finger, fingers 2–5 of each hand).

A progressive statistically significant decrease of CN, forced vital capacity (FVC), and DLCO values was observed from T0 to T5, as well as a progressive statistically significant increase of renal arterial resistive index (RI), total DU number and MES.

Interestingly, the decrease of CN positively correlated over time with the worsening of FVC and DLCO values, and negatively correlated with the increase of renal arterial RI, renal and heart involvement, total DU number, PAPs values and MES.

No difference regarding the mean CN was noted between patients with anti-centromere and anti-Scl70 positivity.

The present study reports for the first time, in SSc patients in the context of the “late" NVC pattern of microangiopathy, an association between progressive decrease of absolute CN and organ involvement during a five year follow-up, despite the treatments. (Tab. 1)

	T0	T1	T2	T3	T4	T5	p*
lcSSc (%)	91	91	78	74	65	65	0.0004
dcSSc (%)	9	9	22	26	35	35	0.0004
New DUs (%)	39	22	35	35	35	48	ns
ED (%)	74	83	87	91	91	91	0.014
ILD (%)	48	65	78	78	96	96	<0.0001
Kidney (%)	9	9	17	17	22	22	0.019
PAH (%)	0	0	0	4	9	9	ns
Heart (%)	0	0	4	9	13	13	0.044
CN**	5.40±0.99	4.95±1.13	4.68±1.17	4.40±1.26	4.32±1.24	4.23±1.21	p<0.0001

Tab. 1. Percentage of patients (%) with different SSc subset and organ involvement at different times during the follow-up (T0 = baseline, T1 = one year, T2 = two years, T3 = three years, T4 = four years, T5 = five years. lcSSc = limited cutaneous systemic sclerosis. dcSSc = diffuse cutaneous systemic sclerosis. DUs = digital ulcers. ED = Esophageal dysmotility. ILD = interstitial lung disease. PAH = pulmonary arterial hypertension. p* = statistical significance: Friedman test. ns = not statistically significant). CN** means ±SD of nailfold capillary number per millimetre (distal row) during the 5 years follow-up.

The results herein obtained underline how important might be the parameter “absolute number of capillaries” in order to better define the microvascular status.

The authors Smith V. et al have constructed a simple NVC scoring modality limited to the mean score of capillary loss that can be used as a clinical prognostic index for present and future digital trophic lesions.

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Publication

Progression of Organ Involvement in Systemic Sclerosis Patients with Persistent "Late" Nailfold Capillaroscopic Pattern of Microangiopathy: A Prospective Study.
Pizzorni C, Sulli A, Paolino S, Ruaro B, Smith V, Trombetta AC, Cutolo M
J Rheumatol. 2017 Dec