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Evaluation of cardiac functional abnormalities in systemic sclerosis by dobutamine stress echocardiography: a myocardial echostress scleroderma pattern

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In this study, we investigate the possibility of detecting, by dobutamine stress echocardiography (DSE), the presence of early or subclinical myocardial functional changes in patients with systemic sclerosis (SSc) without symptoms of ischaemic cardiac involvement.

Thirty consecutive patients with SSc (26 women and four men; mean age 51 years, range 28–73 years), with a mean disease duration of 8 years (range 1–21 years), were studied. In all, 16 of 30 patients with SSc were affected by diffuse cutaneous (dc)-SSc, and the remaining 14 patients had limited cutaneous (lc)-SSc. The study was approved by the local ethics committee, and all patients gave informed consent to participate. All patients fulfilled the American College of Rheumatology preliminary classification criteria for SSc.¹ Table 1 lists the demographic and clinical data of patients with SSc. Four patients with dc-SSc (25%) and two with lc-SSc (14%) had hypertension, and three patients with dc-SSc (19%) had diabetes; all were well controlled by appropriate treatment.

The DSE protocol was applied as follows: after baseline data were acquired, dobutamine was infused, beginning at a dose of 5 µg/kg/min and increasing every 3 min to a maximum dose of 40 µg/kg/min. Echocardiograms were recorded at baseline, low dose, peak dose and 5 min into recovery. When necessary, atropine (up to 1 mg) was given intravenously at higher dose to augment the heart rate response (fig 1). The duration of the whole examination was 30 min.

The electrocardiogram and blood pressure were monitored continuously and recorded at each stage. For segmental analysis of left ventricular function, a 16-segment model was

used, as suggested by the American Society of Echocardiography.²

In 13/30 (43%) patients with systemic sclerosis, a wall motion abnormality, which was absent on baseline rest examination, was observed during dobutamine infusion. These changes were observed in 9/16 (56%) patients with dc-SSc and in 4/14 (28%) patients with lc-SSc, showing a higher frequency in the diffuse cutaneous subset. Owing to the small size of the two patient subsets, this difference did not reach significance ($p = 0.17$).

Table 1 Demographic and clinical features of patients with systemic sclerosis

	dc-SSc		lc-SSc	
	Data	Range	Data	Range
Demographic and clinical features				
Number of patients	16		14	
Mean (SD) age (years)	53 (13.1)	28–71	52 (9.3)	39–73
M/F ratio	1/14		3/12	
Mean (SD) disease duration (years)	8 (3.3)	2–15	8.5 (5.8)	1–21
Clinical manifestation (n (%))				
Raynaud phenomenon	16 (100)		12 (85)	
Teleangiectasias	12 (75)		5 (36)	
Lung involvement	13 (81)		4 (29)	
Oesophageal involvement	14 (88)		1 (7)	
Trophic ulcers	10 (62)		6 (43)	
Calcinosis	0		5 (36)	

dc-SSc, diffuse cutaneous systemic sclerosis; F, female; lc-SSc, limited cutaneous systemic sclerosis; M, male.

Figure 1 Histogram illustrating the protocol of dobutamine stress echocardiography.

The wall motion abnormalities usually involved a small myocardial region, often (in eight patients) a single segment, but when present in more than one segment (in five patients: three with dc-SSc and two with lc-SSc), it affected scattered segments, with a “patchy” or “spots-on-a-leopard” distribution, falling within different coronary territories. This characteristic picture differed from those usually observed in coronary artery disease involving two or more contiguous segments; it seems to be typical of patients with SSc and might be defined as “myocardial echostress scleroderma pattern” (MESP).

To our knowledge, this is the first report of a DSE picture associated with the myocardial functional change observed in patients with SSc, and consisting of segmental left ventricular wall motion abnormality areas the feature of which seems to be, when multiple segments are involved, the typical of scleroderma heart disease.

Owing to the absence of these left ventricular wall motion abnormalities in the baseline examination, the DSE patchy pattern seems not to be directly referable to the patchy areas of fibrosis reported in the literature,^{3–5} but rather to the expression of a functional defect evidenced by pharmacological stress.

In these patients, evaluation of coronary arteries status is needed; a recent clinical experience in some patients with SSc supports the use of myocardial multidetector computed tomography to avoid coronarography in the absence of a clinical history of coronary artery disease.⁶

Further studies are required to investigate the potential use of DSE in evaluating the benefits of pharmacological treatment of the functional status of small coronary vessels in SSc.

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