

# **Paradoxical pattern in a patient with previous myocardial infarction**

**F. Mut, M. Kapitan**

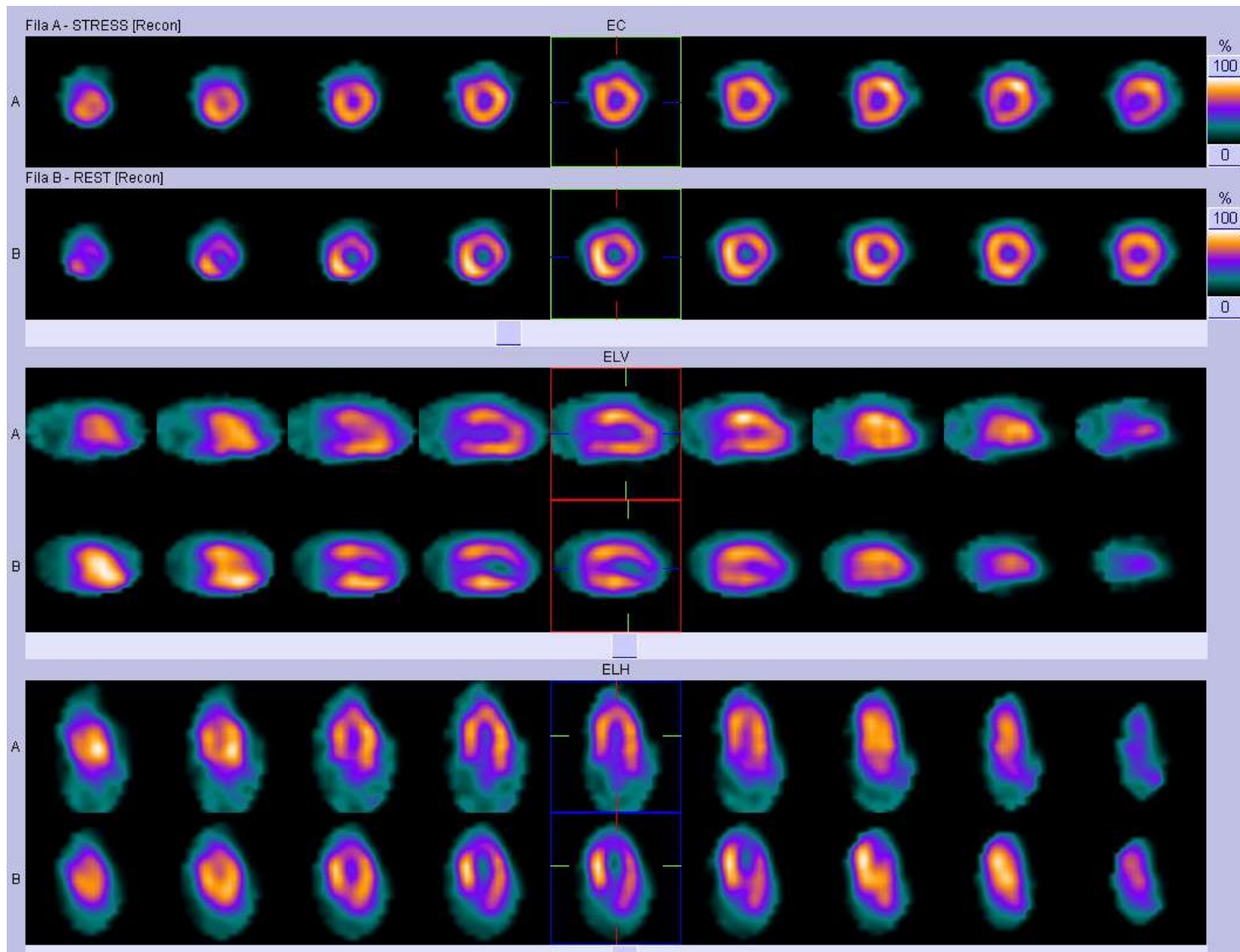
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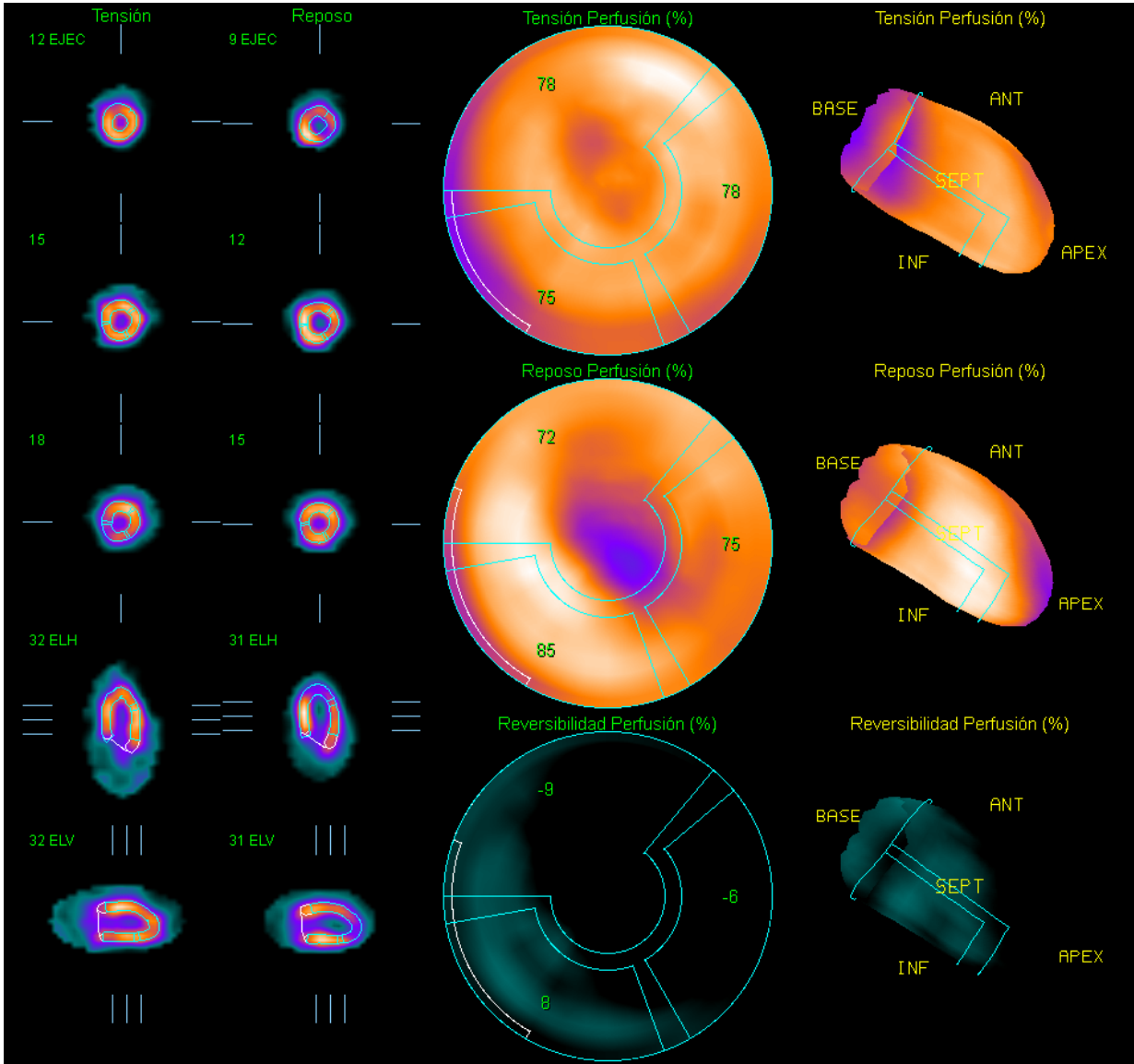
# Clinical history

- Woman 66 y.o.
- Previous MI.
- Dyspnea and non-specific chest discomfort.
- ECG: Q waves V3-V5.
- Echo: LVEF 48%, apical hypokinesia.
- Referred for MPS w/ pharmacologic stress.
- Dipyridamole + rest (2-day protocol),  $^{99m}\text{Tc}$ -MIBI.
- Well tolerated, no symptoms, no ECG changes, BP 130/80 mmHg at rest, 120/75 mmHg during the test.

# Stress/rest myocardial perfusion study



# Stress/rest myocardial perfusion study



Nombre					
ID de pac	35807724				
Sexo	FEMENINO				
Límites	--				
SSS	0	SR8	0	SD8	0
SS%	0	SR%	0	SD%	0

Estudio	SPECT MIOCARDICO				
Conjunto de	STRESS [Recon]				
Fecha	2012-07-17 17:36:33				
Base de dat	FemaleStressMB				
Volumen	38ml				
Área	94cm <sup>2</sup>				
Defecto	0cm <sup>2</sup>				
Extensión	0%				
TPD	2%				
Excentricidad	0.88				

Estudio	SPECT MIOCARDICO				
Conjunto de	REST [Recon]				
Fecha	2012-07-10 18:21:18				
Base de dat	FemaleRestMB				
Volumen	43ml				
Área	95cm <sup>2</sup>				
Defecto	21cm <sup>2</sup>				
Extensión	22%				
TPD	17%				
Excentricidad	0.87				

	Tensión		Reposo		Rev
	Ext	TPD	Ext	TPD	
DAI	0	0.6	29	10.0	0
ICJ	0	0.9	24	4.5	0
ACD	0	0.0	0	0.0	0
TOTAL	0	1.5	22	16.6	0

## How would you interpret the study?

- a) Normal.
- b) Equivocal.
- c) Apical infarction + ischemia.
- d) Apical infarction, no ischemia.

## How would you interpret the study?

a) Normal.

**b) *Equivocal.***

c) Apical infarction + ischemia.

d) Apical infarction, no ischemia.

- There seems to be normal perfusion at stress with an apical defect at rest (paradoxical pattern).
- However, stress images are too noisy, raising the suspicion of a technical artefact - so the interpretation should be categorized as *equivocal* since the presence of ischemia cannot be ruled out.
- Technical parameters should be verified to check for artefact.

# SPECT QC – raw data

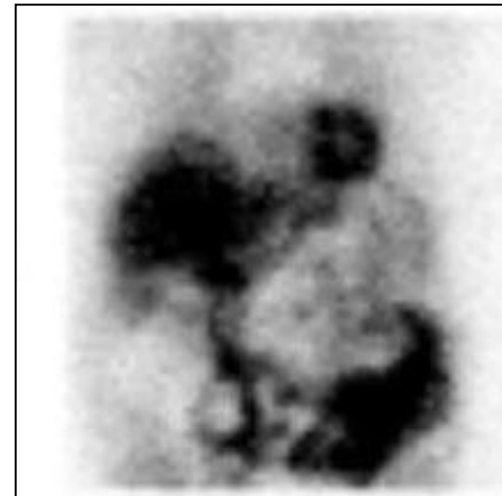
Motion was excluded, but low-count statistics in stress study was detected.  
Partial extravasation of the dose was confirmed.

stress



Total counts  
72,678

rest



Total counts  
287,085

## What would you do now?

- a) Release an indeterminate report.
- b) Report the rest result only.
- c) Try to repeat the stress portion of the study.
- d) Report paradoxical pattern.

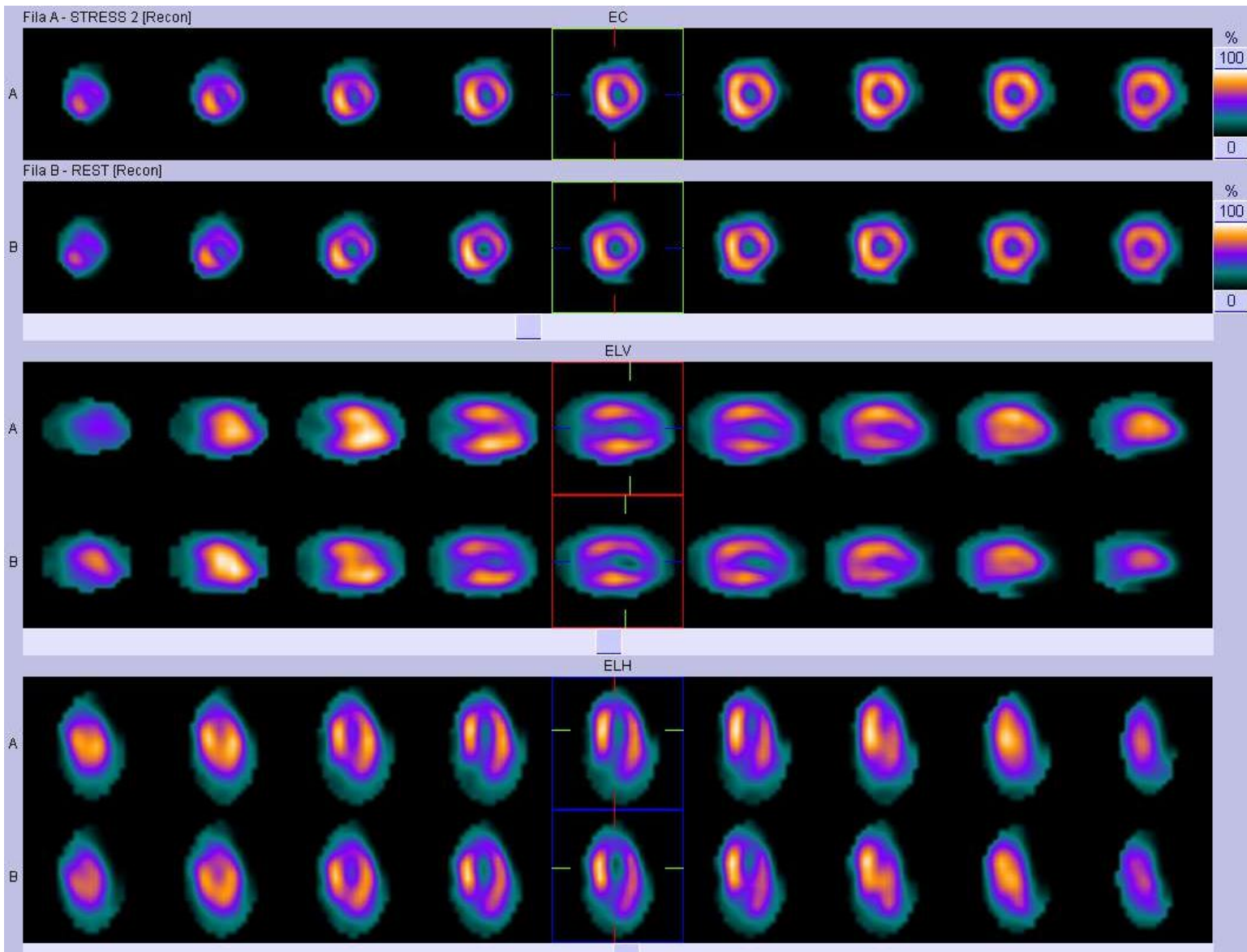


## What would you do now?

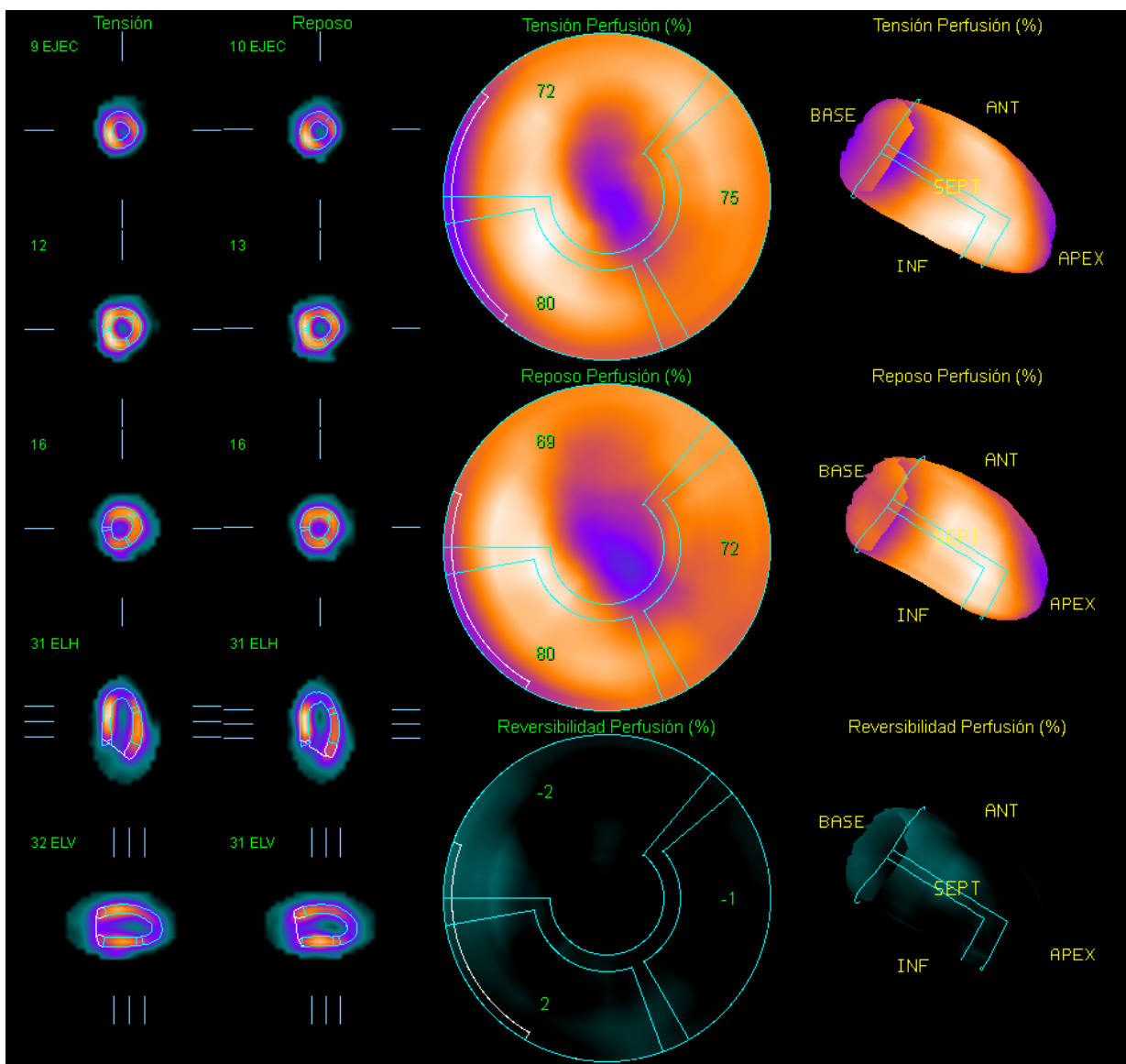
- a) Release an indeterminate report.
- b) Report the rest result only.
- c) *Try to repeat the stress portion of the study.***
- d) Report paradoxical pattern.

- The best option in these cases is to repeat the defective study whenever possible, which may cause additional discomfort to the patient but ensures a reliable result.
- Any other option would be of little help for the referring cardiologist and the patient.

# Myocardial perfusion study (repeated stress)



# Myocardial perfusion study (repeated stress)



Nombre			
ID de pac	35807724		
Sexo	FEMENINO		
Límites	--		
SSS	8	SRS 6	SDS 2
SS%	12	SR% 9	SD% 3

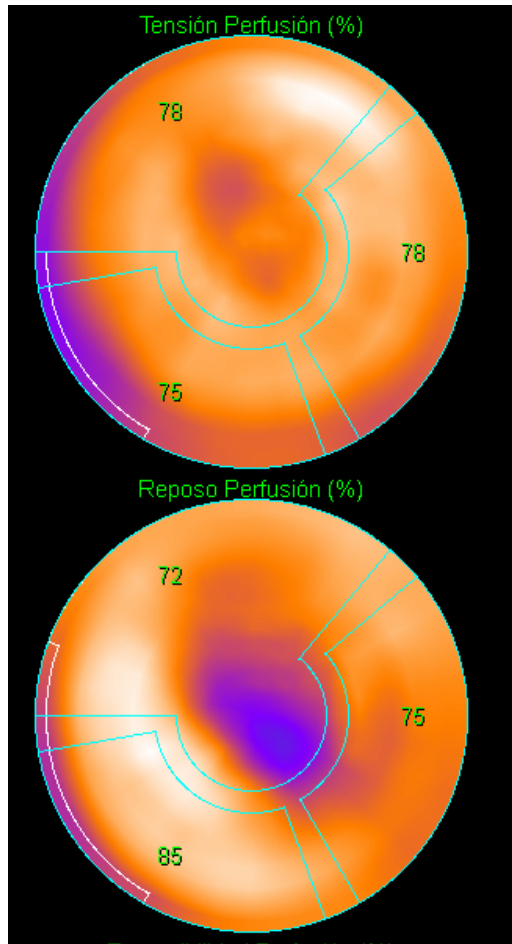
Estudio	SPECT MIOCARDICO	
Conjunto de	STRESS 2 [Recon]	
Fecha	2012-07-24 17:56:32	
Base de dat	FemaleStressMB	
Volumen	48ml	
Área	104cm <sup>2</sup>	
Defecto	9cm <sup>2</sup>	
Extensión	9%	
TPD	11%	
Excentricidad	0.89	

Estudio	SPECT MIOCARDICO	
Conjunto de	REST [Recon]	
Fecha	2012-07-10 18:21:18	
Base de dat	FemaleRestMB	
Volumen	44ml	
Área	97cm <sup>2</sup>	
Defecto	21cm <sup>2</sup>	
Extensión	21%	
TPD	17%	
Excentricidad	0.87	

	Tensión		Reposo		Rev
	Ext	TPD	Ext	TPD	
DAI	16	8.5	31	11.0	3
ICJ	1	1.0	22	4.4	0
ACD	0	0.0	0	0.0	0
TOTAL	9	11.2	21	17.5	2

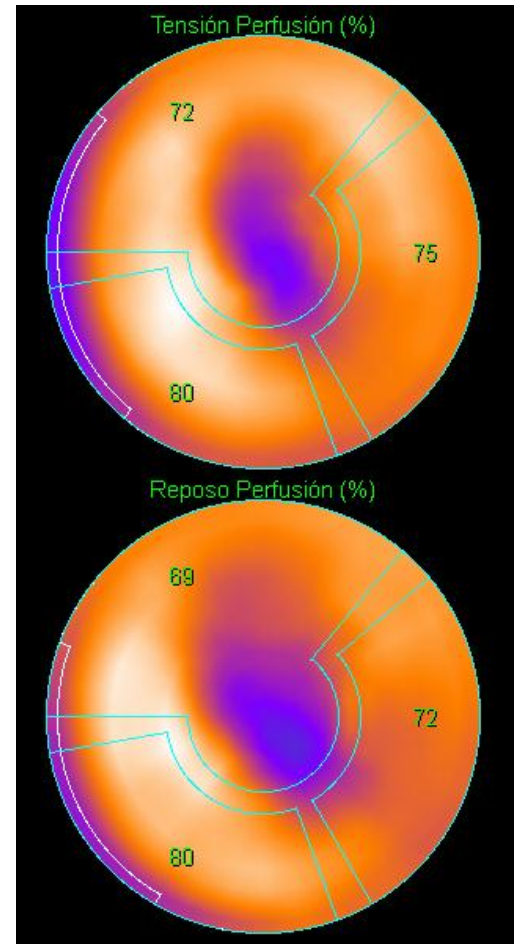
# Polar maps

Stress #1



Rest

Stress #2



Rest

# How would you interpret the study now?

- a) Normal.
- b) Equivocal.
- c) Apical infarction + ischemia.
- d) Apical infarction, no ischemia.

# How would you interpret the study now?

- a) Normal.
- b) Equivocal.
- c) Apical infarction + ischemia.
- d) *Apical infarction, no ischemia.***

- The new stress study is of good diagnostic quality and paradoxical pattern is no longer present.
- Is possible to conclude that there is an extensive apical MI with no significant induced ischemia.
- Any other option would be of little help for the referring cardiologist and the patient.

# Teaching points

- Myocardial necrosis with a paradoxical pattern (PP) is observed in a few proportion of patients with myocardial necrosis.
- Necrotic areas with PP have preserved myocardial flow, owing to either patency of the culprit artery, or the presence of collateral circulation to this territory when the artery is occluded.
- Patients exhibiting a PP on MPS with Tc-99m-labeled tracers have a better prognosis and better LV function than patients with a non-PP pattern in necrotic myocardial regions.
- PP can also be observed as an artefact in studies with low-count statistics, or if there is dominant attenuation during the stress portion.
- QC data should be always checked before interpreting MPS.

# Bibliography

- Takeishi Y, Sukekawa H, Fujiwara S, et al. Reverse redistribution of technetium-99m-sestamibi following direct PTCA in acute myocardial infarction. J Nucl Med 1996; 37:1289-94.
- Araujo W, DePuey EG, Kamran M, et al. Artifactual reverse distribution pattern in myocardial perfusion SPECT with technetium-99m sestamibi. J Nucl Cardiol 2000; 7:633-8.
- Burrell S, MacDonald A. Artifacts and pitfalls in myocardial perfusion imaging. J Nucl Med Technol 2006; 34:193-211.
- Pizzi MN, Sabate-Fernandez M, Aguade-Bruix S, et al. Paradoxical scintigraphic pattern in regions with myocardial necrosis on myocardial perfusion gated SPECT with <sup>99m</sup>Tc-tetrofosmin. J Nucl Cardiol 2012; 19:515-23.