

Don't stress, relax!

Lennert Boeckxstaens¹

L. Minten², T. Adriaenssens², K. Van Laere¹ and S. Jentjens¹

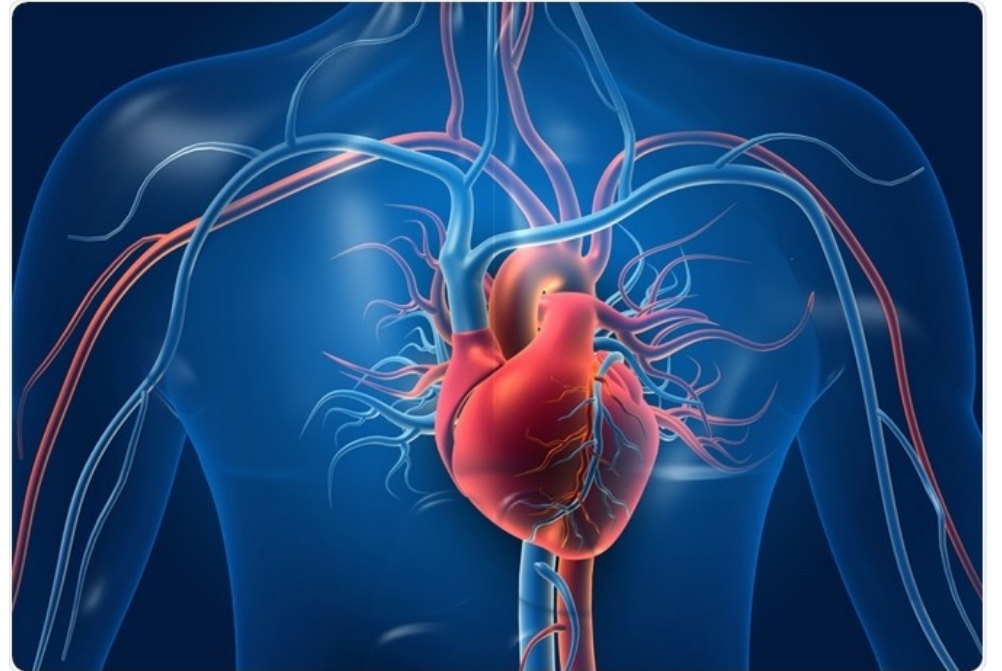
¹ Nuclear Medicine, University Hospitals Leuven, Leuven, Belgium

² Cardiology, University Hospitals Leuven, Leuven, Belgium



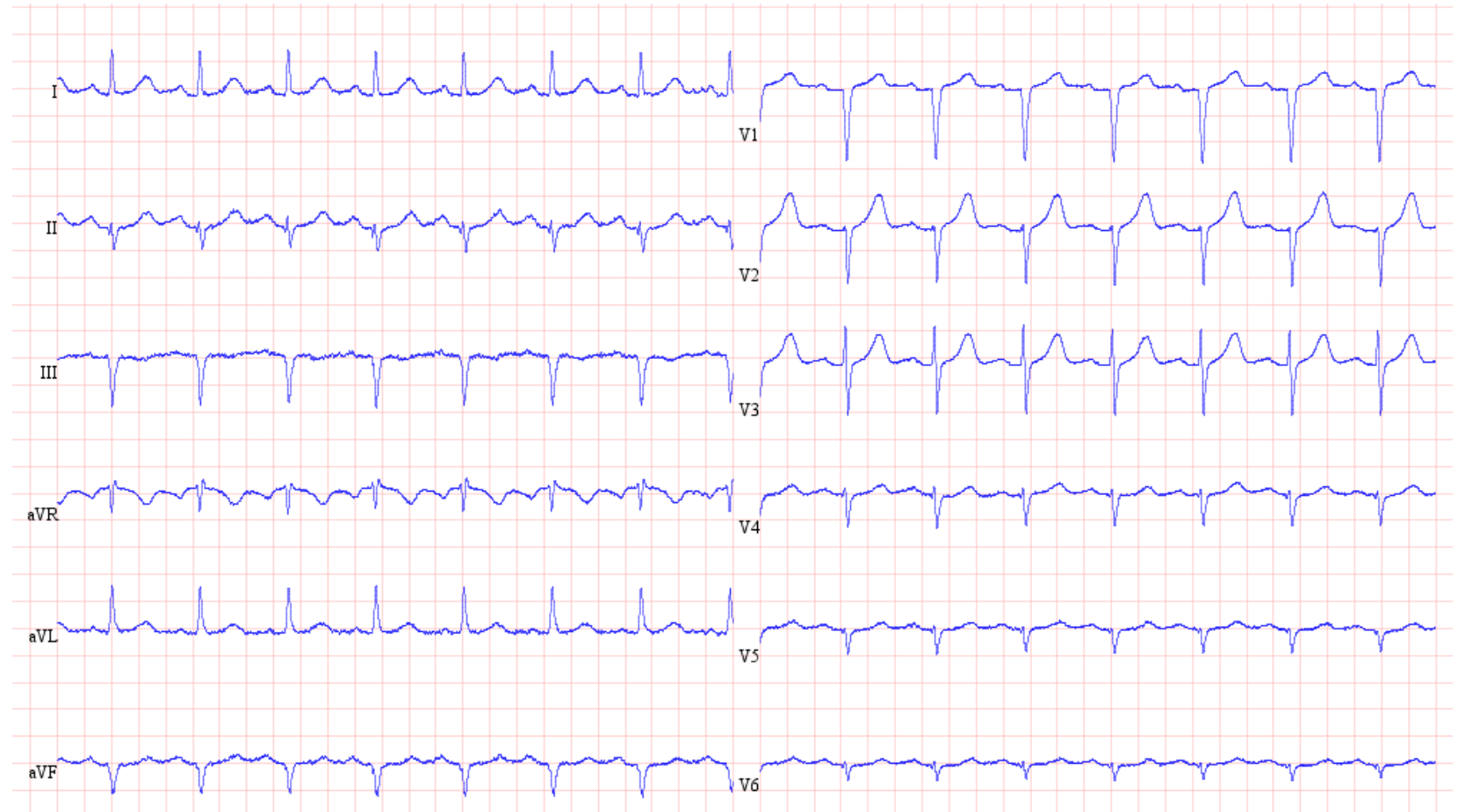
Case presentation

- 75-year-old female
- Severe aortic valve stenosis
- Myocardial scintigraphy to evaluate the significance of a known LAD stenosis, observed on a recent coronary angiography



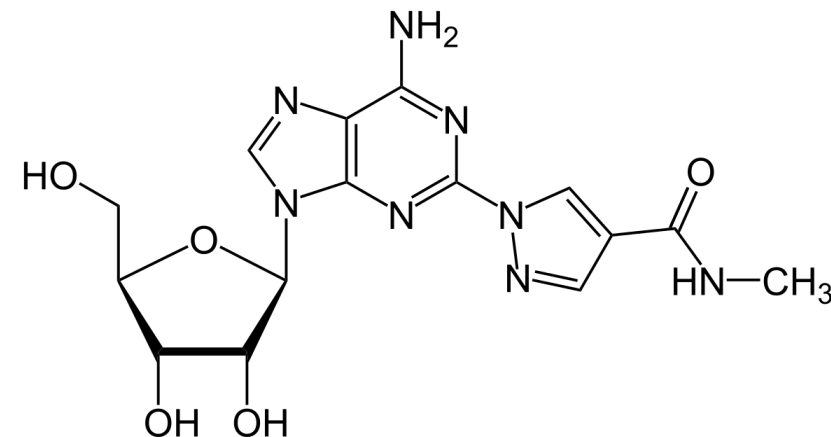
Case presentation

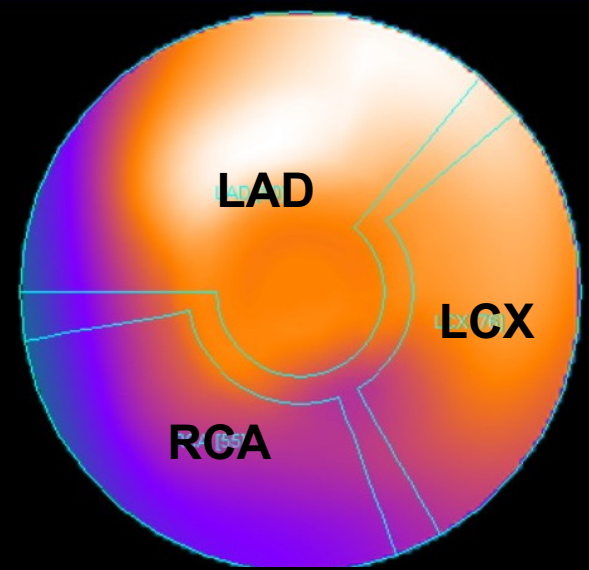
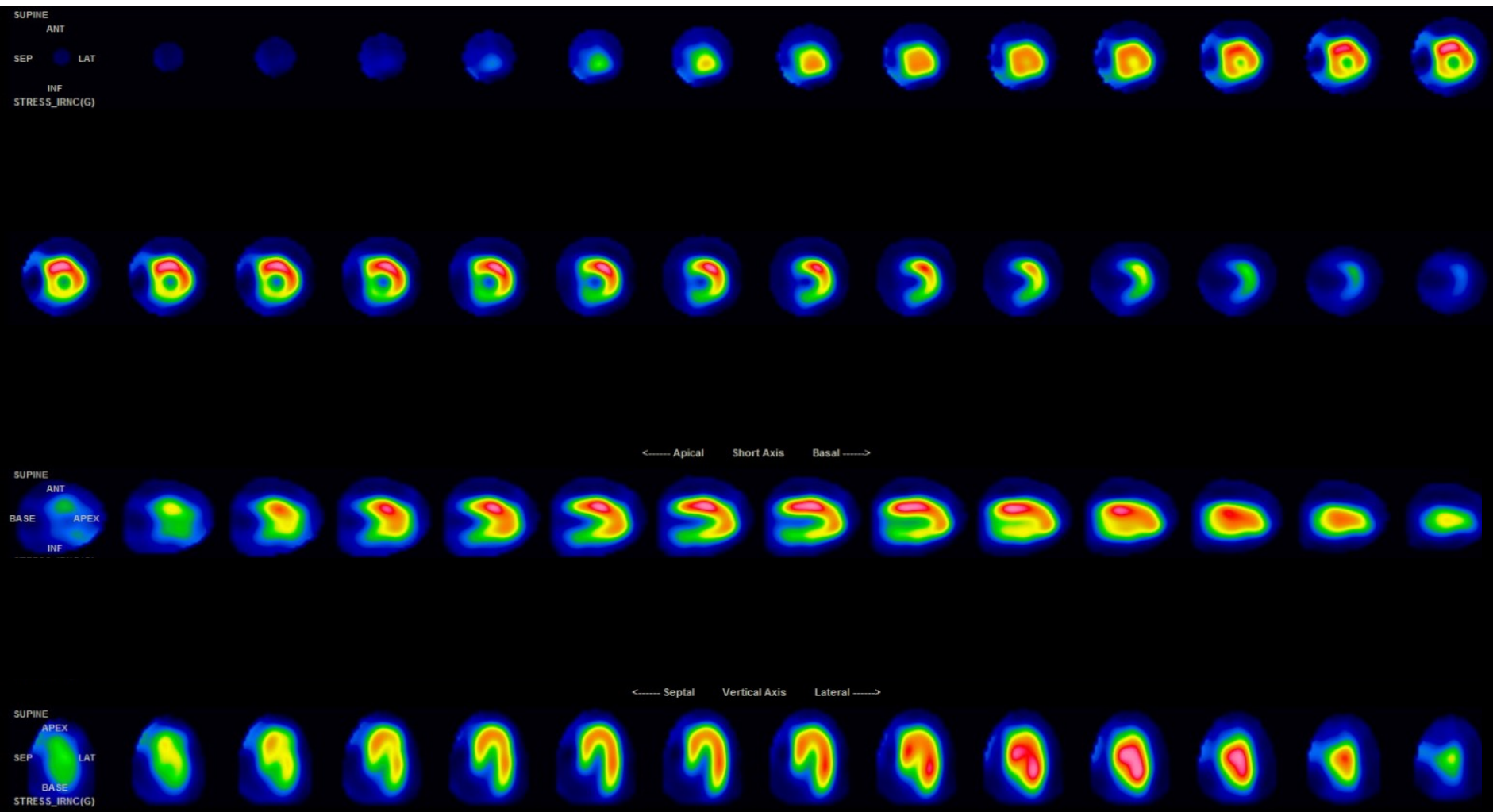
- Normal rest ECG
 - Normal sinus rhythm
 - Left axis
 - QTc 484 ms

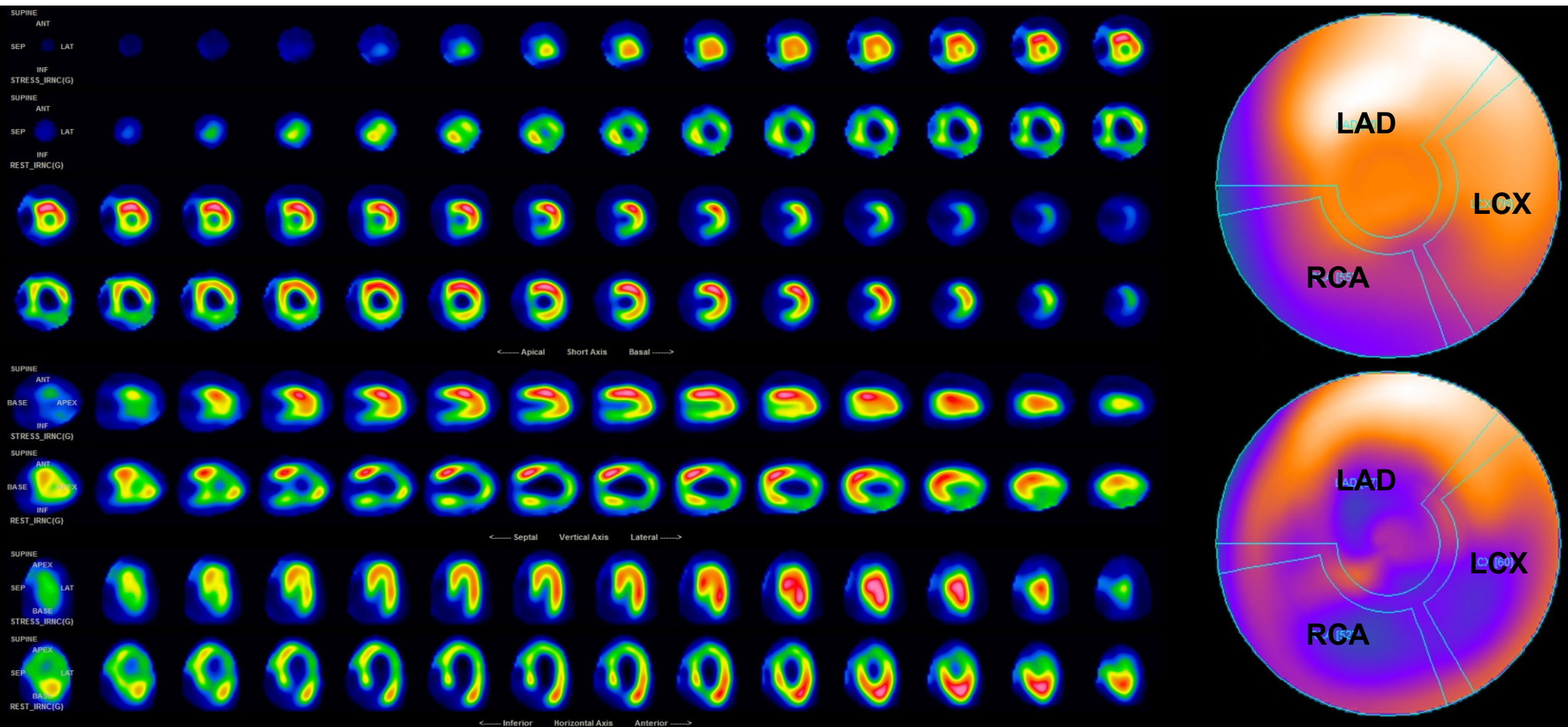


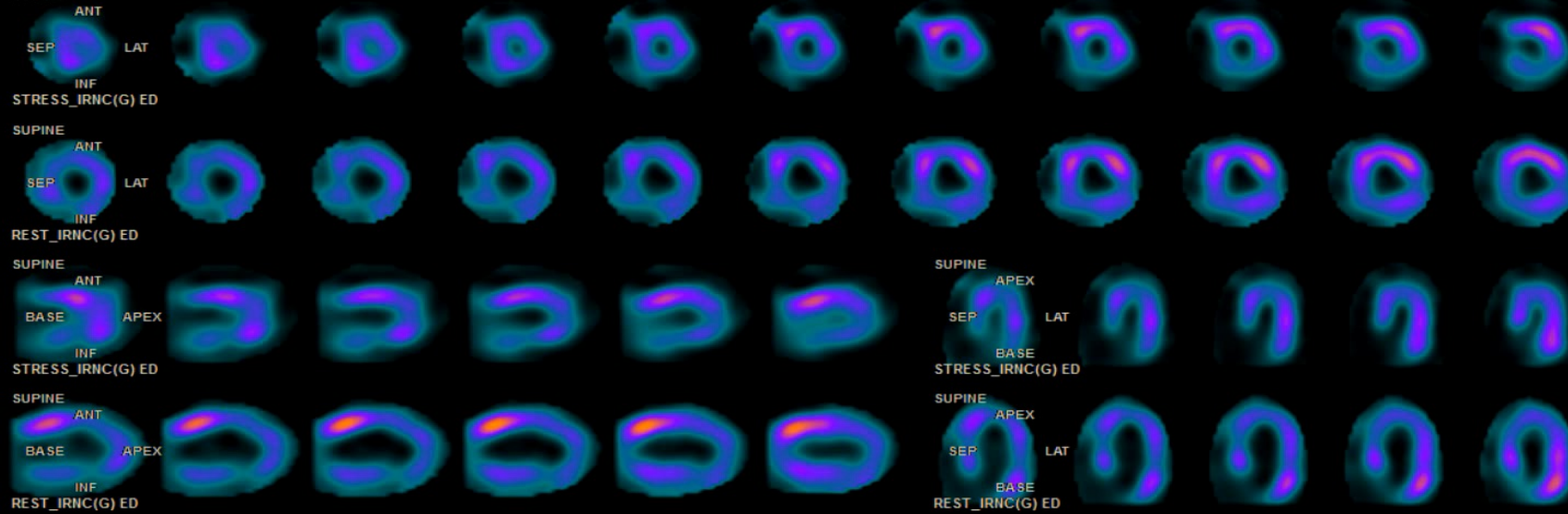
Case presentation

- **Pharmacological stress test**
 - Vasodilator stress test with Regadenoson
 - No complaints
 - ECG remained normal during the test
- Afterwards patient underwent a CT scan in workup to a valve replacement
- **Rest test few hours later**
 - Extravasation of contrast fluid during CT scan
 - Extremely painful and emotional









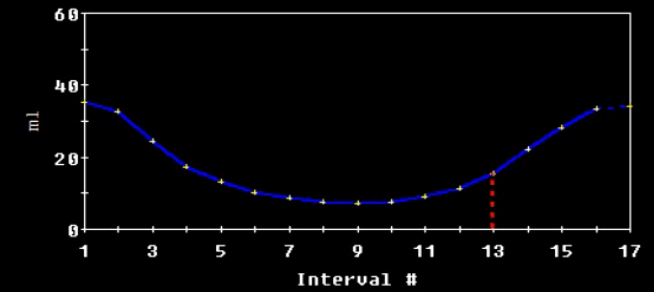
STRESS_IRNC(G)

EF: 79%

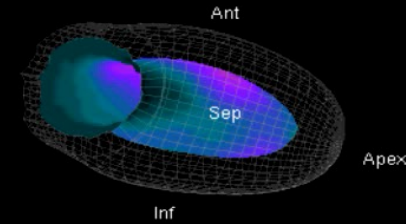
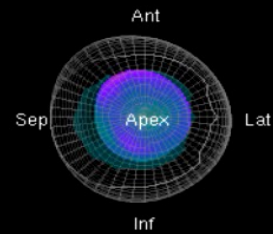
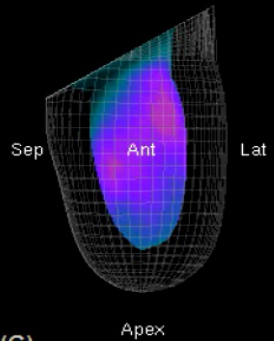
EDV: 35ml

ESV: 7ml

SV: 28ml

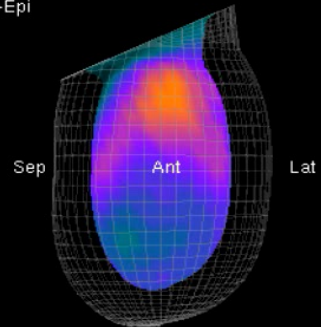


Endo+Epi

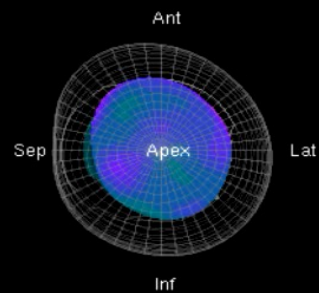


STRESS_IRNC(G)

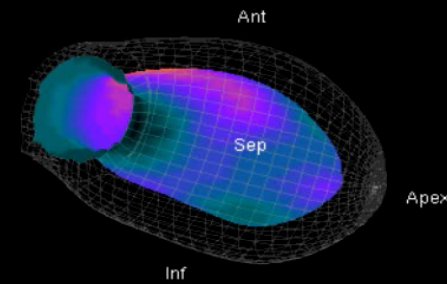
Endo+Epi



ED



ED



ED

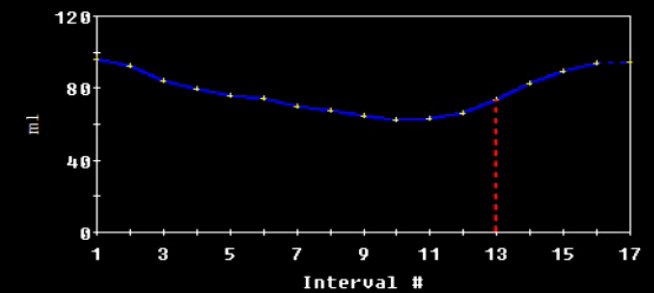
REST_IRNC(G)

EF: 35%

EDV: 96ml

ESV: 62ml

SV: 34ml



80px

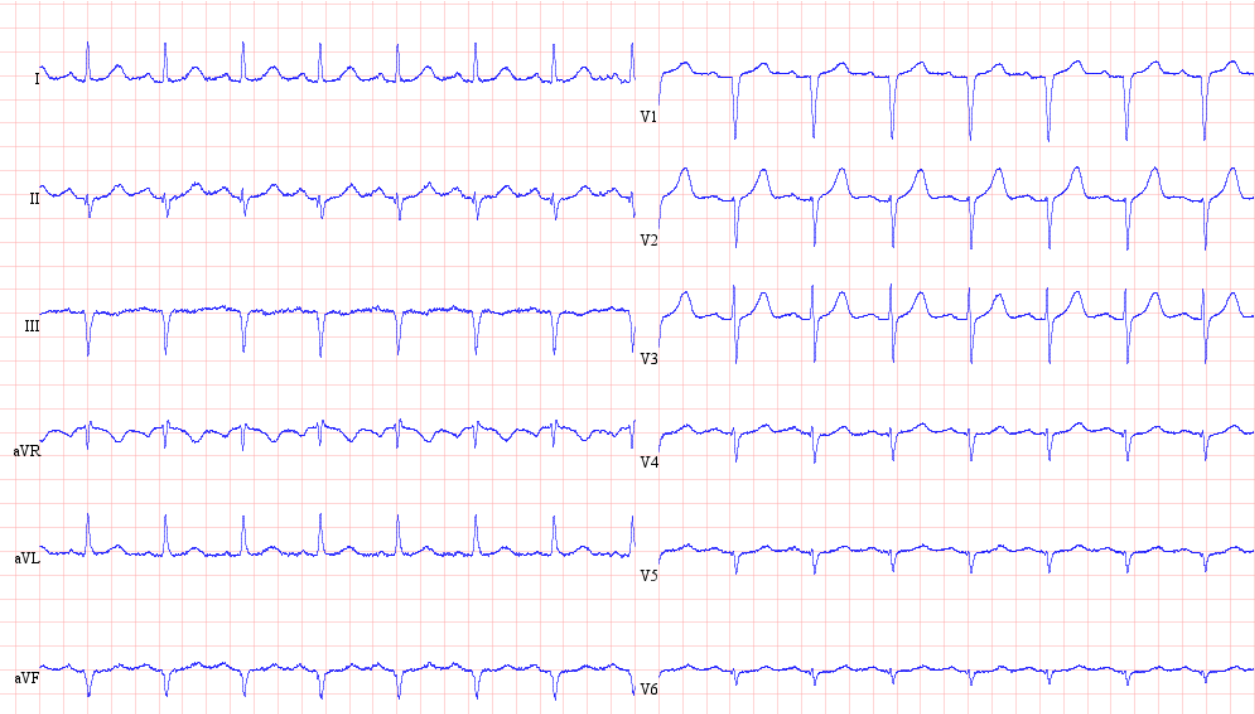
Case presentation

- Excluded an accidental mix-up of patients
- Patient was asymptomatic and physical examination was normal
- **Differential diagnosis**
 - Acute myocardial infarction
 - Acute volume overload
 - Takotsubo cardiomyopathy
- After consulting the treating cardiologist: referral to the emergency department

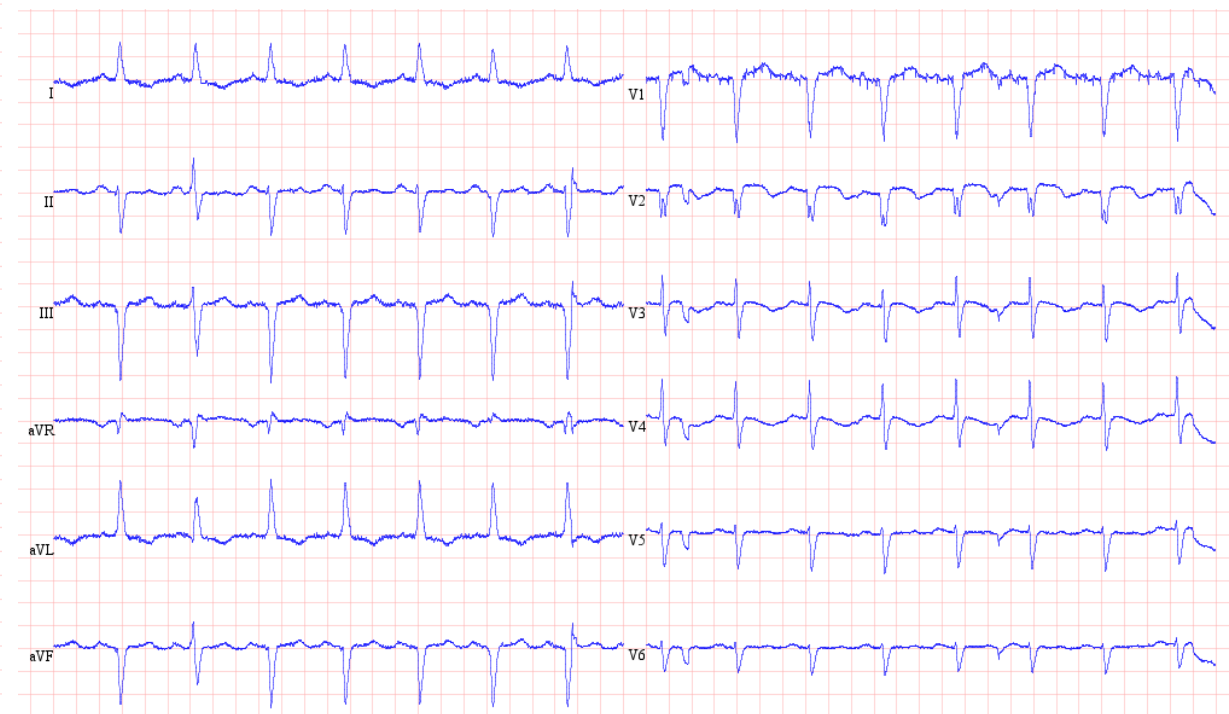


Case presentation

During stress test

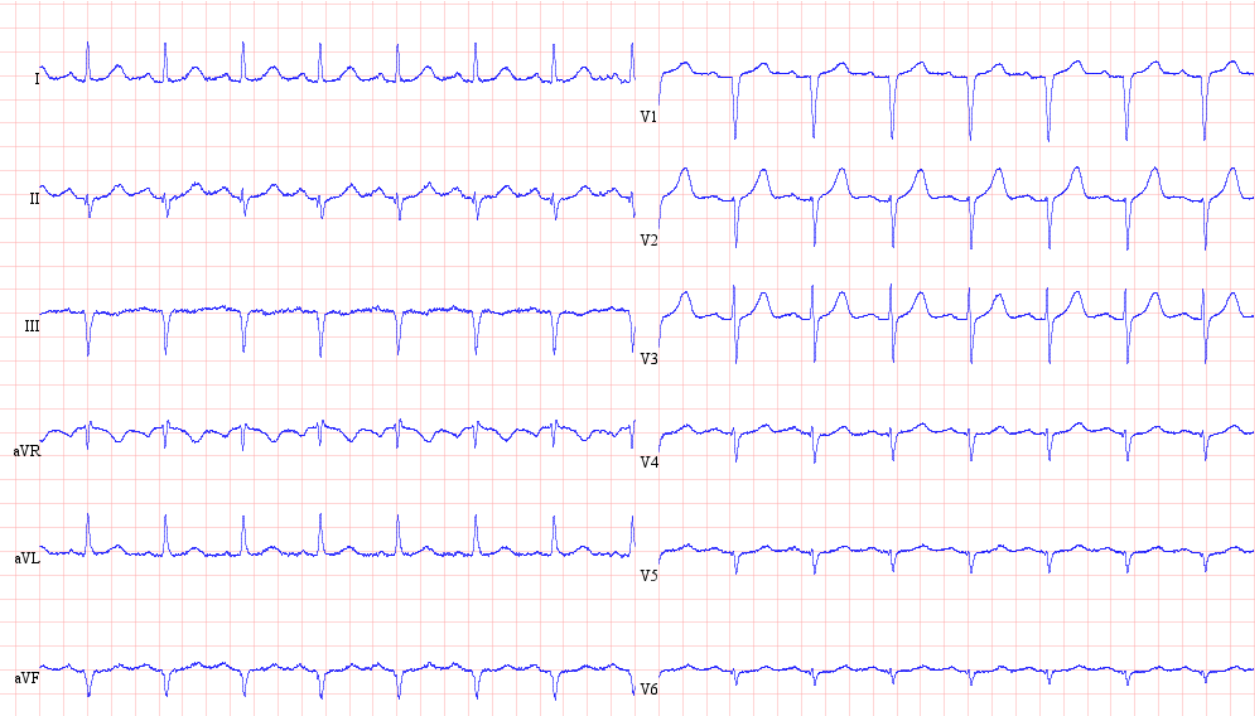


Emergency department

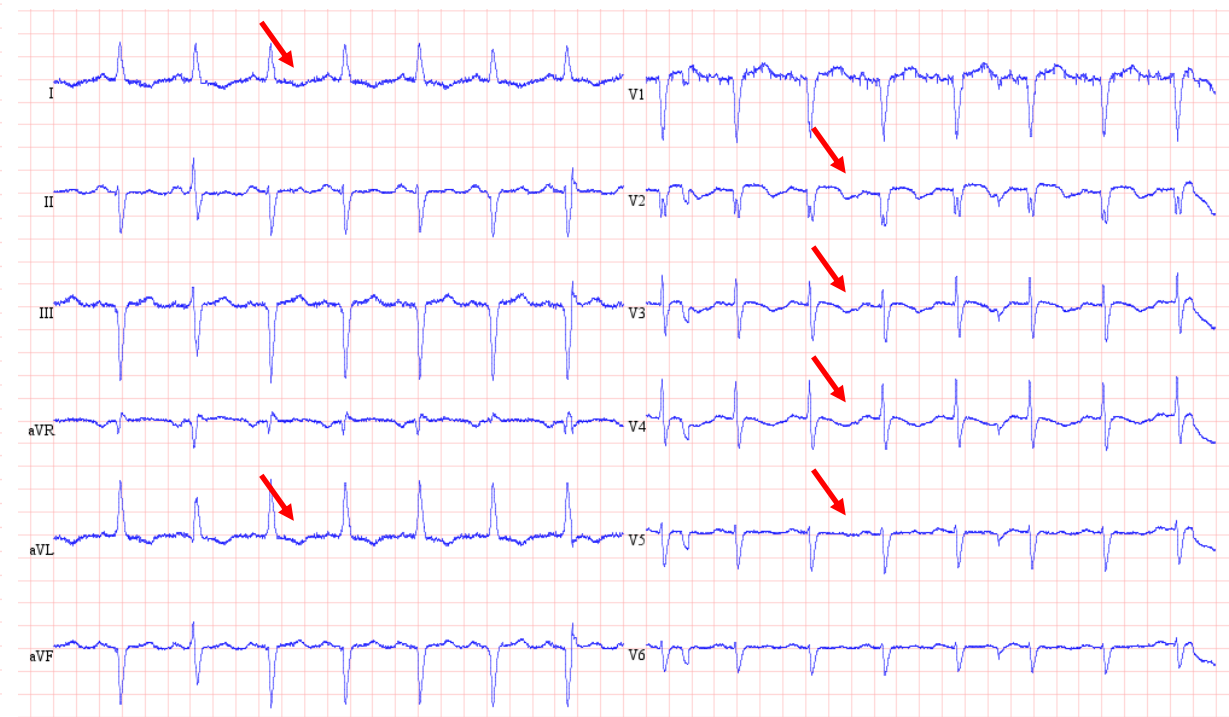


Case presentation

During stress test



Emergency department



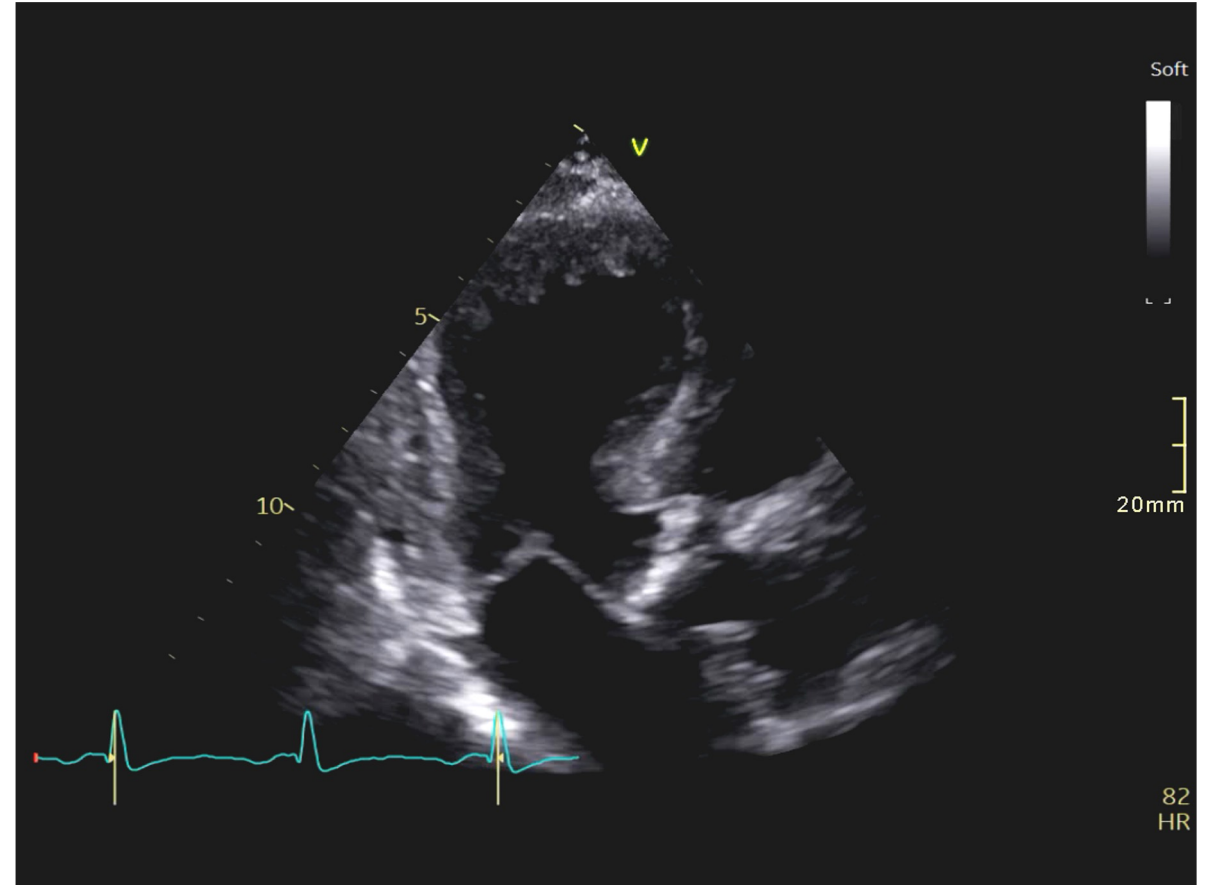
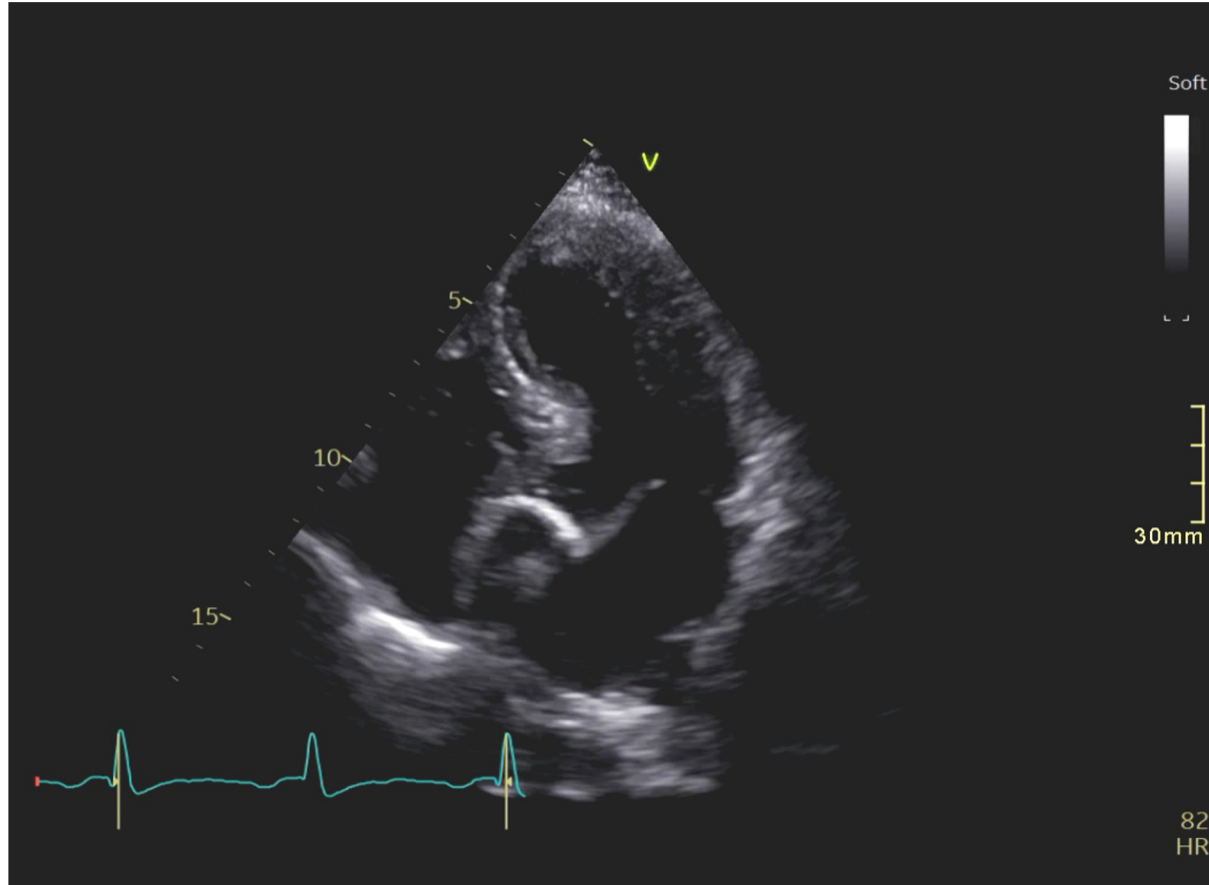
- **Significant changes**

- Prolonged QTc 762ms
- T-wave inversions, exceeding the distribution of a single coronary artery

Case presentation

- **Blood results:** Troponine T 125 ng/L (<14 ng/L),
NT-proBNP 8215 ng/L (<738 ng/L)
- **Echocardiogram:**
 - Typical sign of apical ballooning of the left ventricle with mildly reduced function of the left ventricle (46%)
 - Global function was relatively preserved due to hypercontractility of the basal segments





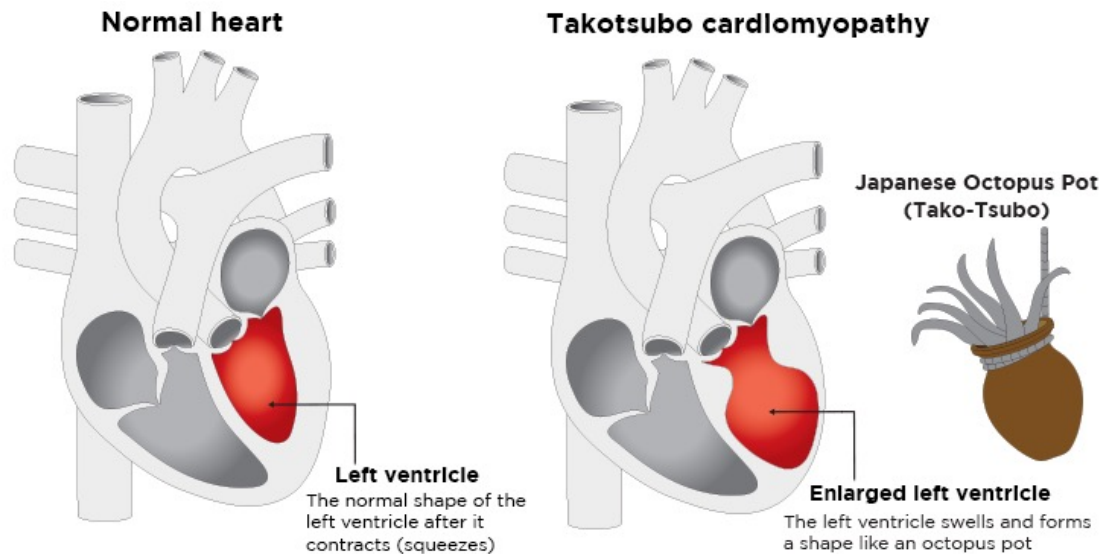
Case presentation

- Diagnosis: **Takotsubo cardiomyopathy**
- Patient was hospitalized for a few days for monitoring and supportive medicinal care was commenced with ACE-inhibition



Takotsubo cardiomyopathy

- Temporary regional wall motion abnormality of the left ventricle that is not linked to obstructive coronary artery disease
- Takotsubo = a pot for octopus fishing used in Japan, which resembles the shape of the heart in Takotsubo cardiomyopathy
- Classic form: apical ballooning



Takotsubo cardiomyopathy - diagnosis

- Exclusion of coronary artery disease
- **Diagnostic criteria**
 1. Temporary wall abnormality in LV segments with the existence of stress elicitation
 2. No presence of significance coronary artery disease
 3. Recent changes in ECG (ST segment elevation and/or T-wave inversion) or significant elevation of cardiac troponin serum levels
 4. Non-existence of pheochromocytoma or myocarditis
- Typical finding during echocardiography is apical ballooning of the LV
 - reported to appear in 75% of patients

Takotsubo cardiomyopathy - pathophysiology

- Remains uncertain
- **Adrenergic theory:** Catecholamine-induced cardiotoxicity
 - plasma levels of epinephrine were critically elevated in patients
 - pheochromocytoma can result in similar features
 - ^{123}I -MIBG scintigraphy studies show an acute reduction in tracer uptake in the affected segments
- Catecholamines could result in cardiomyocyte dysfunction
 - β_1 -receptor and β_2 -receptor density is highest in the apex => apical ballooning

Takotsubo cardiomyopathy - treatment

- Supportive and symptomatic treatment
- Conventional therapy for heart failure
 - ACE-inhibition or angiotensin receptor blockers
 - Beta-blockers
- The LV function may begin to recover in several days and often fully recovers in 3-4 weeks



Conclusion

- This case shows a very rare finding of a Takotsubo cardiomyopathy on a myocardial scintigraphy with its onset in the few hours between the stress test and the rest test
 - resulting in the peculiar finding of a normal stress test and a pathological rest test
- Takotsubo cardiomyopathy should be considered in a prominent apical perfusion defect and matching wall motion abnormality, resulting in apical ballooning
- **Don't stress, relax!**

References

1. Patankar GR, Choi JW, Schussler JM. Reverse takotsubo cardiomyopathy: two case reports and review of the literature. *Journal of Medical Case Reports*. 2013;7:84.
2. Prasad A, Lerman A, Rihal CS. Apical ballooning syndrome (Tako-Tsubo or stress cardiomyopathy): a mimic of acute myocardial infarction. *Am Heart J*. 2008;155:408–417.
3. Dote K, Sato H, Tateishi H, Uchida T, Ishihara M. Myocardial stunning due to simultaneous multivessel coronary spasms: a review of 5 cases. *J Cardiol*. 1991;21:203–214.
4. Matta *et al.*, “Takotsubo cardiomyopathy,” *Rev Cardiovasc Med*, vol. 23, no. 1, p. 1, Jan. 2022, doi: 10.31083/j.rcm2301038.
5. A. R. Lyon *et al.*, “Pathophysiology of Takotsubo Syndrome,” *J Am Coll Cardiol*, vol. 77, no. 7, pp. 902–921, Feb. 2021, doi: 10.1016/j.jacc.2020.10.060.
6. T. Singh, H. Khan, D. T. Gamble, C. Scally, D. E. Newby, and D. Dawson, “Takotsubo Syndrome: Pathophysiology, Emerging Concepts, and Clinical Implications,” *Circulation*, vol. 145, no. 13, pp. 1002–1019, Mar. 2022, doi: 10.1161/CIRCULATIONAHA.121.055854.
7. H. Z. Amin, L. Z. Amin, and A. Pradipta, “Takotsubo Cardiomyopathy: A Brief Review,” *J Med Life*, vol. 13, no. 1, pp. 3–7, Jan. 2020, doi: 10.25122/jml-2018-0067.