

Transitory Apical Hypokinesia in Hyperthyroidism

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Introduction

Cardiovascular symptoms are a frequent and, sometimes, predominant clinical manifestation in patients with hyperthyroidism. Reports of palpitations is present in most cases. Increased heart rate results both from increased sympathetic tone and reduced parasympathetic tone. It is common to observe frequency above 90 bpm at rest, dull diurnal variation and exaggerated elevation on exertion. A subgroup of patients may develop precordial pain similar to angina. In rare patients, generally young women, resting chest pain syndrome is associated with ischemic abnormalities on electrocardiogram. Cardiac catheterization demonstrates that most have angiographically normal coronary arteries. However, coronary vasospasms similar to those found in Prinzmetal angina are reported. Myocardial infarction rarely develops, and these patients seem to respond to calcium channel blockers or nitroglycerin.

Case report

Patient A.S.P, female, 59 years old, on a routine visit to the general practitioner. She had healthy habits, exercised regularly and had no risk factors for coronary artery disease. Laboratory tests, echocardiogram and carotid Doppler were requested.

Carotid Doppler revealed a slight increase in the medial-intimal thickness located in both bifurcations and, as an additional finding, two nodules were detected in the left lobe of the thyroid. Echocardiogram showed normal cavity diameters, normal parietal thickness, cardiac valves without anatomical abnormalities and undetermined diastolic function (E/E' ratio 10, left atrial volume 35 mL/m², lateral e' velocity 0.89 m/s and tricuspid regurgitation velocity <2.8 cm/s). Evaluation of segmental motility revealed hypokinesia in the apical region (Videos 1 to 3). Ejection fraction by the Simpson method was 53% and left ventricular global longitudinal strain was -15.5% (Figure 1). Longitudinal strain of the 2-chamber apical window revealed post-systolic contraction in several segments (Figure 2).

Laboratory tests revealed thyroid stimulating hormone (TSH) <0.01, anti-TPO 372.

Coronary angiography was requested to rule out coronary artery disease in a low-risk asymptomatic patient with segmental disorders. The only disorder found was a calcified plaque at the origin of the anterior descending artery, which promotes discrete luminal reduction.

Keywords

Hypothyroidism; Hypokinesia; Vasospasm.

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Two weeks after the first echocardiogram, the second test (still untreated) revealed normal segmental contractility (Videos 4 to 6), same diastolic function pattern, ejection fraction 60% and global longitudinal strain -22.6% (Figure 3). Strain improved on all segments, but the most expressive increase was in the anterolateral and inferior apical regions. Two-chamber longitudinal strain shows a more uniform strain pattern with no post-systolic contraction (Figure 4).

Due to the absence of ischemic origin for the segmental disorders and spontaneous improvement, even before specific treatment, it was decided to start the treatment with tiamazol 20 mg/day, and the patient was referred to the endocrinologist for follow-up and functional evaluation of the thyroid nodules.

Discussion

Thyroid hormones have different effects on cardiovascular hemodynamics, such as reduced peripheral vascular resistance, activation of the renin-angiotensin-aldosterone system and increased preload and cardiac output. Excessive adrenergic activity may create a state of tachycardiomyopathy and progressive deterioration of left ventricular systolic and diastolic functions. Animal studies prior to the development of speckle tracking have found that one of the first abnormalities of hyperthyroidism on echocardiogram is left atrial increase and free wall hypertrophy. Today, it is believed that this is already a late event, as minor studies show a reduced left ventricular longitudinal strain before any structural disorder. Global longitudinal strain reduction is reported in both hypo and hyperthyroidism, and reduced ejection fraction depends on more intense myocardial impairment. In this particular case, as the patient never presented any symptoms of myocardial dysfunction, and the disorders presented spontaneous remission in two weeks without any specific treatment, we deduced that vasospasm was responsible for the abnormalities detected on the echocardiogram. The theory of vasospasm is largely based on the cellular disorders that occur in hyperthyroidism, which end up increasing cytoplasmic calcium.

Cardiologists often encounter disorders in thyroid function. Most of these disorders are due to hypothyroidism and, occasionally, to hyperthyroidism. On routine echocardiogram in asymptomatic and low-risk patients, it is not common to find segmental contractility disorders. Because it is a myocardial region irrigated by the anterior descending artery, anatomical evaluation of the coronary circulation was required. As coronary angiography has a high negative predictive value, it was chosen over invasive study. Due to the absence of other explanations for the clinical condition presented and suppression of the thyroid stimulating hormone, we deduced that reversible segmental disorder was caused by excessive circulating thyroid hormone.

Potential conflict of interest

The authors declare that there is no relevant conflict of interest.



Video 1 – Apical 4-chamber view of the first echocardiogram with apical hypokinesia.

Watch the video here: http://departamentos.cardiol.br/dic/publicacoes/revistadic/2019/v32_2/video_v32_2_hipocinesia_ingles.asp



Video 2 – Apical 2-chamber view of the first echocardiogram with apical hypokinesia.

Watch the video here: http://departamentos.cardiol.br/dic/publicacoes/revistadic/2019/v32_2/video_v32_2_hipocinesia_ingles.asp



Video 3 – Apical 3-chamber view of the first echocardiogram with apical hypokinesia.

Watch the video here: http://departamentos.cardiol.br/dic/publicacoes/revistadic/2019/v32_2/video_v32_2_hipocinesia_ingles.asp

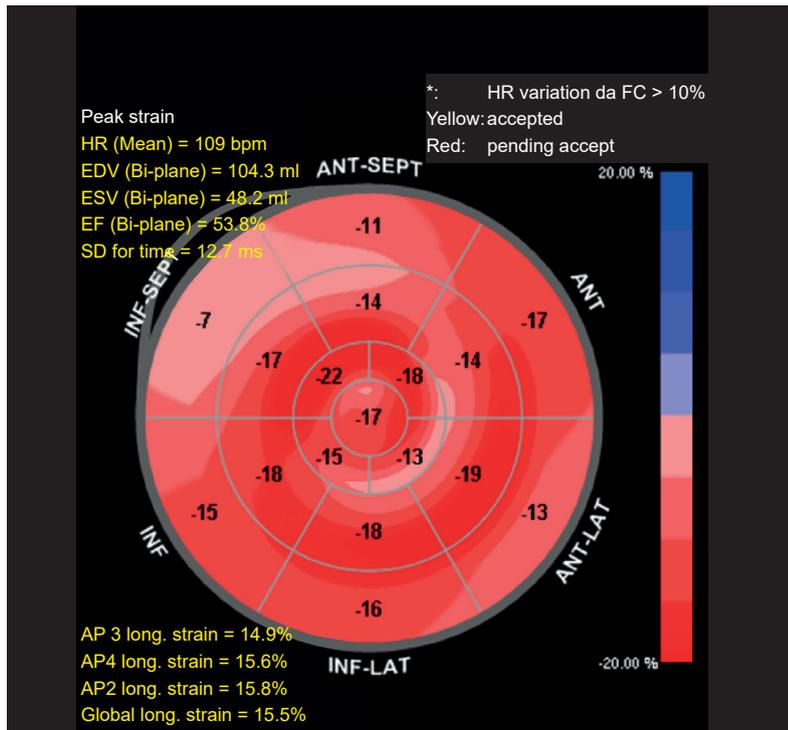


Figure 1 – Global longitudinal strain of the first echocardiogram with discrete reduction.

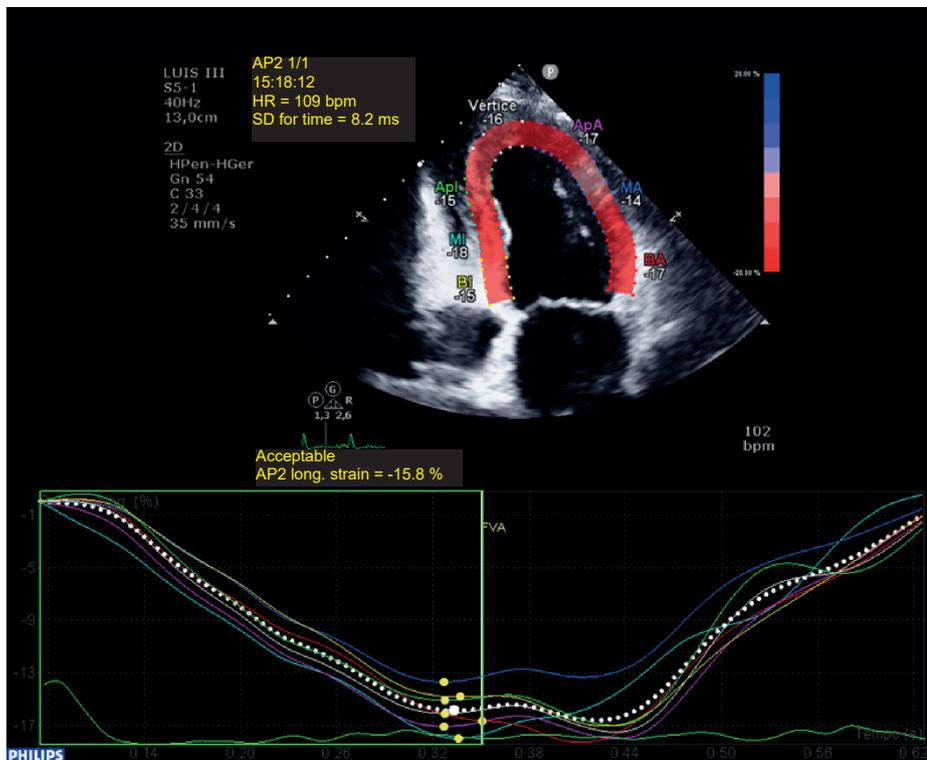
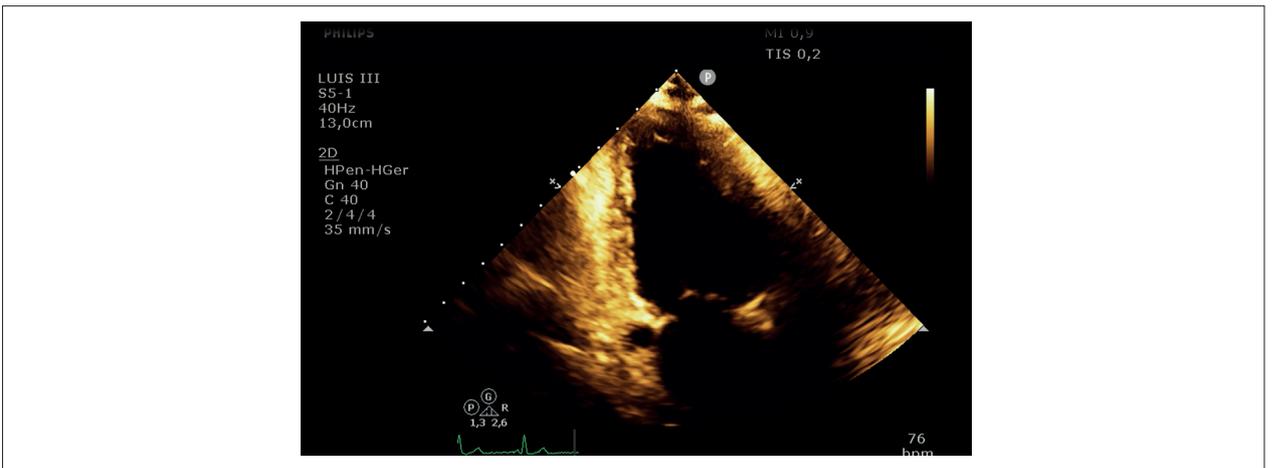


Figure 2 – Two-chamber apical longitudinal strain of the first echocardiogram with reduced values and post-systolic contraction.



Video 4 – Apical 4-chamber view of the second echocardiogram with normal contractility.
Watch the video here: http://departamentos.cardiol.br/dic/publicacoes/revistadic/2019/v32_2/video_v32_2_hipocinesia_ingles.asp



Video 5 – Apical 2-chamber view of the second echocardiogram with normal contractility.
Watch the video here: http://departamentos.cardiol.br/dic/publicacoes/revistadic/2019/v32_2/video_v32_2_hipocinesia_ingles.asp



Video 6 – Apical 3-chamber view of the second echocardiogram with normal contractility.
Watch the video here: http://departamentos.cardiol.br/dic/publicacoes/revistadic/2019/v32_2/video_v32_2_hipocinesia_ingles.asp

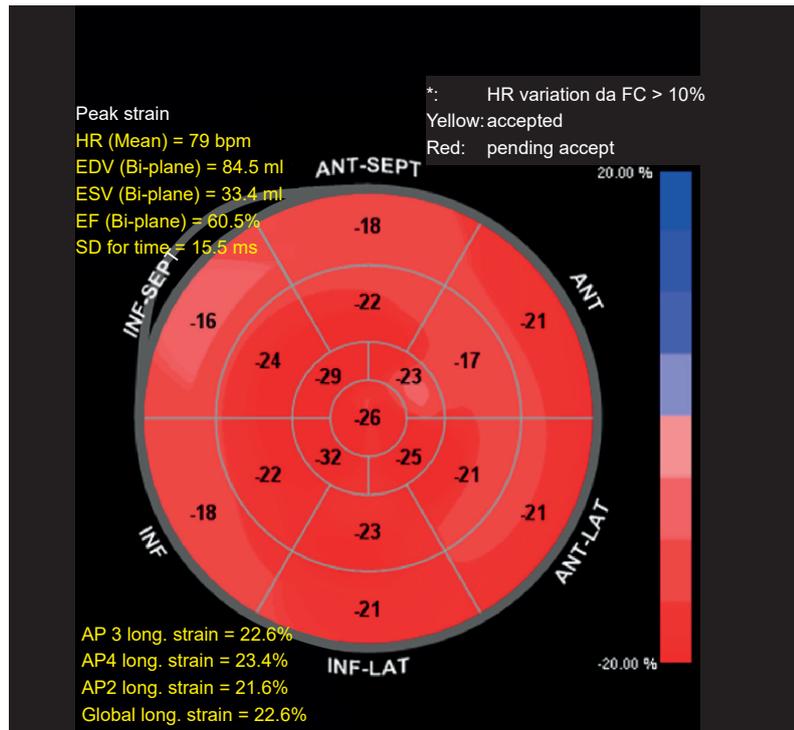


Figure 4 – Global longitudinal strain of the second echocardiogram with normal value.

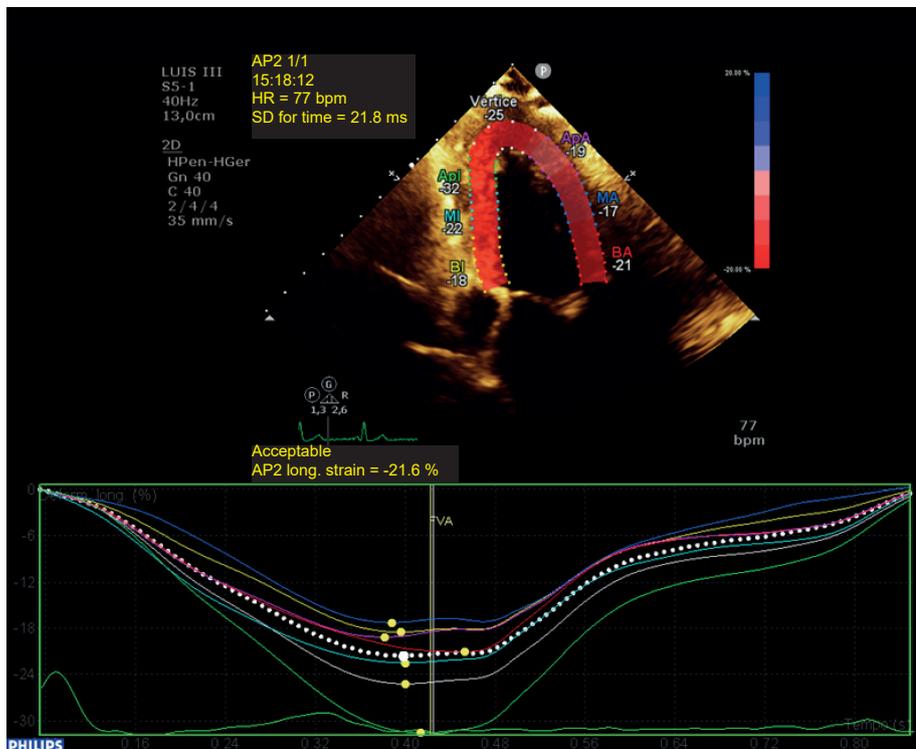


Figure 4 – Two-chamber apical longitudinal strain of the second echocardiogram with normal values and without post-systolic contraction.

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