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CASE REPORT

Androgen deprivation therapy mimicking acute coronary syndrome: A case report

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KEYWORDS
Androgen therapy;
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QT interval

Abstract An 80-year-old man diagnosed with prostate cancer and under treatment with androgen deprivation therapy presented at the emergency room with chest pain, repolarization abnormalities and QT interval prolongation on electrocardiogram. An initial diagnosis of acute coronary syndrome was proposed, but biomarkers and coronary angiography were negative. Hydroelectrolyte balance and echocardiogram were also normal. Some weeks after drug withdrawal, repolarization changes reverted. A rare side effect of these drugs mimicking an acute coronary syndrome was the most probable diagnosis.

PALAVRAS-CHAVE
Terapia androgénica;
Eletrocardiograma;
Síndrome coronária aguda;
Intervalo QT

Terapia de privação de androgénio que imita uma síndrome coronária aguda: um relato de caso

Resumo Homem de 80 anos diagnosticado com cancro da próstata e em tratamento com terapia de privação androgénica apresentou-se num serviço de urgência com dor torácica, alterações de repolarização e prolongamento do intervalo QT no eletrocardiograma. Um diagnóstico inicial de síndrome coronária aguda foi sugerido, mas os biomarcadores e a angiografia coronária foram negativos. O balanço hidroeletrolítico e o ecocardiograma também foram normais. Algumas semanas após a retirada do fármaco, as alterações de repolarização foram revertidas. Um raro efeito colateral desses fármacos, mimetizando uma síndrome coronária aguda, foi o diagnóstico mais provável.

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Introduction

Androgen deprivation therapy (ADT) is commonly used for treating patients with prostate cancer. It has been associated with an increasing risk of atherosclerotic heart disease. Non-ischemic repolarization abnormalities and QT interval prolongation have been reported, but the real incidence is unknown.[1] The aim of this paper is to report a rare case of treatment with ADT in which the patient presented with repolarization abnormalities and QT interval prolongation mimicking acute coronary syndrome (ACS).

Case presentation

We present the case of an 80-year-old man with a history of hypertension 20 years ago, under treatment with captopril (25 mg) 25 mg three times daily. He also has prostate cancer which was diagnosed five years ago and treated with goserelin (Zoladex) (10.8 mg) as a subcutaneous implant every three months and bicalutamide (Casodex) (50.0 mg) one tablet daily. The patient was admitted to the emergency room because of acute chest pain. The first electrocardiogram (Figure 1) showed a sinus rhythm, heart rate: 56 beats/minute, QRS axis: -55°, ST depression on DII, aVF and from V3 to V6, deep negative T waves on DI, aVL and from V1 to V6 leads. A prolonged QT interval (QT interval: 642 milliseconds, corrected QT interval by Bazzet formula: 623 milliseconds and corrected QT interval by Fridericia formula: 629 milliseconds) were also observed.

Serial electrocardiograms performed at the cardiology department showed similar characteristics, even four days after patient admission. Cardiac biomarkers and hydroelectrolyte balance were normal. Based on clinical and electrocardiographic features the diagnosis of unstable angina was put forward. Three days after patient admission, a coronary angiography was performed which showed no epicardial coronary artery disease (Figure 2). Transthoracic echocardiogram was performed one day after patient admission, which revealed biventricular normal systolic function, type I diastolic dysfunction, normal chamber diameters and volumes, no segmental left ventricular wall motion disorders, mild mitral and aortic regurgitations and no intracardiac masses or pericardial effusion.

After consultation with the patient, his family members and head physician, we decided to withdraw the administration of goserelin, due suspected acquired QT interval prolongation induced by administration of this drug (rarely reported). Four weeks after goserelin withdrawal, a new electrocardiogram was performed (Figure 3) which showed minimal QT interval prolongation and non-specific repolarization changes.

Discussion

Goserelin is an uncommon cause of acquired QT interval prolongation. This gonadotropin-releasing hormone agonist produces androgen deprivation and is usually used for treating prostate cancer.[2] Repolarization abnormalities and QT interval prolongation have been described with goserelin administration, but the incidence of both conditions is infrequent.[3]

The patient also received bicalutamide for treatment of prostate cancer and chest pain has been documented as a side effect of this particular drug.[4] In this case, bicalutamide-associated chest pain and goserelin-related repolarization abnormalities (negative T wave and QT interval prolongation) use combined and mimicked ACS.

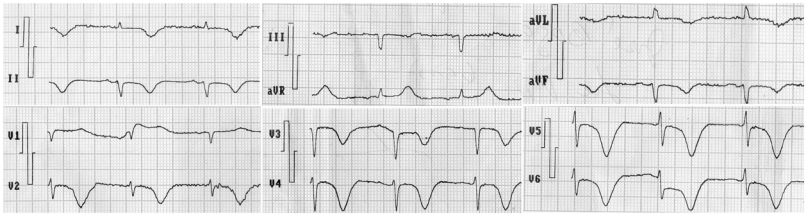

Figure 1 First electrocardiogram recorded at the emergency room.
Sinus rhythm, heart rate: 56 beats/minute, QRS axis: -55°, ST depression of 1 mm on DII, aVF and from V3 to V5 and of 2 mm on V6, deep negative T waves in DI, DII, DIII, aVF, aVL and from V1 to V6 leads and prolonged QT interval (QT interval: 642 milliseconds, corrected QT interval by Bazzet formula: 623 milliseconds and corrected QT interval by Fridericia formula: 629 milliseconds).

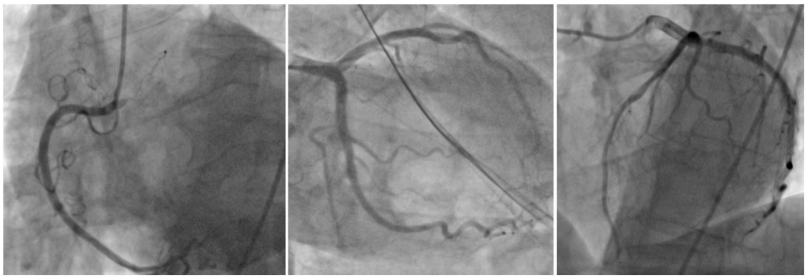

Figure 2 Coronary angiography
No lesion was found in the three main coronary arteries.

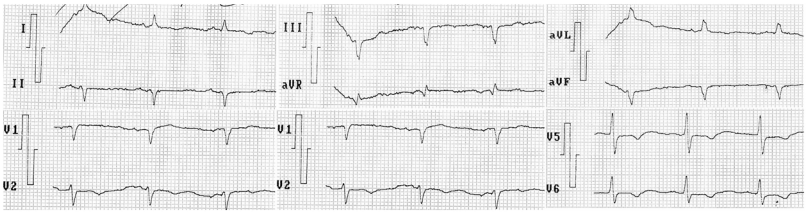

Figure 3 Second electrocardiogram recorded four weeks after goserelin withdrawal.
Sinus rhythm, heart rate: 78 beats/minute, QRS axis: -55°, non-specific repolarization abnormalities on DII, DIII, aVF and from V2 to V6, QT interval: 427 milliseconds, corrected QT interval by Bazzet formula: 479 milliseconds and corrected QT interval by Fridericia formula: 464 milliseconds).

Androgen deprivation therapy with gonadotropin-releasing hormone agonists with or without the association of oral antiandrogens is a common therapy for treating patients with prostate cancer. These drugs have been related to an increased risk of cardiovascular diseases including coronary artery disease, heart failure, arrhythmias and conduction disorders.[5]

QT interval prolongation can occur soon after initiation of ADT, but atherosclerosis progression occurs progressively over years. In this case, no evidence of atherosclerotic disease was found in the three major coronary arteries, but QT interval prolongation and repolarization abnormalities were observed and ACS was strongly suspected.

Pathophysiological mechanisms are diverse but some of the most studied are the development of new atherosclerosis, endothelial dysfunction and arterial wall thickness.[1] Altered ventricular repolarization has been reported previously with goserelin administration in an asymptomatic patient who presented with ST segment elevation from V1 to V3 leads.[6] In this case, atherosclerotic disease in the main coronary arteries was ruled out by coronary computed tomography angiography. Testosterone deprivation therapy appears to be the most likely mechanism of abnormalities in ventricular repolarization parameters.[7] However, to our knowledge, this is the first case reporting T waves inversion, ST depression and QT interval prolongation secondary to goserelin and bicalutamide use that could mimic ACS.

Androgen therapies for prostate and other cancer are frequently prescribed alone or in combination with other treatments that may induce cardiac toxicity, such as chemotherapy and radiotherapy. In these cases, cardiovascular risk factors could increase the probability of cardiac adverse events. However, in this patient, no coronary artery lessons were found, so ACS was ruled out. Also, Takotsubo syndrome, myocarditis and pulmonary embolism were excluded due to the normal values for biomarkers and on the transthoracic echocardiogram. For that reason, an uncommon side effect of the combination of goserelin and bicalutamide was the most probable diagnosis.

Conclusions

Repolarization abnormalities and QT interval prolongation are rare side effects of ADT for prostate cancer which could mimic ACS.

Conflicts of interest

The authors have no conflicts of interest to declare.

References

1. Conteduca V, Di Lorenzo G, Tartarone A, et al. The cardiovascular risk of gonadotropin releasing hormone agonists in men with prostate cancer: an unresolved controversy. Crit Rev Oncol Hematol. 2013;86:42–51.
2. Brawer MK, Crawford ED, Labrie F, et al. Androgen deprivation and other treatments for advanced prostate cancer. Rev Urol. 2001;3 Suppl. 2:S59–68.
3. Garnick MB, Pratt CM, Campion M, et al. The effect of hormonal therapy for prostate cancer on the electrocardiographic QT interval: phase 3 results following treatment with leuprolide and goserelin, alone or with bicalutamide, and the GnRH antagonist abarelix. J Clin Oncol. 2004;22:401.
4. Kolvenbag GJ, Nash A. Bicalutamide dosages used in the treatment of prostate cancer. Prostate. 1999;39:47–53.
5. Haque R, Yood MU, Xu X, et al. Cardiovascular disease risk and androgen deprivation therapy in patients with localised prostate cancer: a prospective cohort study. Br J Cancer. 2017;117:1233–40.
6. Coman CM, Manea A, Nedelcu C, et al. Cardiotoxicity in a patient with prostate adenocarcinoma under treatment with gonadotropin releasing hormone agonist. Romanian J Cardiol. 2014;Suppl.:63–4.
7. Ezaki K, Nakagawa M, Taniguchi Y, et al. Gender differences in the ST segment-effect of androgen-deprivation therapy and possible role of testosterone. Circulation J. 2010;74:2448–54.