Atypical presentation of Takotsubo syndrome early after pacemaker implantation

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SOUHRN

Kontext: Takotsubo syndrom (TTS) je formou kardiomyopatie navozené akutním stresem s dysfunkcí levé komory ve většině případů bez obstrukční ischemické choroby srdeční, i když ta může být přítomna v 10–29 % případů. Spouštěčem pro rozvoj takotsubo syndromu může být i málo invazivní výkon spojený s fyzickým nebo emocionálním stresem.
Popis případu: Popisujeme případ 87leté ženy s vysokou, již dříve přítomnou zátěží stresem, u níž došlo k rozvoji takotsubo syndromu s neobvyklými symptomy po nekomplikované implantaci trvalého kardiostimulátoru.
Závěry: Tento případ ukazuje, že TTS je nutno zvažovat jako potenciální komplikaci po implantaci kardiostimulátoru, zvláště u postmenopauzálních žen. Je třeba vytvořit multicentrické registry a provést další studie, abychom zjistili, jak a u které kategorie pacientů mohou i málo invazivní výkony vést ke vzniku TTS.

Keywords:
Atrio-ventricular block
Cardiac device implantation
Isoprenaline
Pacemaker implantation
Takotsubo cardiomyopathy
Takotsubo syndrome

ABSTRACT

Background: Takotsubo syndrome is a form of acute stress-induced cardiomyopathy showing left ventricular dysfunction without, in most cases, obstructive coronary artery disease, although these can be present in 10–29% of cases. Even a low invasive procedure, representing a physical and emotional stress, could be associated with the onset of Takotsubo syndrome.
Case presentation: We report the case of an 87-year-old woman with high pre-existing stress load who developed Takotsubo syndrome with uncommon symptoms after an uncomplicated placement of a permanent pacemaker.
Conclusions: This case remarks that TTS should be considered as a potential complication after pacemaker implantation, especially in post-menopausal women. Multicentre registers and more studies are needed to better understand how and in which category of patients also low invasive procedures could be associated with TTS.

Introduction

Takotsubo syndrome (TTS) is a non-ischemic acute cardiomyopathy consisting of release of myocardial enzymes, left ventricular disfunction (typical transient regional left ventricular contraction abnormalities with acute heart failure), and new onset electrocardiography abnormalities. This condition mimics an acute myocardial infarction (AMI) because of the symptoms and the new onset of ST segment elevation and/or negative T waves, but without findings of acute obstructive coronary artery disease at angiography, although these can be present in 10–29% of cases.[1–19] The diagnosis is made with invasive coronary angiography and ventriculography, together with transthoracic echocardiography which can show different patterns: typical "apical ballooning" of the left ventricle (LV), characterized by apical akinesis and hyperkinesis of the basal segments, or atypical patterns, including the midventricular, basal, and focal wall motion patterns, all of these with reduced ejection fraction.[20] The exact mechani-

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sm of TTS is unknown, but it is hypothesized that a sudden massive surge of circulatory catecholamines (adrenaline, noradrenaline) from a physical or emotional stress may play a central role.[5,18,21–25]

TTS is responsible for 2% of all acute coronary syndrome cases presenting to hospitals and most of the patients are women in post-menopausal age.[26,27] It is generally a self-limiting disease, spontaneously resolving in days or weeks. However, potentially life-threatening complications are cardiogenic shock, arrhythmias, acute pulmonary edema, and stroke.[12,26–31] In-hospital mortality is about 2% and long-term prognosis is mostly favorable with complete resolution.[26,32–35]

However, recent studies have challenged the notion that TTS portends a benign outcome, stating that long-term mortality is higher compared with mortality in the general population, and outcomes resemble those of patients with acute coronary syndrome and ST-segment elevation myocardial infarction.[36]

Case report

An 87-year-old woman presented with asthenia and orthopnea. An ECG performed by private cardiologist showed advanced atrio-ventricular block with right branch block. She was referred to our Emergency Department to perform a pacemaker (PM) implantation.

In her history there were hypertension, chronic kidney disease (IV stage), psoriatic and rheumatoid arthritis, chronic atrophic gastropathy. She had also family history of primary dilated cardiomyopathy. At home, she was taking the following drugs: olmesartan/hydrochlorothiazide, methylprednisolone (recently suspended), pantoprazole, epoetin alfa and cholecalciferol.[37–47]

We performed an echocardiogram that showed normal kinesis and function of LV (EF 60%), left atrium dilation (21 cm^2), moderate mitral and mild tricuspid regurgitation (Fig. 1A). The patient was then administered with infusion of isoprenaline. The following day, a permanent dual-chamber pacemaker was implanted (Boston Scientific Accolade): during the procedure she received lidocaine SC as local anesthetic; the procedure was completed without any complications.

Three days after the implantation, the patient complained of severe asthenia and fever. Because of the increase of white blood cells and C-reactive protein, we also performed blood cultures, without pathological findings. We started antibiotic therapy (amoxicillin/clavulanic acid) and, suspecting a reactivation of rheumatoid arthritis, a steroid therapy with methylprednisolone. Her ECG showed sinus rhythm at 75 bpm with ventricular pacing (Fig. 2), associated with an echocardiographic pattern of akinesia of apical and medium segments of LV wall, preserved kinetics of basal segments and EF reduction (35%) (Fig. 1B). Pacemaker interrogation showed

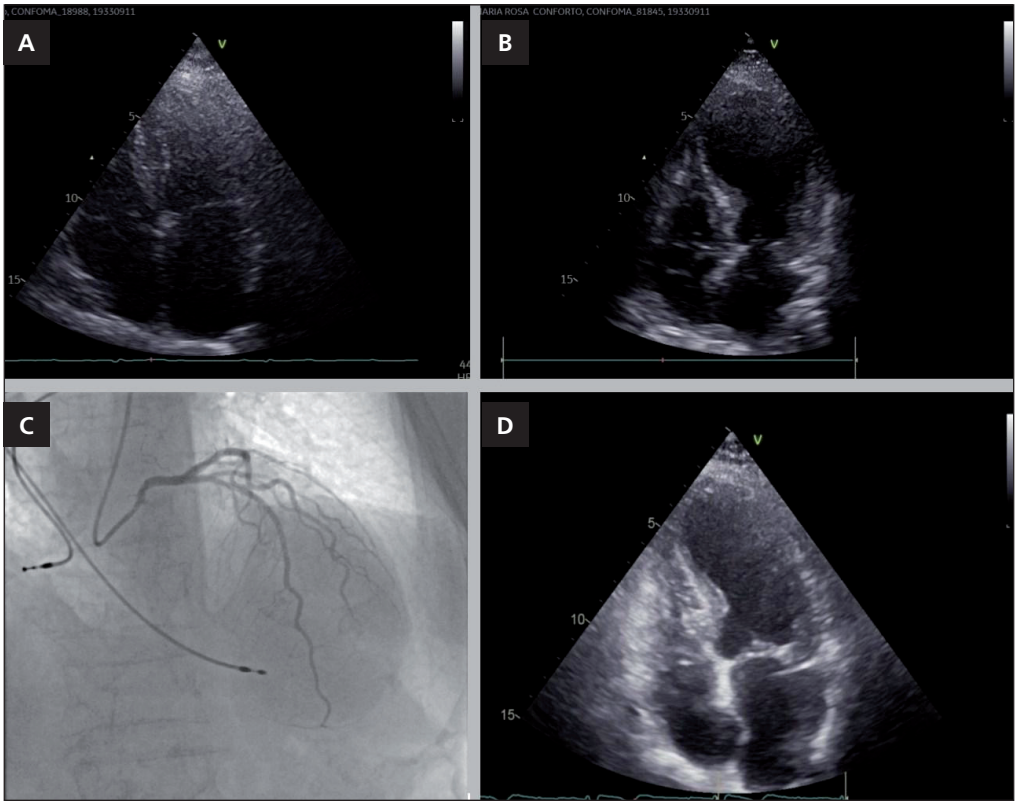

Fig. 1 – (A) Echocardiogram performed on the admission day, with normal LV function (EF 60%). (B) Echocardiogram performed after the onset of symptoms, with "apical ballooning" pattern and impaired LV function (EF 35%). (C) Angiography in which we found normal coronary flow. We can see the two PM's catheters. (D) Echocardiogram performed one week after discharge, with apical akinesia, partial recovery of medium segments motility, EF 40%.

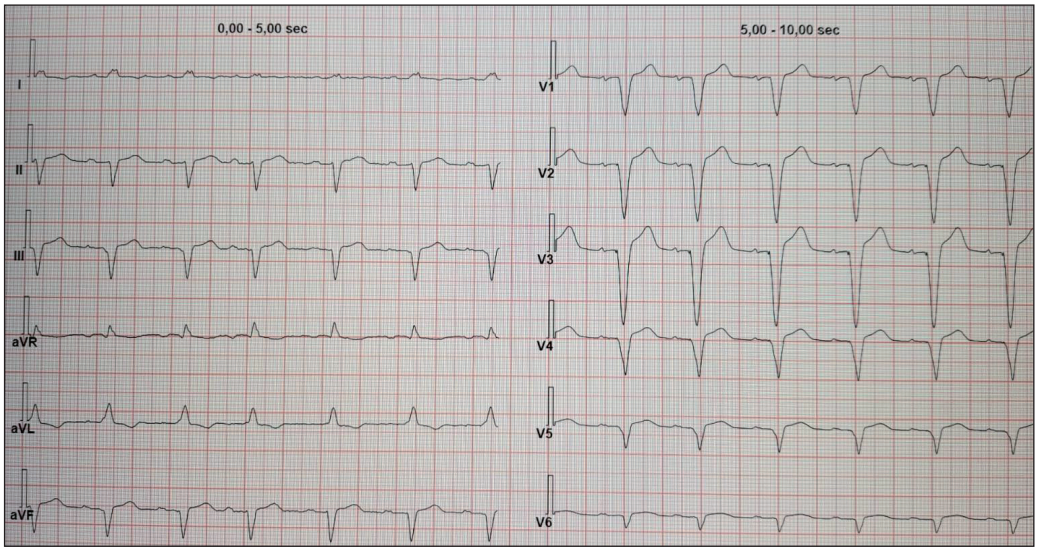

Fig. 2 – ECG performed during the onset of symptoms; sinus rhythm, HR 75 bpm, ventricular pacing.

normal function of the device. Therefore she underwent coronary angiography which documented absence of coronary obstructive lesions and normal coronary flow (Fig. 1C). The final diagnosis was takotsubo syndrome. A CT scan of the chest showed diffused pleural effusion, so we have enhanced diuretic therapy. During the following days, we documented a progressive reduction of symptoms without improvement of the EF. The patient was discharged at home 3 days after coronary angiography without symptoms and in good clinical condition. We modified home therapy stopping olmesartan/hyrochlorothiazide and introducing enalapril 5 mg SID, bisoprolol 1.25 mg SID, furosemide 25 mg SID, spironolactone 50 mg SID, methylprednisolone 8 mg SID (to be reevaluated). One week later, an echocardiogram was performed: we revealed apical akinesia, partial recovery of medium segments motility and slight increase of EF (40%) (Fig. 1D).

Discussion

As mentioned before, the excess of catecholamines, released directly by nerves that stimulate cardiac muscle cells, could have a toxic effect and lead to decreased cardiac muscular function.[24,35] Further, this adrenaline surge may lead to a spasm of the coronary arteries, thus preventing these arteries from delivering adequate blood flow and oxygen to the heart muscle.[25] This effect is mediated by both alfa 1 and alfa 2 adrenergic receptors. Together, these events can lead to acute heart failure and decrease the LV ejection fraction. This is the most accepted theory on the substrate of TTS. So, a strong emotional or physical stress could be the initial event of this condition. Furthermore, about 90% of patients with Takotsubo syndrome are women, especially in the postmenopausal period, during which there is the highest risk.[26,27]

Scientific community is continuing to investigate on the pathophysiological mechanisms. Authors explain that young women have lower adrenaline and noradrenaline plasmatic concentration compared to men, but its increase with age is higher. Also, lower levels of estrogens after the menopause are linked to higher sympathetic activity.[48,49]

A pacemaker implantation procedure exposes the patient to an emotional and physical stress that, in typical patients, could determine a TTS.[50–53] We reported the case of an old woman, in line with patient's features described in literature.[54,55] In addition, the patient before implantation was treated with isoprenaline, which is an exogenous catecholaminergic stimulation and was observed to be associated with TTS after PM-implantation.[56,57] More, most of clinical conditions after the procedure could probably be explained by a reactivation of rheumatoid arthritis, treated with steroid therapy IV.[58] The peculiarity of this case, in fact, was the atypical symptoms of TTS and the combination of different predisposing factors: female sex in post-menopausal period, anamnesis of chronic inflammatory disease, use of drugs which increase stress and atrio-ventricular block itself. What we observed remarks that in such a patient at risk for TTS the implantation of a PM, even if it's a minimally invasive procedure, needs to be carefully considered as a possible cause of this syndrome in the peri-procedural setting. Probably, in those patients a conscious sedation could be useful to reduce the stress load. Also, it should be considered to reduce exogenous stress drugs as much as possible.

We think that a multicentre register and more studies are needed to better understand how and in which category of patients PM implantation or other low invasive procedures could be associated with TTS.

Conclusions

This case remarks that TTS should be considered as a potential complication after pacemaker implantation, especially in post-menopausal women with high pre-existing stress load.

Conflict of interest

None.

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