Acromegalic Cardiomyopathy With Malignant Arrhythmogenic Pattern Successfully Treated With Mechanical Circulatory Support and Heart Transplantation

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ABSTRACT

Cardiovascular involvement is common in acromegaly and can lead to development of acromegalic cardiomyopathy, characterized by concentric biventricular hypertrophy with a progressive impairment of diastolic and systolic function. The onset of heart failure and arrhythmias are related to poor prognosis. We report on a case of a 48-year-old man with acromegalic cardiomyopathy caused by pituitary adenoma. Despite the successful trans-sphenoidal resection of the tumour, the patient was rehospitalized for ventricular arrhythmic storms that led to cardiogenic shock, which required mechanical hemodynamic support with intra-aortic balloon pump, venoarterial extracorporeal membrane oxygenation, and urgent heart transplantation.

RÉSUMÉ

L'atteinte cardiovasculaire va souvent de pair avec l'acromégalie et peut se solder par l'apparition d'une cardiopathie acromégalique caractérisée par une hypertrophie concentrique biventriculaire et une détérioration progressive des fonctions diastolique et systolique. L'apparition d'une insuffisance cardiaque et d'arythmie est associée à un pronostic sombre. Nous traitons du cas d'un homme âgé de 48 ans atteint de cardiopathie acromégalique causée par un adénome hypophysaire. Malgré la réussite d'une résection trans-sphénoïdale de la tumeur, le patient a dû être hospitalisé de nouveau en raison de « tempêtes arythmiques ventriculaires » ayant entraîné un choc cardiogénique, lequel a nécessité un soutien hémodynamique mécanique par pompe à ballonnet intra-aortique, une oxygénation veino-artérielle par membrane extracorporelle et une transplantation cardiaque d'urgence.

We report on a 48-year-old man with acromegalic cardiomyopathy caused by pituitary adenoma.

Case

A 48-year-old man presented in the emergency department in 2011 for chest pain. Systemic examination revealed coarse facial features and signs of heart failure. The electrocardiogram showed sinus rhythm, left bundle branch block, and ectopic ventricular beats.

Transthoracic echocardiogram revealed a dilated left ventricular cavity with diffuse hypokinesis, apical thrombosis, and ejection fraction of 20%. Coronary angiography showed normal coronary arteries and cardiac magnetic resonance imaging confirmed the severe left ventricular dilatation (indexed telediastolic volume: 195 mL/m^2) and dysfunction (ejection fraction, 22%), eccentric hypertrophy with apical thrombosis, and transmural fibrosis. At the same time, the patient was evaluated for acromegaly. Elevated growth hormone (GH) levels (11.5 ng/mL) and cerebral magnetic resonance imaging were compatible with pituitary adenoma. The patient was treated with somatostatin analogue and the adenoma was successively removed using trans-sphenoidal resection. After the surgery, the patient developed secondary adrenal insufficiency and cortisone acetate 37.5 mg/d was introduced. With tailored heart failure therapy, amiodarone and warfarin, the patient remained asymptomatic. Clinical stability was maintained for 3 years, until the patient was admitted to our hospital for monomorphic sustained ventricular tachycardia (VT) of 170 beats per minute (Fig. 1), solved with direct current shock. A dual coil lead implantable cardioverter-defibrillator (ICD) was placed and amiodarone was interrupted because of iatrogenic hyperthyroidism.

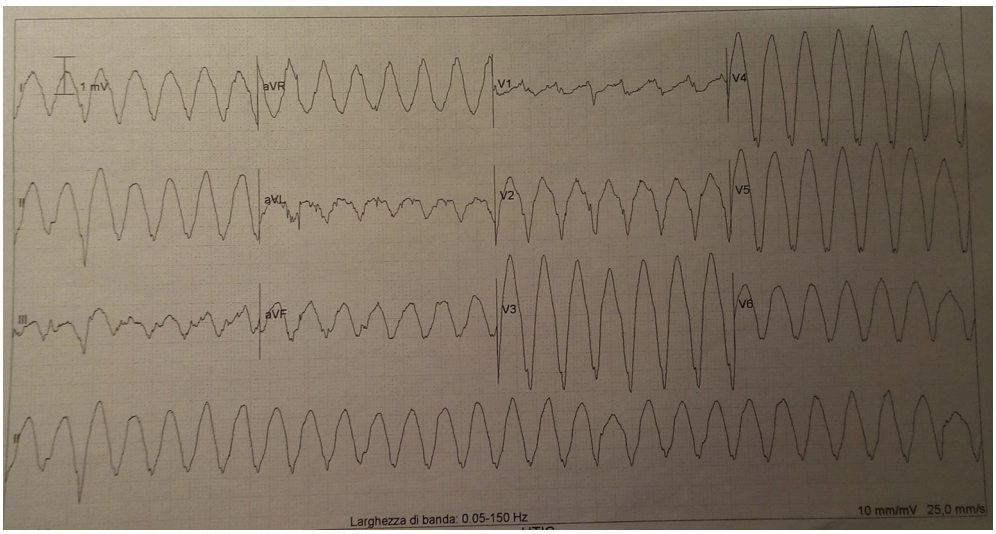

Figure 1. Twelve-lead electrocardiogram of monomorphic ventricular tachycardia. RS aspect in V_1 and QS pattern in V_2-V_6, frontal axis +230, suggesting an apical origin in the left ventricle.

After 6 months, the patient was readmitted for repeated ICD interventions because of VT of 190 beats per minute. With introduction of procainamide (1.5 g/d orally) no recurrence of VT was documented and the patient was successfully discharged. Unfortunately, 3 months later, the patient was hospitalized for multiple episodes of VT interrupted by ICD shock. Electrolytic balance and thyroid hormone levels were normal. The patient was treated with intravenous procainamide and amiodarone, both ineffective to prevent another electrical storm (ES) of sustained VT, then, an intra-aortic balloon pump (IABP) was placed. Unfortunately, despite these treatments a new ES with hemodynamic instability recurred, therefore after 9 days, it was decided to initiate extracorporeal life support with venoarterial extracorporeal membrane oxygenation (VA-ECMO) and the patient was placed on the waiting list for emergent heart transplantation. However, antiarrhythmic drugs, IABP, and VA-ECMO were ineffective to prevent the recurrence of VT and a catheter ablation was scheduled, but the day before the procedure, after 19 days of VA-ECMO, a compatible organ was available and heart transplantation with bicaval anastomoses was performed.

At macroscopic analysis of the explanted heart, the severe dilatation and eccentric hypertrophy was confirmed (Fig. 2A). Histologically, sporadic foci of fibroadipose replacement, interstitial fibrosis, and fibrous thickening of the endocardium without inflammation (Fig. 2B) was highlighted. There were not immediate perioperative complications. The pituitary function was normal. Before transplantation GH and insulin-like growth factor-1 levels were 1.96 ng/mL and 322 ng/mL, respectively, whereas after transplantation GH was 1.48 ng/mL and insulin-like growth factor-1 was 385 ng/mL.

The current immunosuppressive therapy consists of cyclosporine 50 mg twice daily and everolimus 0.50 mg twice daily without any rejection episodes. Steroid treatment was suspended 2 years after the transplantation. The lipid profile was optimally controlled with atorvastatin 40 mg once daily and glycemia was normal. Echocardiographic evaluations during follow-up showed normal biventricular function and coronary angiography did not reveal allograft vasculopathy.

Discussion

The natural history of acromegalic cardiomyopathy is characterized by progressive impairment of diastolic and systolic function and when heart failure appears, the prognosis is poor with a 25% mortality rate at 1 year and 37.5% at 5 years,[1,2] but with arrhythmias is approximately 50% and increase to 85% and 97% when ESs happen.[3] There are not

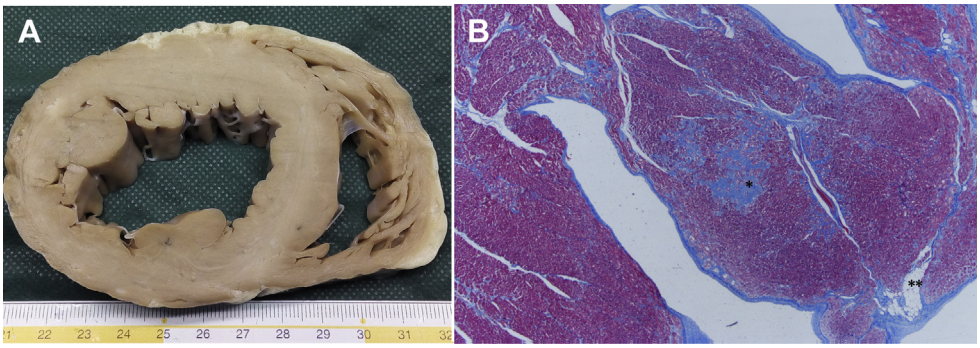

Figure 2. (**A**) Section of the explanted heart; (**B**) histological analysis showing the interstitial fibrosis (**asterisk**) and sporadic foci of fibroadipose replacement (**double asterisks**).

specific treatments to prevent the onset of VT in acromegalic cardiomyopathy. Whereas the role of the ICD in the prevention of sudden death has been confirmed, with the exception of β-blockers, there are not studies that have shown the effectiveness of the currently available antiarrhythmic drugs in the primary management of patients with life-threatening sustained VT.

Regarding the efficacy of the IABP in the treatment of incessant VT, studies are inconclusive concerning the specific characteristics of patients in whom IABP support yields benefits and the indications of its use, remain subject to physicians' biases and experience, whereas the scarcity of patients in randomized trials might explain why there is still uncertainty about the appropriate timing of VA-ECMO placement in patients with cardiogenic shock.[4]

To our knowledge, the literature reports only anecdotal cases of heart transplantation in acromegalic patients with heart failure,[5] and there are not cases with malignant arrhythmias, treated with cardiac mechanical support and heart transplantation. Nevertheless, the limited follow-up of 26 months of our patient does not allow conclusions to be drawn about the long-term prognosis.

Disclosures

The authors have no conflicts of interest to disclose.

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See the Supplementary Material for additional references.

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