Table 1

Antiarrhythmic Agents and Safety in Acute Porphyrias

Antiarrhythmic drugs	Safety/porphyrinogenicity	Alternative
Class Ia	Unsafe	Beta blockers
Quinidine, procainamide	Porphyrinogenic	
Class Ib	Unsafe	Beta blockers
Lidocaine	Porphyrinogenic	
Mexiletine	Possibly porphyrinogenic	
Class Ic	Unsafe	Beta blockers
Flecainide, propafenone	Possibly porphyrinogenic	
Class II	Safe	
Beta blockers	Nonporphyrinogenic	
Class III	Unsafe	Sotalol
Amiodarone, ibutilide	Probably porphyrinogenic	
Class IV	Unsafe	Beta blockers
Verapamil, diltiazem	Probably porphyrinogenic	Digoxin
Others	Safe	
Digoxin, adenosine	Nonporphyrinogenic	

beta blocker therapy was started. The patient progressed favorably and the case was presented to the arrhythmia unit to consider AF ablation.

AHPs are characterized by episodes of acute porphyria (EAP) that, if not properly treated, can lead to death. Due to the low incidence of EAP in Spain, health care professionals caring for patients who present their first EAP are unlikely to recognize the condition and, therefore, patients are often not adequately treated and may even be given drugs capable of exacerbating the attack.

In the case of VP, drug exposure plays a significant role.[1] According to the European Porphyria Initiative recommendations, class Ic antiarrhythmic agents are classified as possibly porphyrinogenic and amiodarone as probably porphyrinogenic.[2,3] Although the prevalence of AF in AHPs is low,[4] there is a significant association in its appearance. The antiarrhythmic armamentarium in these patients is limited because most drugs are unsafe and can cause EAP (Table 1). All registers include beta blockers as antiarrhythmic agents to be used in AF, above all to control heart rate, whereas only sotalol appears to be safe for the prevention of recurrences. Both digoxin and adenosine have shown no toxicity and can be used in supraventricular arrhythmias in patients with AHPs. Conversely, Méndez et al.[5] studied 17 patients with acute intermittent porphyria who used amiodarone between 2 and 20 years and concluded that amiodarone was safe. We found no literature reports of AHP associated with class Ic drugs. In patients with porphyrias and AF in whom cardiac rhythm needs to be controlled, percutaneous ablation could be proposed.[6]

Santiago Rodríguez-Suárez,[a,*] Salvador García-Morillo,[a] Luis Gómez-Morales,[a] Nieves Romero-Rodriguez,[b] Luis Beltran-Romero,[a] and Aurora Gonzalez-Estrada[a]

[a]*Unidad Clínica de Atención Médica Integral (UCAMI), Servicio de Medicina Interna, Hospital Universitario Virgen del Rocío, Sevilla, Spain*
[b]*Unidad de Gestión Clínica Área del Corazón, Hospital Universitario Virgen del Rocío, Sevilla, Spain*

* Corresponding author:
E-mail address: santisanti84@hotmail.com (S. Rodríguez-Suárez).

REFERENCES

1. Hift RJ, Meissner PN. An analysis of 112 acute porphyric attacks in Cape Town, South Africa: Evidence that acute intermittent porphyria and variegate porphyria differ in susceptibility and severity. Medicine (Baltimore). 2005;84:48–60.
2. Anderson KE, Bloomer JR, Bonkovsky HL, Kushner JP, Pierach CA, Pimstone NR, et al. Recommendations for the diagnosis and treatment of the acute porphyrias. Ann Intern Med. 2005;142:439–50.
3. The Drug Database for Acute Porphyria. NAPOS. Available at: http://www.drugs-porphyria.org/
4. Dhoble A, Patel MB, Abdelmoneim SS, Puttarajappa C, Abela GS, Bhatt DL, et al. Relation of porphyria to atrial fibrillation. Am J Cardiol. 2009;104:373–6.
5. Méndez M, Parera V, Enríquez de Salamanca R, Batlle A. Amiodarone is a pharmacologically safe drug for porphyrias. Gen Pharmacol. 1999;32:259–63.
6. Arenal Maíz A, Castel MA, López Gil M, Merino Llorens JL. Actualización en arritmias y en electrofisiología cardiaca. Rev Esp Cardiol. 2009;62(Supl 1):67–79.

An Unusual Etiology for Long QT

Una extraña etiología para el QT largo

To the Editor,

Long QT syndrome is characterised by a prolongation of the QT interval on the electrocardiogram (ECG), which predisposes to the development of *torsade de pointes* ventricular arrhythmias. QT prolongation is defined as a corrected QT of >450 ms in men and of 470 ms in women.[1] There are two main groups: congenital long QT syndromes, associated with mutations in certain genes, and the acquired variant, associated with environmental factors.[2]

The main cause of acquired long QT is pharmacological, and there is a great variety of drugs associated with prolonging the QT interval.[3] Other causes include electrolyte disorders (mainly hypokalaemia, hypomagnesaemia and hypocalcaemia, toxic substances like organophosphates, liquid protein intake, endocrine disorders like hypothyroidism[4] or phaeochromocytoma, starvation, anorexia nervosa or bradyarrhythmias.
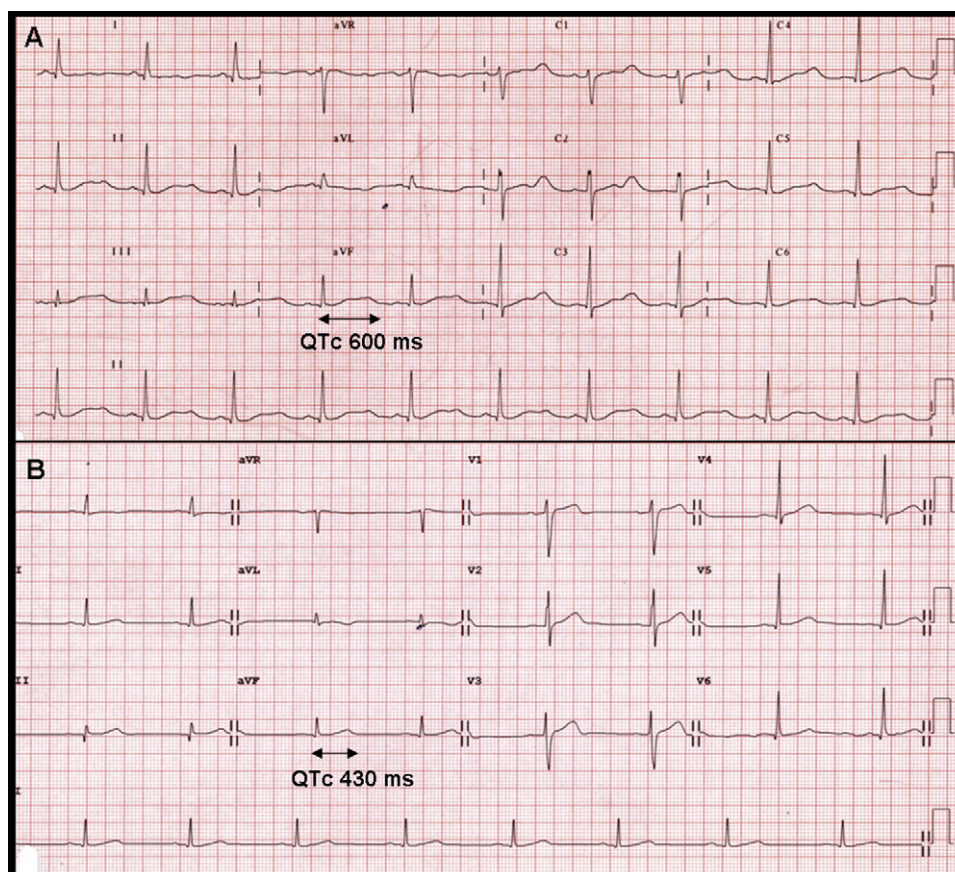
Figure 1. A, electrocardiogram showing an intense hypokalemia with prolonged QT interval. B, electrocardiogram after resolving hypokalemia with normal QT interval.

We present the case of a white 50-year-old man who was admitted to hospital because he suffered a syncopal episode while he was driving, causing an accident. The only interesting aspect of his medical history was that he was diagnosed with arterial hypertension 3 months before. He started treatment with amlodipine 5 mg, valsartan 160 mg and hydrochlorothiazide 12.5 mg, with adequate control. Since then he said that he continually felt thirsty, had polyuria and polydipsia, without having previously presented with dizziness or syncope.

When he arrived at the emergency department he was conscious and aware of his surroundings, with a Glasgow coma score of 15, blood pressure of 150/90 mm Hg, and heart beat of 59 bpm. Cardiorespiratory and neurological examination was normal. The ECG showed a sinus rhythm with a very significant QT interval prolongation; corrected QT using Bazzet's formula was 600 ms (Fig. 1A). The analytical tests showed an important electrolyte alteration with hypokalaemia (2.1 mEq/l) and hypernatraemia (150 mEq/l). Magnesium was normal and blood gas showed mild alkalosis (pH 7.5). In light of these findings, the patient was admitted to the intermediate cardiology care unit. It was initially suspected that a disorder of the renin-angiotensin-aldosterone axis had caused the symptoms.

High doses of potassium supplements were needed to correct the hypokalaemia, with gradual normalisation of the QT interval duration until normal values were restored (Fig. 1B). To control arterial hypertension, calcium antagonists and alpha blockers were initially used, which obtained a suboptimal control. Angiotensin-converting enzyme inhibitors and anti-aldosterone agents had to be added once the hormone studies had been performed to achieve adequate control.

A transthoracic echocardiogram was performed, which ruled out structural heart disease. In view of an aetiological diagnosis, the adrenal function was examined, which showed high plasma aldosterone concentrations and absence of plasma renin activity. A thoracoabdominal computerised tomography scan was also performed showing a lobulated homogeneous tumour of 6.8 cmx6.2 cmx4 cm dependent on the left adrenal gland (Fig. 2A) which did not affect other organs. Diagnosis was therefore primary aldosteronism caused by the left adrenal mass.

In the follow-up he initially presented with abundant ventricular extrasystoles of different morphologies (couplets and triplets) but with no sustained arrhythmic events that were gradually remitting with QT normalisation. He was discharged in a stable situation, with potassium supplements and antihypertensive treatment, waiting for the adrenal mass to be surgically removed.

The patient continued to be asymptomatic, and a strict analytical control was performed to keep ion levels within the normal range. Pre-operative magnetic resonance imaging was performed: the tumour heterogeneously enhanced after gadolinium injection and small enlarged lymph nodes were found in the retroperitoneal space (Fig. 2B). As planned, the patient underwent surgery to remove the left adrenal tumour and associated lymphadenectomy. The pathological anatomy examination (Figs. 2C and D) characterised the mass as an adrenocortical carcinoma with no signs of metastasis in lymph nodes. A variable architecture was observed in the microscopic examination. It was formed by clear cytoplasm cells with important nuclear pleomorphism, areas of frequent necrosis and mitosis, some being atypical. Invasion of the capsule was observed, but no venous
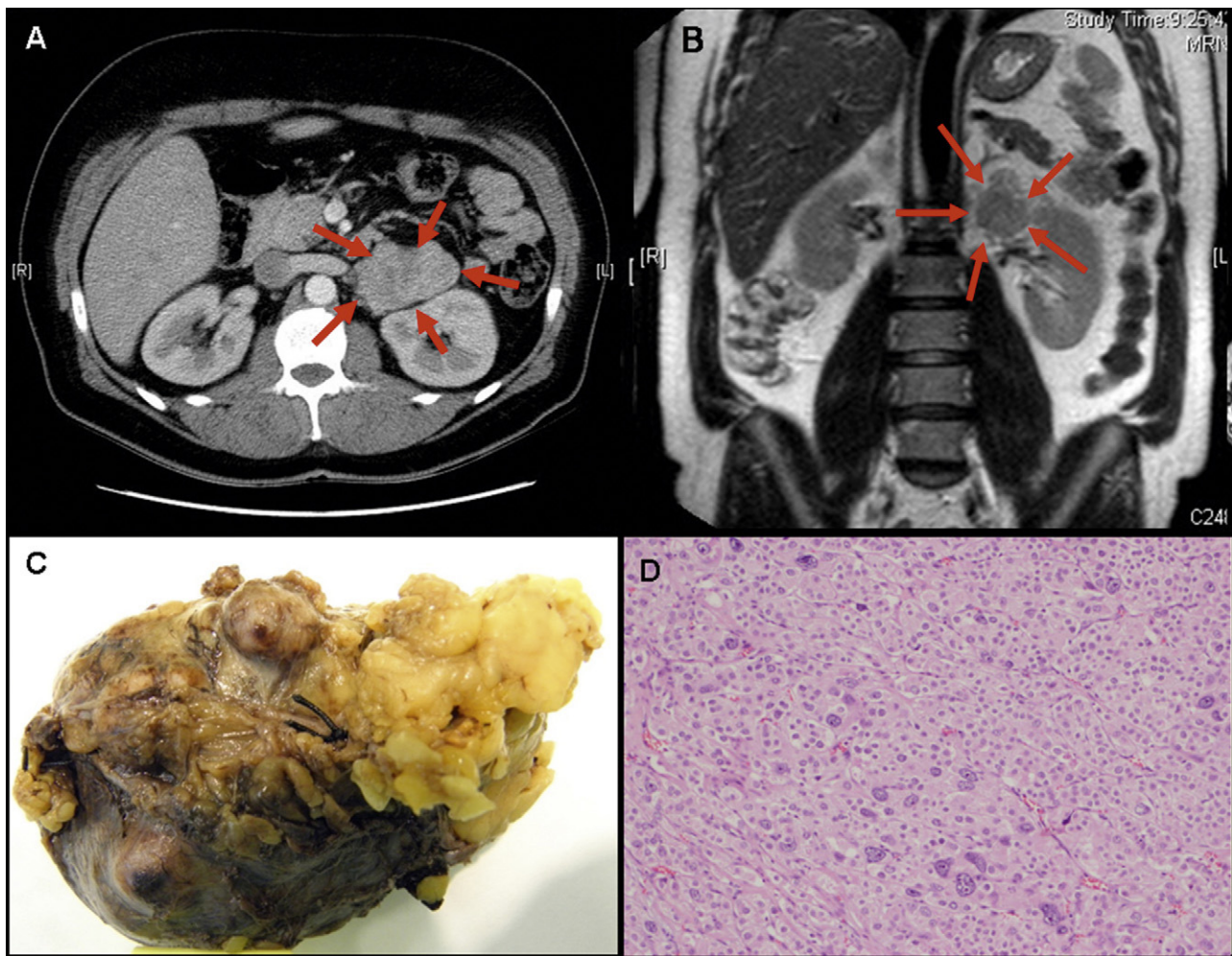
Figure 2. Computerized tomography image (A) and magnetic resonance (B) of left adrenal mass. Macroscopic (C) and microscopic (D) image of tumor. L, left; R, right.

invasion. Following the intervention, the electrolyte and blood pressure readings normalised, meaning that potassium supplements and antihypertensive treatment could be withdrawn.

Our patient presented an acquired QT interval prolongation related to an intense hypokalaemia. Once the electrolyte disorder was corrected, normal values were restored. Within a clinical context, we assumed that the patient's syncope was secondary to a torsade de pointes arrhythmic event related to intense hypokalaemia. As with etiologies such as this one, the initial suspicion was confirmed and the diagnosis reached was primary aldosteronism secondary to adrenocortical carcinoma.

The adrenal carcinoma is a very aggressive and rare condition, with an incidence of 1-2 cases/million habitants/year.[5] Approximately 60% of these are functioning, and the most frequent disorder is Cushing's syndrome. Adrenal carcinoma as a cause of primary hyperaldosteronism is extremely rare, with an incidence of 1%-3% of all cases.[6] Surgical resection is the only treatment that has proven effective for tumours and local lymphadenopathies. If this condition is presented as a primary aldosteronism, it may allow for an earlier diagnosis and intervention on the neoplasia.

Lourdes García-Bueno,* David Couto-Mallón,
José A. Rodríguez-Fernández, Ana García-Campos,
Juan P. Abugattás-Torres, and Alfonso Castro-Beiras

Servicio de Cardiología, Complejo Hospitalario Universitario A Coruña, A Coruña, Spain

* Corresponding author:
E-mail address: lgarbue@googlemail.com (L. García-Bueno).

REFERENCES

1. Goldenberg I, Moss AJ. Long QT syndrome. J Am Coll Cardiol. 2008;51:2291–300.
2. Schwartz PJ, Locati EH, Napolitano C. The long QT syndrome. In: Zypes DP, Jalife J, editors. Cardiac electrophysiology: from cell to bedside. 3rd ed. Philadelphia: WB Saunders; 2000. p. 788–811.
3. Salinas Arce J, Romero R, Solórzano P. Un caso de QT largo y *torsades de pointes* por ciprofloxacino. Rev Esp Cardiol. 2010;63:111–2.
4. Facenda M, Romero-Garrido R, Hernández-Afonso J, Ramos-López M. *Torsade de pointes* por QT largo y silla turca vacía. Rev Esp Cardiol. 2009;62:1195–7.
5. Allolio B, Fassnacht M. Clinical review: Adrenocortical carcinoma: clinical update. J Clin Endocrinol Metab. 2006;91:2027–37.
6. Hsieh MS, Chen JH, Lin LW. Myxoid adrenal cortical carcinoma presenting as primary hyperaldosteronism: case report and review of the literature. Int J Surg Pathol. 2010 May 5 [Epub ahead of print].