Long QT syndrome in extensive infective endocarditis complicating hypertrophic obstructive cardiomyopathy

Zespół długiego QT u chorego z zapaleniem infekcyjnym wsierdzia i kardiomiopatią przerostową z zawężeniem drogi odpływu

Shi-Min Yuan, Eugene Demosthenous, Vera Coman

The Chaim Sheba Medical Center, Tel Hashomer, Israel

Abstract

Infective endocarditis in hypertrophic obstructive cardiomyopathy is uncommon. We present a case of extensive infective endocarditis in a female patient with mild hypertrophic obstructive cardiomyopathy and long QT syndrome. Upon a definite diagnosis, an urgent operation was performed successfully, and the patient had an uneventful postoperative course. The clinical features and the possible mechanisms of long QT syndrome of this patient are discussed.

Key words: aortic valve replacement, hypertrophic obstructive cardiomyopathy, infective endocarditis, long QT syndrome, mitral valve replacement

Kardiol Pol 2009; 67: 53–57

Introduction

Infective endocarditis (IE) complicating hypertrophic obstructive cardiomyopathy (HOCM) is uncommon. From 1961 to 1998, only 61 cases of this condition were reported [1]. Moreover, coexistence of HOCM, IE and long QT syndrome has not been reported in the literature.

Case report

A 52-year-old female was referred to the Department of Cardiology of this hospital due to intermittent fever, jaundice, worsening palpitation, and dyspnoea. She also complained of fatigue, malaise, headache and night sweats. On admission, the patient appeared pale, dyspnoeic and weak. The blood pressure was 142/74 mmHg, the pulse rate was 110/min, the body temperature was 37.4°C, and the respiratory rate was 24/min. Conjunctival and skin jaundice was noted. The cardiac rhythm was regular. A systolic thrill was palpable at the apex. A grade 3/6 harsh ejection murmur was heard at the apex, and a grade 2-3/6 diastolic murmur was audible at the left sternal border. A grade 2 pedal oedema was noted. She had no signs of splinter haemorrhages, skin nodules, enlarged lymph nodes, or hepatosplenomegaly. In spite of treatment with penicillin and gentamicin for one week, she continued to have fever with the highest temperature of 39.2°C. The electrocardiogram showed atrial fibrillation with marked left ventricular (LV) hypertrophy and enlarged left atrium with a QTc interval of 540 ms (Figure 1), and the chest X-ray film revealed cardiomegaly. Echocardiographic study was clearly diagnostic of IE of both mitral and aortic valves, especially illustrating a large vegetation on the mitral valve (Figure 2). Vegetations on the mitral and aortic valves with trace mitral valve regurgitation and mild aortic regurgitation were also visible. A large vegetation on the mitral valve was quite mobile, extending 2.4 × 1.1 cm in size (Figure 3). Diastolic and systolic dimensions of LV were 4.7 cm and 2.3 cm, respectively. The left atrium extended 4.7 cm in diameter. The interventricular septum and left ventricular posterior wall during diastole were 1.4 cm and 1.1 cm, with a ratio of 1.3. The pressure gradient across the LV outflow tract was 20.4 mmHg and the peak velocity was 226 cm/s. The LV mass was 207 g, and the estimated LV mass index was 115 g/m^2. Her blood culture produced *Streptococcus viridans* growth and serum haptoglobin level increased to 252 mg%. Other findings demonstrated a series of complications caused by IE, including hypochromic-microcytic anaemia, hyperbilirubinaemia, acute glomerulonephritis, and nonoliguric acute renal failure, with hypokalaemia and

Address for correspondence:
Shi-Min Yuan MD, The Chaim Sheba Medical Center, Tel Hashomer 52621, Israel, tel.: +972 3 530 27 10, fax: +972 3 530 24 10, e-mail: shi_min_yuan@yahoo.com

Received: 22 June 2008. **Accepted:** 16 July 2008.

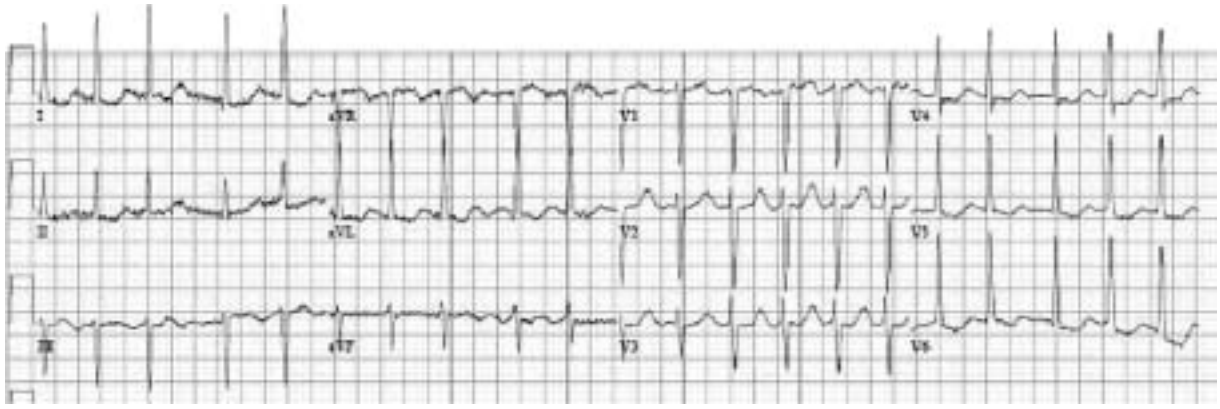

Figure 1. Preoperative electrocardiogram showed atrial fibrillation with marked left ventricular hypertrophy, and enlarged left atrium with a QTc interval of 594 ms

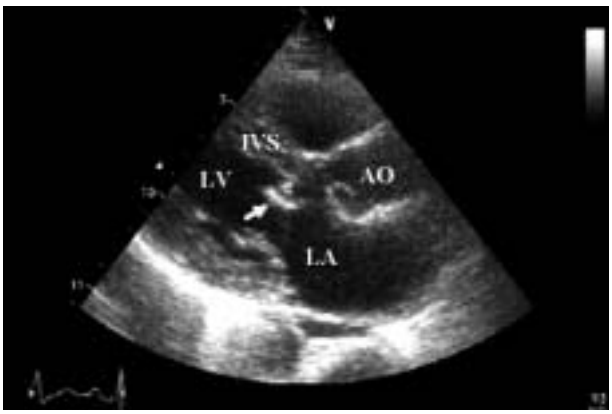

Figure 2. Transthoracic echocardiography in a long axis view showed a vegetation on the mitral valve (arrow)
AO – aorta, IVS – interventricular septum, LA – left atrium, LV – left ventricle

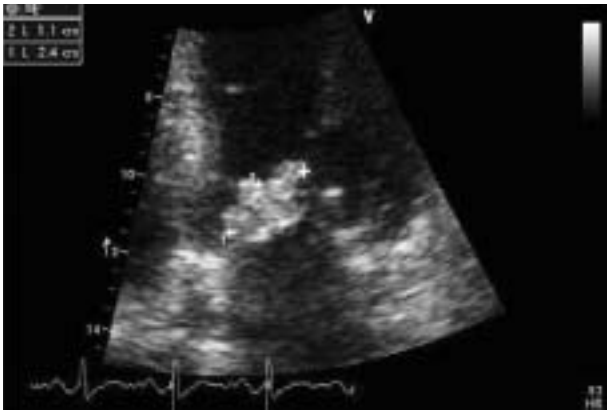

Figure 3. A large vegetation on the mitral valve extended 2.4 × 1.1 cm in size

hypoproteinaemia, with no evidence of hypomagnesaemia or hypocalcaemia. The antibiotic regimen was therefore changed to intravenous rocephine 2 g a day. She was also prescribed with atenolol 25 mg and KCl slow-release 1200 mg twice a day. She was then transferred to our department for urgent surgical operation.

At operation, a vegetation measuring 2.4 × 1.1 cm was noted on the ventricular aspect of the mid-portion of the obviously thickened anterior mitral leaflet, which was fragile, fleshy, lobulated and mobile, resembling a pendulous 4-5-grape cluster. Care was taken not to touch the vegetation, while it was removed *en bloc* together with the mitral leaflets. There were 2-3 small vegetations measuring 0.5 × 0.5 cm at the basal portion of the anterior leaflet. The mitral leaflets were removed and the vegetations were cleaned. After an aortotomy was made, it could be visualised that the aortic valvular leaflets were mildly thickened, and the left coronary sinus prolapsed. There were multiple small vegetations measuring from 0.3 × 0.3 cm to 1.5 × 1.5 cm on both aspects of all three aortic leaflets. Two more small mural vegetations 0.5 × 0.5 cm were noted inside the aorta. The aortic leaflets were removed, and the mural vegetations were cleaned. A mural vegetation 0.5 × 0.5 cm, which was attached to the hypertrophic septum in the LV outflow tract, was removed as well. A 21-mm Sorin Bicarbon valve was inserted in the aortic position, and then a 29-mm SJM valve, in the mitral position. The patient's temperature was cooled to 28°C during the operation. The cardiopulmonary bypass time was 137 min, and the cross-clamp time was 124 min.

She continued to receive intravenous rocephine, atenolol, lercanidipine hydrochloride, and KCl slow-release tablets after operation. She underwent an uneventful postoperative course, and her body temperature was normal. The laboratory findings of the complications of IE were improved somewhat except for hyperbilirubinaemia and hypoproteinaemia. Postoperative electrocardiogram before discharge showed sinus rhythm with first degree atrioventricular block, LV hypertrophy, and left atrial

Table I. Results of postoperative ECGs (operation date: 12.02.07)

Time	QT	QTc	HR	Rhythm
17:05:23 17.02.07	376	540	124	sinus tachycardia with conjunctional escape complexes
17:05:41 17.02.07	380	523	114	AF with rapid ventricular response
17:06:23 17.02.07	368	520	120	AF with rapid ventricular response
09:23:41 18.02.07	458	497	71	sinus rhythm with first degree AV block
09:24:25 18.02.07	416	452	71	sinus rhythm with first degree AV block
02.05.07	468	490	66	sinus rhythm with first degree AV block
02.06.07	490	501	63	sinus rhythm with first degree AV block
14.05.08	490	497	62	sinus rhythm with first degree AV block

enlargement, with a QTc interval of 497 ms (Figure 4). The electrocardiograms demonstrated the same results 3 months, 4 months, and 1 year and 3 months after the operation (Figure 5 and Table I). Her hypokalaemia did not improve until one year after the operation (blood potassium was 3.9 mEq/L on 04 February 2008). Pathological results of the surgical specimens supported the diagnosis of infective endocarditis, demonstrating areas of heavy calcification by von Kossa stain, colonies of gram-positive cocci by gram stain, and negative fungi by PAS and GMS stains.

Discussion

The normal QTc is 0.43 for males and 0.45 for females. A prolonged QTc of 0.45 for males or 0.47 for females is used as a cut-off value to diagnose long QT syndrome in the absence of appropriate causes. Long QT syndrome can be congenital or acquired. Congenital long QT syndrome is a heritable ion channel disease due to gene mutations of the transmembrane sodium or potassium ion channel proteins. Acquired factors leading to long QT syndrome include hypokalaemia, hypomagnesaemia, hypocalcaemia,

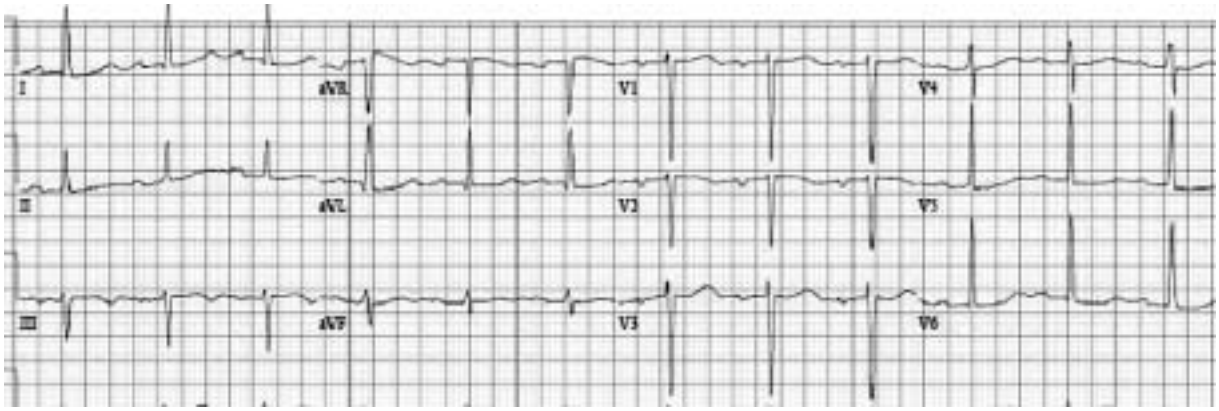

Figure 4. Electrocardiogram before discharge showed sinus rhythm with first degree atrioventricular block, left ventricular hypertrophy, left atrial enlargement, with a QTc interval of 497 ms

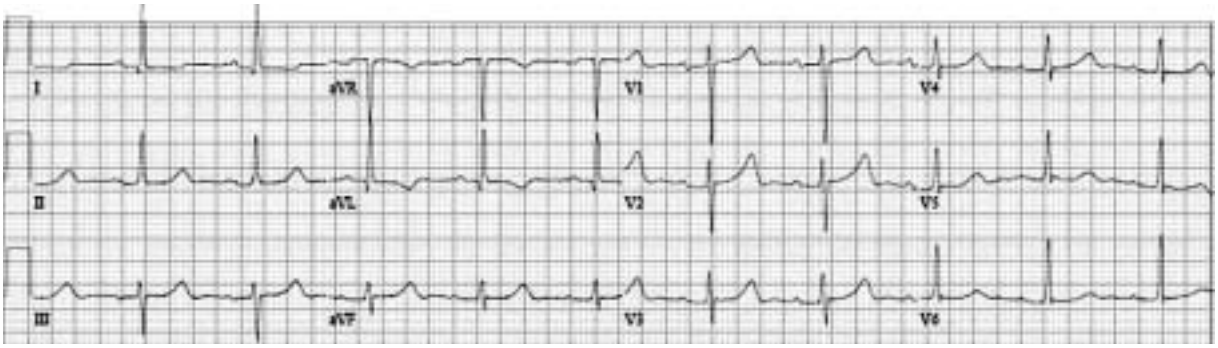

Figure 5. Electrocardiogram at 1 year and 3 months after the operation showed sinus rhythm with first degree atrioventricular block with a QTc interval of 497 ms

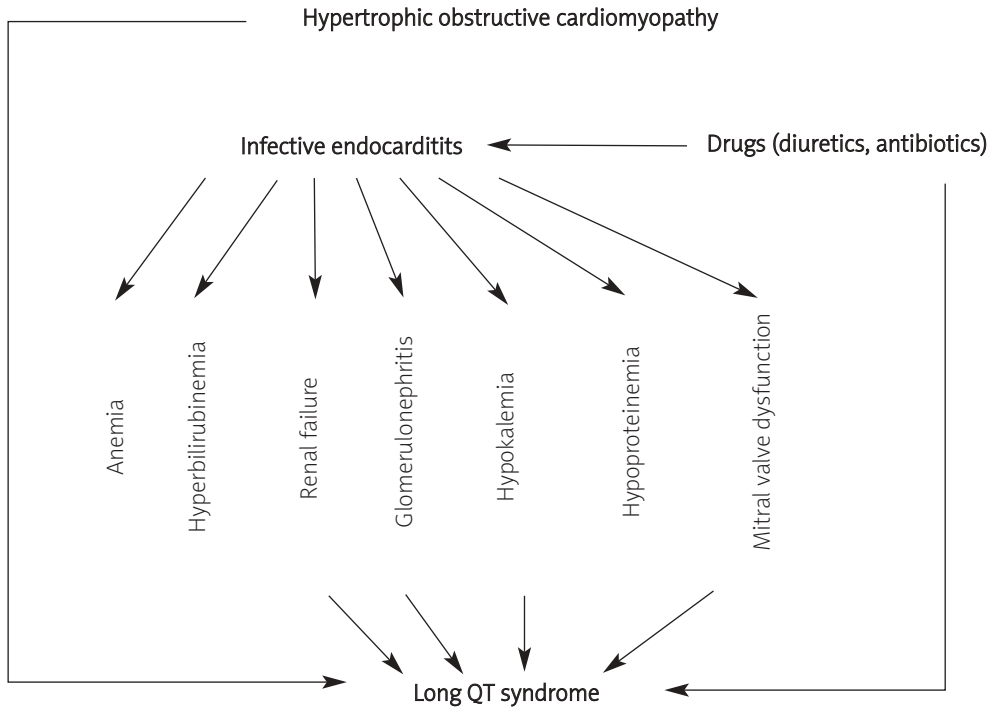

Figure 6. Possible predictors of acquired long QT syndrome of the present case

marked bradycardia, cocaine abuse, organophosphorus compound poisoning, subarachnoid haemorrhage, stroke, myocardial ischaemia, protein-sparing fasting by using liquid protein diets, autonomic neuropathy, and human immunodeficiency virus disease [2]. Certain common antibiotics, such as erythromycin, appetite suppressants and decongestants, may trigger dangerous heart rhythms. Antiarrhythmic drugs, calcium channel blockers, psychiatric drugs, antihistamines, antimicrobial and antimalarial drugs, serotonin agonists/antagonists, immunosuppressants, and antidiuretic hormones are capable of prolonging the QT interval [3].

A clinical study on acute promyelocytic leukaemia therapy by arsenic trioxide revealed that mild and moderate anaemia did not affect QTc and QTd [4]. Neither hypoproteinaemia nor hyperbilirubinaemia correlated with a prolonged QT interval [5]. However, patients with chronic renal disease have elongated QT intervals, which was further prolonged by dialysis therapy [6].

Beta-blockers are the mainstay treatment of long QT syndrome. The QTc remains prolonged after effective treatment with beta-blockers, but QTc dispersion is decreased in the responders [7]. Nevertheless, this class of drug slows the heart rate and helps prevent a fast heart beat for those with long QT syndrome. Potassium supplementation may shorten a prolonged QT interval and may be helpful for people with certain forms of long QT syndrome.

In the present patient, a hereditary basis of long QT syndrome might be missing as the familial history was scanty; however, a genetic screening test was not conducted. Laboratory tests ruled out the possibility of hypomagnesaemia or hypocalcaemia. Thus, predisposing factors for acquired long QT syndrome may include hypokalaemia, mitral valve regurgitation caused by infective endocarditis, renal failure, glomerulonephritis, and medications, such as diuretics, calcium channel blocker, or antibiotics (Figure 6). Genetic association of long QT syndrome with congenital hypokalaemia cannot apparently be excluded at all in view of her electrocardiogram at long-term follow-up. The clinical characteristics of the present case merited an extensive IE in a mild HOCM, with a series of complications predisposing to the occurrence of long QT syndrome. Exceptionally, an elevated serum haptoglobin level was introduced as an auxiliary diagnostic tool as evidence of the infection. In the long-term treatment, a low dose of calcium channel blocker was continued, after taking into consideration advantages of this therapy in HOCM and disadvantages in long QT syndrome.

Removal of the diseased valves and vegetations, effective management of complications and careful postoperative surveillance did not shorten the QT interval. Thus, the possibility of congenital long QT syndrome could not be rejected, even though many acquired factors participated in the development of this syndrome in our patient.

References

1. Alessandri N, Pannarale G, del Monte F, et al. Hypertrophic obstructive cardiomyopathy and infective endocarditis: a report of seven cases and a review of the literature. *Eur Heart J* 1990; 11: 1041-8.
2. Khan IA. Long QT syndrome: diagnosis and management. *Am Heart J* 2002; 143: 7-14.
3. Yap YG, Camm AJ. Drug induced QT prolongation and torsades de pointes. *Heart* 2003; 89: 1363-72.
4. Zhou J, Meng R, Li X, et al. The effect of arsenic trioxide on QT interval prolongation during APL therapy. *Chin Med J* (*Engl*) 2003; 116: 1764-6.
5. Oakley CM. Mitral valve palpitations. *Aust N Z J Med* 1992; 22 (5 Suppl.): 562-5.
6. Familoni OB, Alebiosu CO, Ayodele OE. Effects and outcome of haemodialysis on QT intervals and QT dispersion in patients with chronic kidney disease. *Cardiovasc J S Afr* 2006; 17: 19-23.
7. Chiang CE. Congenital and acquired long QT syndrome. Current concepts and management. *Cardiol Rev* 2004; 12: 222-34.