Jervell and Lange-Nielsen syndrome (case report) Jervell and Lange-Nielsen syndrome (prolonged QT interval and hearing loss)

Ali A.-A. Mohammad Al-Mousawi* **CABM, FICMS, FICMS(Cardio.)**
Kasim A. Ismail Al-Saedi* **DIM, FICMS, FICMS (Cardio.)**
Shokry F. Nassir* **FICMS, FICMS (Cardio)**

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Introduction:

Jervell and Lange-Nielsen syndrome (congenital LQTS and hearing loss) isa rare inherited disorder characterized by deafness present at birth (congenital) occurring in association with abnormalities affecting the electrical system of the heart , Iron-deficient anemia and elevated levels of gastrin are also frequent features of JLNS1. The severity of cardiac symptoms associated with Jervell and Lange-Nielsen syndrome varies from case to case. Some individuals may have no apparent symptoms (asymptomatic); others may develop abnormally increased heartbeats (tachyarrhythmias) resulting in episodes of syncope, cardiac arrest, and potentially sudden death. Physical activity, excitement or stress may trigger the onset of these symptoms. Jervell and Lange-Nielsen syndrome is usually detected during early childhood and is inherited as an autosomal recessive trait.2

In 1957autosomal recessive(AR) LQTS, first described by Drs. Jervell and Lange-Nielsen, is extremely rare affects about 1 in 1 million persons and is responsible for less than 10 percent of all cases of long QT syndrome. It has a markedly higher incidence in Norway and Sweden, up to 1:200,0003,4 and is characterized by a severe cardiac phenotype(mutations in the voltage-gated potassium channel gene (KVLQT1)) as well as by sensorineural hearing loss5.The Jervell and Lange-Nielsen syndrome type 1 (JLNS1) is caused by homozygous or compound heterozygous mutations in the KCNQ1 gene, located on chromosome 11p15.Another variant of the Jervell and Lange-Nielsen syndrome (JLNS2) is caused by homozygous or compound heterozygous mutations in the KCNE1 gene on chromosome 21q22 6.

The Jervell and Lange-Nielsen syndrome is the most severe variant of long QT syndrome. Nearly 90% of the patients have cardiac events, 50% become symptomatic by age 3 years, their average QTc is markedly prolonged (557 ± 65 ms), and they become symptomatic much earlier than has been observed in any other major genetic subgroup of long QT syndrome7.

Two phenotypic variants have been described: the autosomal-dominant Romano-Ward Syndrome (RW) and the autosomal-recessive Jervell–Lange-

Nielsen syndrome (JLN); in the latter, the cardiac phenotype is associated with sensorineural deafness8.

Clinically, patients with JLNS usually have longer Q–T intervals as compared toindividuals with Romano-Ward syndrome and also have a more malignant course9.

Case Report:

A three - year old deaf and mute boy presented with recurrent syncopal attacks due to documented polymorphic ventricular tachycardia (torsades de pointes) by24 hours holter monitor (Figure 1),his 12 leads surface ECG shows sinus rhythm, prolonged QT interval (QTc was560 msec.)(Figure 2), no history of drug intake (medications that can aggravate this problem), electrolyte within normal range (K+, Ca++ and Mg++).

Diagnosis of Jervell and Lange-Nielsen syndrome was made (congenital long QT syndrome LQTS with hearing loss).

Implantation of Implantable cardioverter –defibrillator (ICD-VR) was done in Ibn Al-Bitar hospital for cardiac surgery-Baghdad/Iraq (SECURA VR Medtronic D234VRC) with single coil ICD lead to the right ventricle RV (we choose single coil lead because of small chest of the patient) (Linox S 65 Biotronik) (Figure 3) plus B-blocker therapy. Three weeks after implantation during follow up patient develop 3 attacks of fast VT at rate 300 bpm detected as VF by ICD generator and terminated successfully by single DC shock (25J) from his

**Ibn Al-Bitar hospital for cardiac surgery*
Corresponding Auther: aadaialiamir@yahoo.com

ICD generator(figure 4).

Discussion:

Many advances have been made in the identification of genes responsible for syndromes associated with VTs and sudden cardiac death. Specific examples include the congenital long QT syndrome (LQTS), hypertrophic obstructive cardiomyopathy, arrhythmogenic right ventricular dysplasia, catecholamine-related VT/VF, and the Brugada syndrome. 2

An increasing understanding of the molecular biology of myocardial ion channels has led to a better understanding of the genetic basis of life-threatening arrhythmias in certain patients. The best described model for this is the long QT syndrome5 This syndrome known previously as Romano-Ward or Jervell and Lange-Nielsen syndrome, is a group of related disorders of arrhythmias (torsades de pointes) associated with prolongation of the QT interval. The long QT syndrome is now recognized as having a distinct genetic basis. More than 35 mutations in four cardiac ion channels are associated with this syndrome. 5,6

Autosomal recessive(AR) LQTS, first described by Drs. Jervell and Lange-Nielsen, is extremely rare affects about 1 in 1 million persons and is characterized by a severe cardiac phenotype(mutations in the voltage-gated potassium channel gene (KVLQT1)) as well as by sensorineural hearing loss .The cardiac phenotype is generally more severe and, in fact, primary prevention ICD therapy is clinically indicated for JLNS.5,6,8

The therapeutic approach to patients with Jervell and Lange-Nielsen syndrome is made complex by the early age at which most of them become symptomatic, and especially by the fact that beta-blockers appear to have limited efficacy6. Left cardiac sympathetic denervation may be less effective than in other patients with long QT syndromeThus, for many patients with Jervell and Lange-Nielsen syndrome, an implantable cardioverter-defibrillator (ICD) should be seriously considered, in addition to the traditional therapies. For the subgroups at lower risk, it may be reasonable to postpone a decision about ICD implantation until the patient reaches the age of 8 to 10 years.7 Left cardiac sympathetic denervation should be considered for any patient with JLNS requiring recurrent VF-terminating ICD therapies. 5,6,7

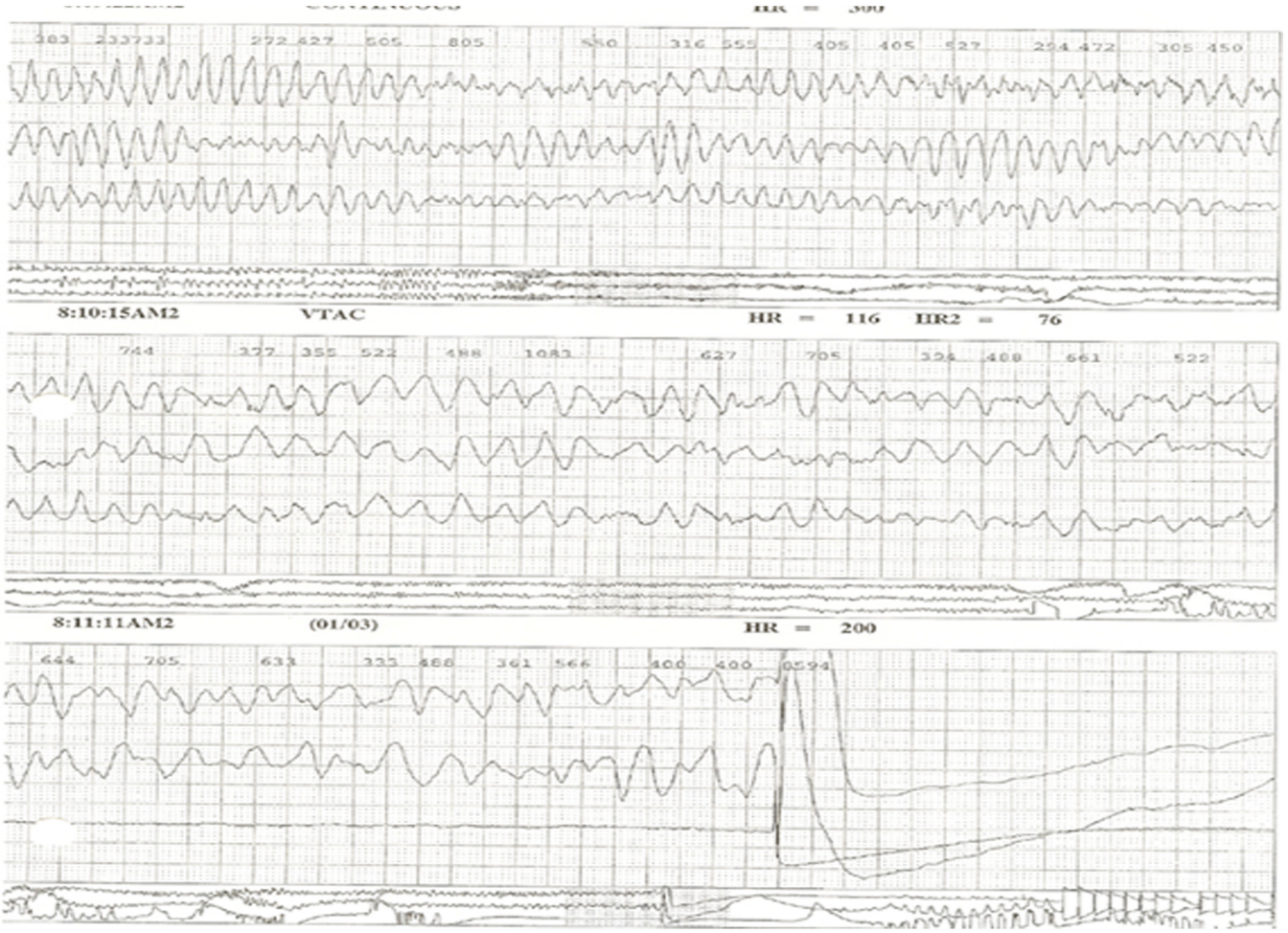

Figure 1- Holter monitor showsdocumented Torsades de pointes associated with syncope in 3 yrs boy with congenital LQTS

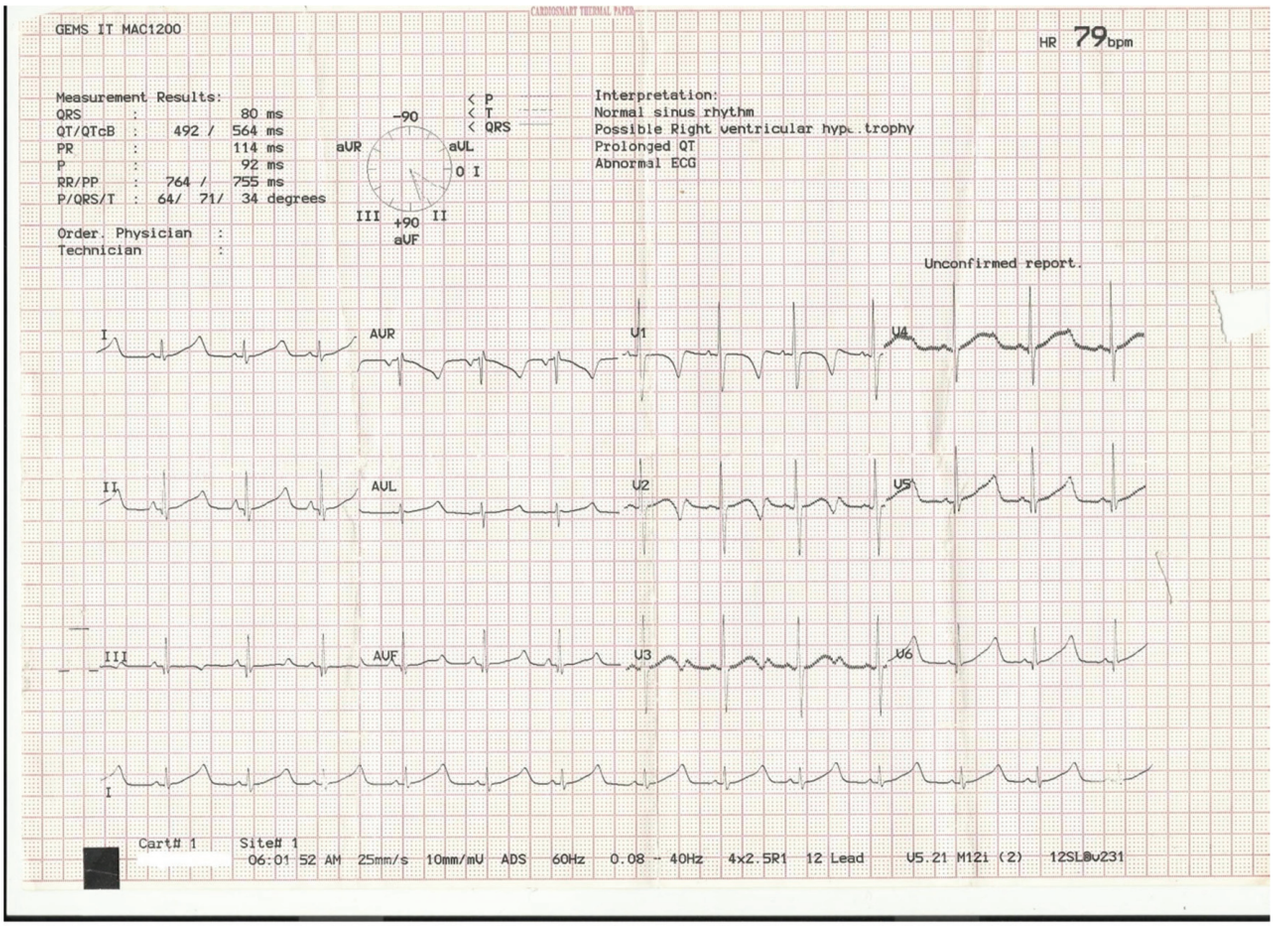

Figure 2-12 leads ECG shows prolonged QT (QTc = 560 msec.)

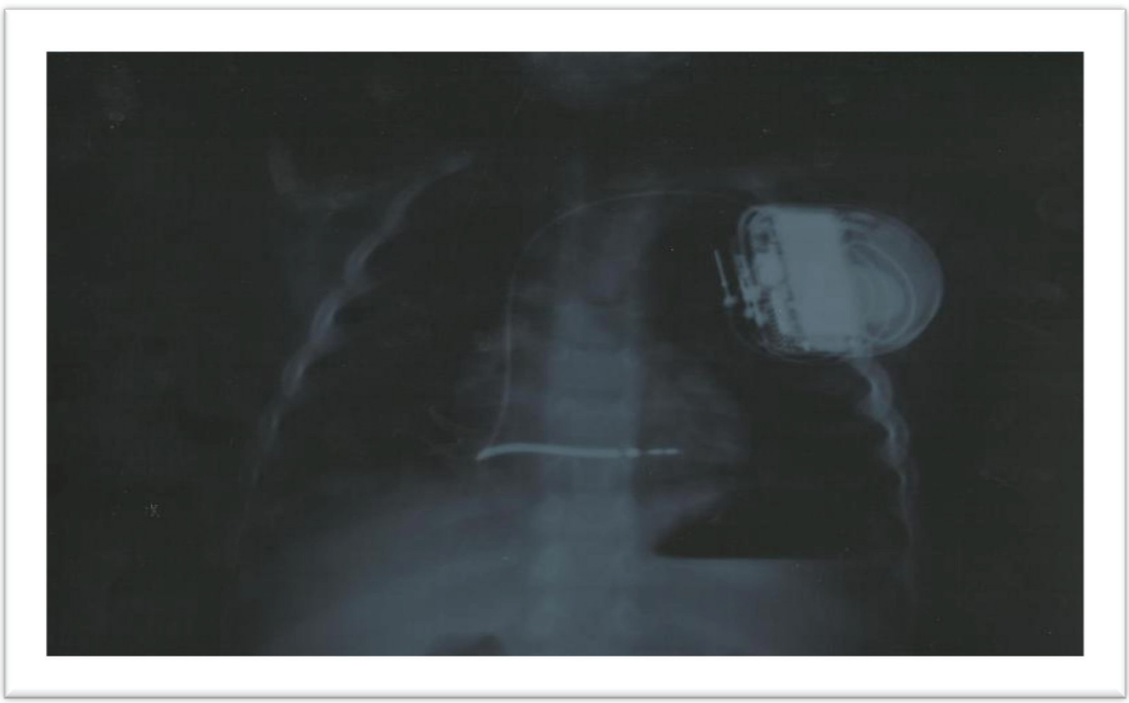

Figure 3 –CXR shows single coil ICD lead in RV with ICD-VR generator

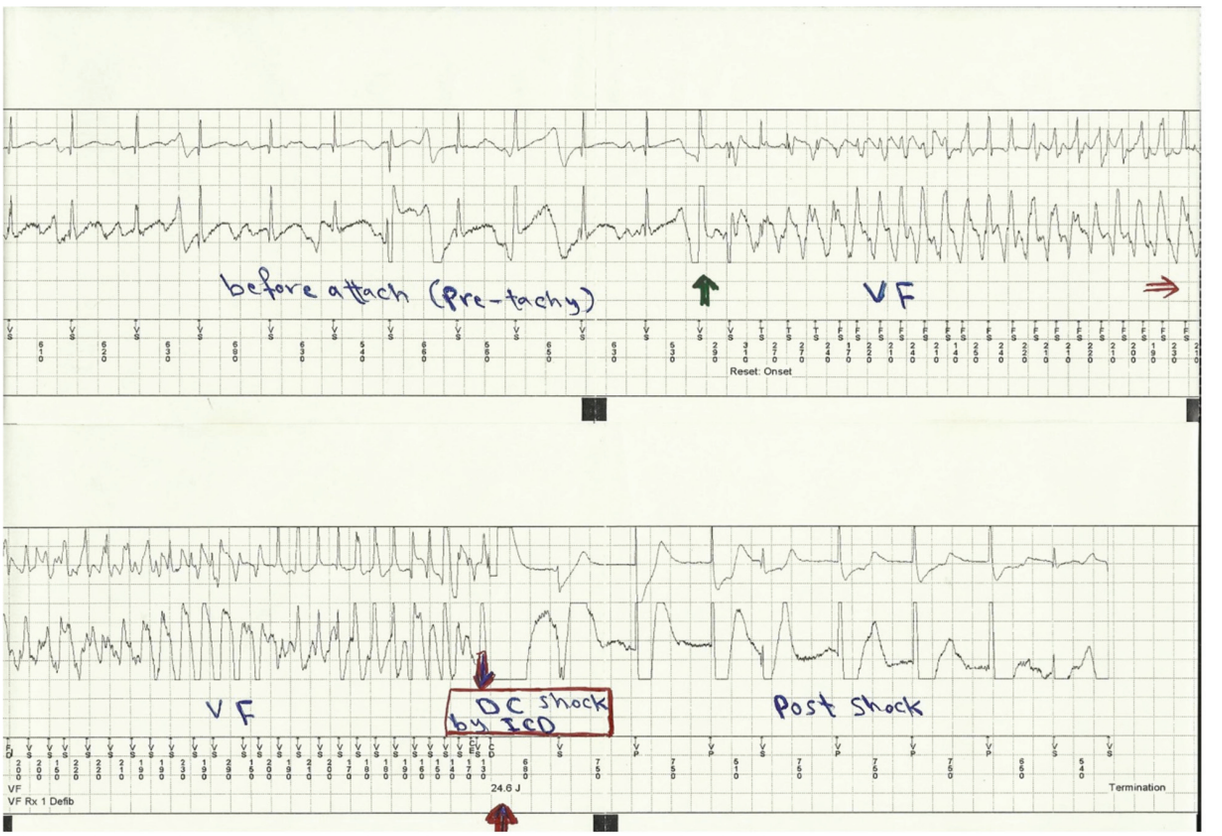

Figure 4 – a strip shows successful DC shock delivered by ICD for fast VT (detected as VF)

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