Case Report

A DUAL CHAMBER PACEMAKER LEADS SWITCH AT THE HEADER – AN ELECTROCARDIOGRAPHICAL AND CLINICAL PICTURE, A CASE REPORT

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ABSTRACT

In pacemaker practice the occurrence of atrial / ventricular leads switch at the pacemaker box header is very rare and may cause confusion and possibly serious complications as failure of pacing and probably cardiac standstill, recognizing and managing this complication is highly vital for patient safety and even survival.

INTRODUCTION

Diagnosing leads switch in permanent pacemaker is usually done within few hours or days after implantation but longer periods of missing this complications rarely occurs [(1)]. Considering the possibility of this complication should be considered during pacemaker follow up in patients with miscapture and miss-sensing of the patient's own atrial or ventricular signal in both chambers. Symptoms of dizzy spells, pre syncope or syncope in pacemaker patients are commonly due to miscapture but noticing the switch in the atrial signal seen at the ventricular channel and vice versa should raise the possibility of leads switch at the pacemaker header and managing this complication will be done accordingly to achieve proper pacemaker function [(1-4)].

Keywords: *Dual chamber pacemaker…*

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CASE REPORT

An 82-year-old man presented in 2003 with syncope and was found to have complete heart block with slow ventricular escape rhythm, consequently, he received a dual chamber pacemaker (Identity DR, SJM) after which his symptoms of syncope disappeared and he was active and doing his moderate daily activities as a shopkeeper quite well. His follow up was unremarkable for seven years until he came for device replacement due to battery depletion (ERI) in 2010 when his pacemaker was replaced at another hospital (Identity DR, SJM). After this, he started to complain of moderate shortness of breath (SOB), occasions of dizzy spells and pre-syncope. His device was re-programmed then, after few weeks and his symptoms of dizzy spells and pre-syncope almost disappeared but his SOB progressed since then reaching NYHA functional class II over the last 6 months before the current presentation in 2013.

His pacemaker follow-up notes were registered since then. On the current presentation he was in mild dyspnea. He had bilateral basal crepitations on chest physical examination. Chest X-ray revealed moderate cardiomegaly and moderate bilateral hilar congestion. ECG showed sinus P wave and constant ventricular pacing with a rate of 70 bpm in bipolar mode.

Pacemaker interrogation showed that his pacemaker was programmed to AAIR mode with base rate of 70 bpm; battery power was fine. ECG showed typical right ventricular pacing compatible with VVI mode despite AAI program at the pacemaker (Figure 1). Moreover, atrial channel EGM showed ventricular pacing and ventricular channel EGM showed spontaneous atrial depolarization (Figure 2).

These findings were highly suggestive of atrial / ventricular leads switch at the pacemaker header. He showed no intrinsic escape rhythm. Chest X-ray and then fluoroscopy showed that the A and the V leads were in the right positions at the appropriate chambers. He went in to corrective procedure under temporary pacing cover. When the pacemaker can was extracted it was confirmed that the leads were switched with the atrial lead connected to the ventricular port and the ventricular lead connected to the atrial port of the pacemaker header. Both leads were then disconnected and tested: the ventricular pacing threshold was 1.3 V and the atrial P wave amplitude was 1.7 mV. The leads then were re-connected to the proper ports at the pacemaker header. Atrial sense / pace and ventricular pace were achieved through the DDD pacing mode (Figure 3). The patient was discharged on the next morning with his symptoms (SOB) improved.

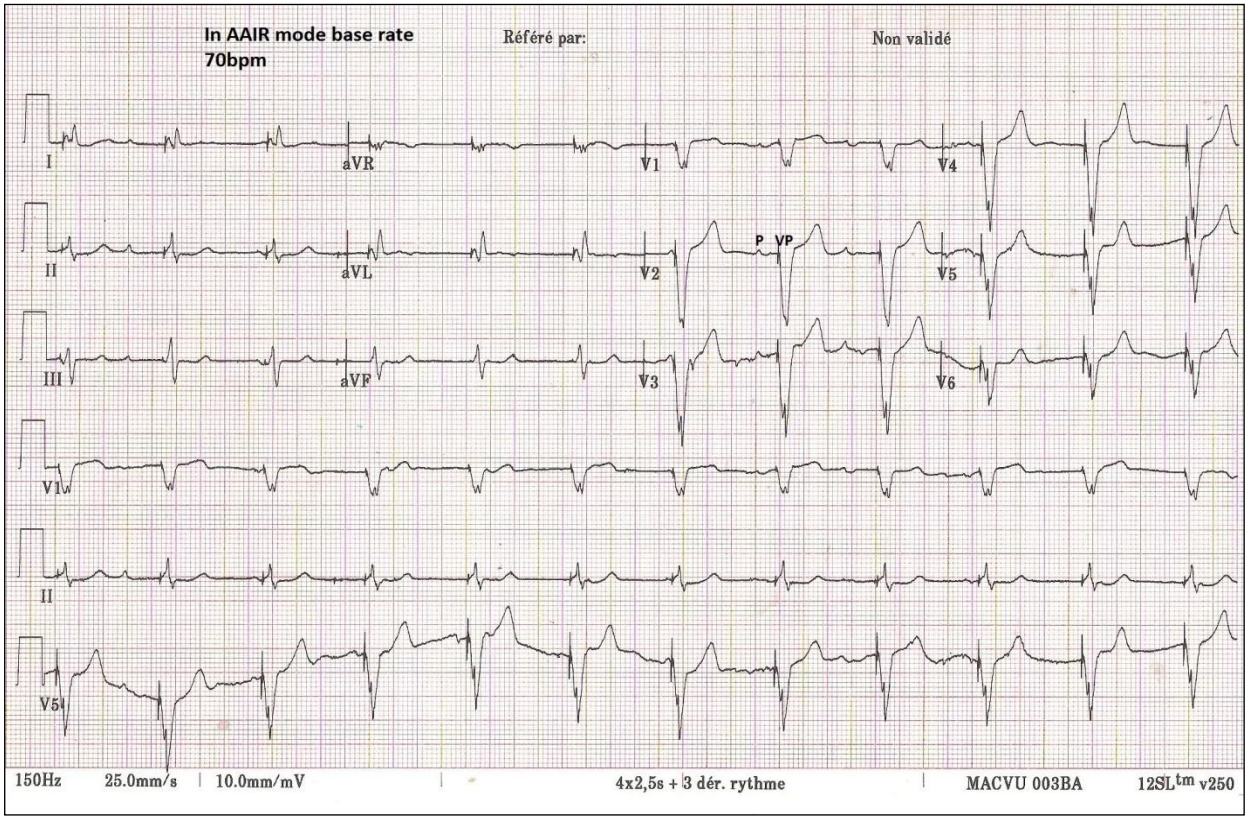

Figure 1. Twelve lead ECG on presentation showing single chamber bipolar ventricular pacing and dissociated sinus P wave.

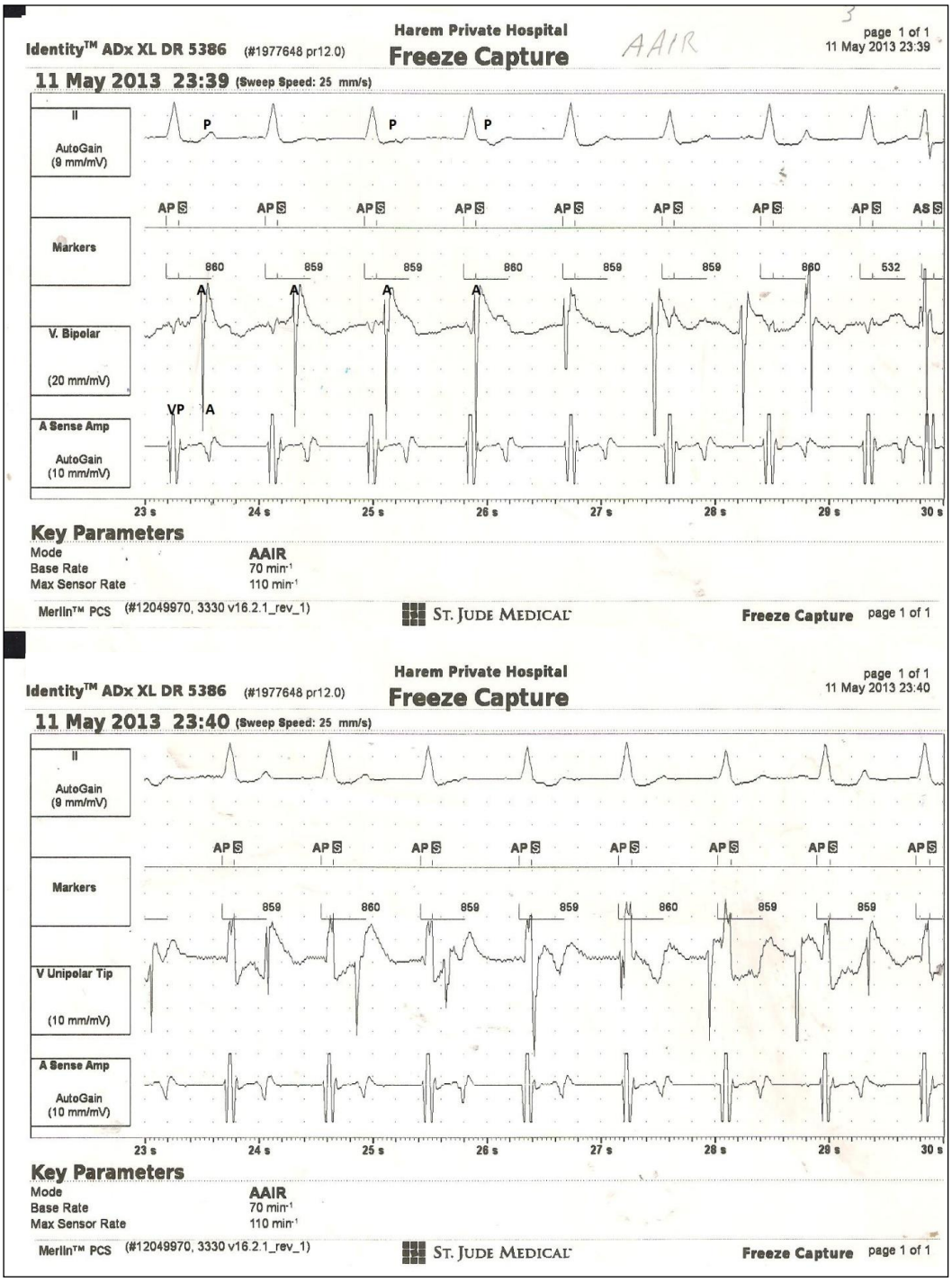

Figure 2. Standard ECG lead II, EGMs from ventricular channel (both bipolar and unipolar) and EGMs from the atrial channels showing atrial depolarizations at the ventricular channel and the ventricular pacing signal at the atrial channel.

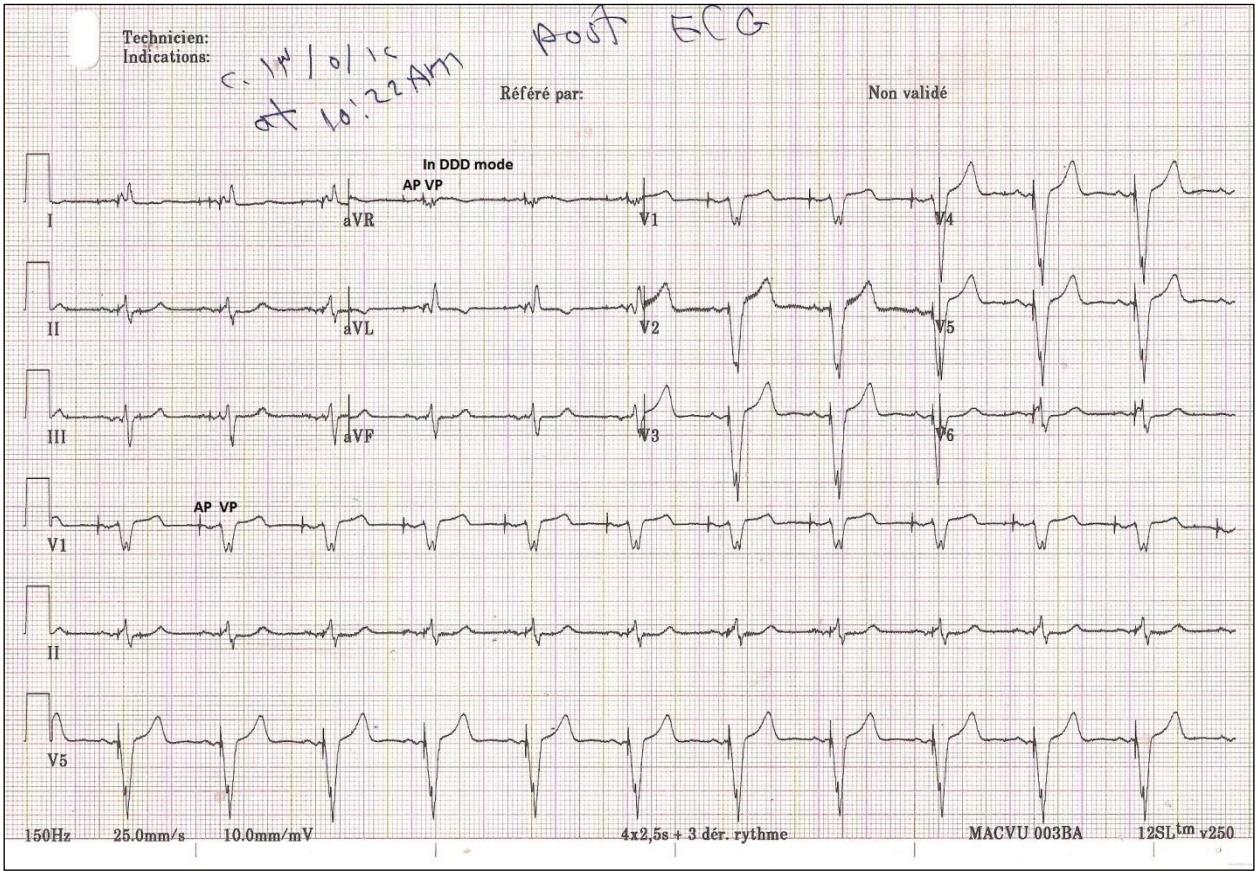

Figure 3. Twelve leads ECG after correction of the leads position showing proper atrial and ventricular pacing in DDD bipolar mode.

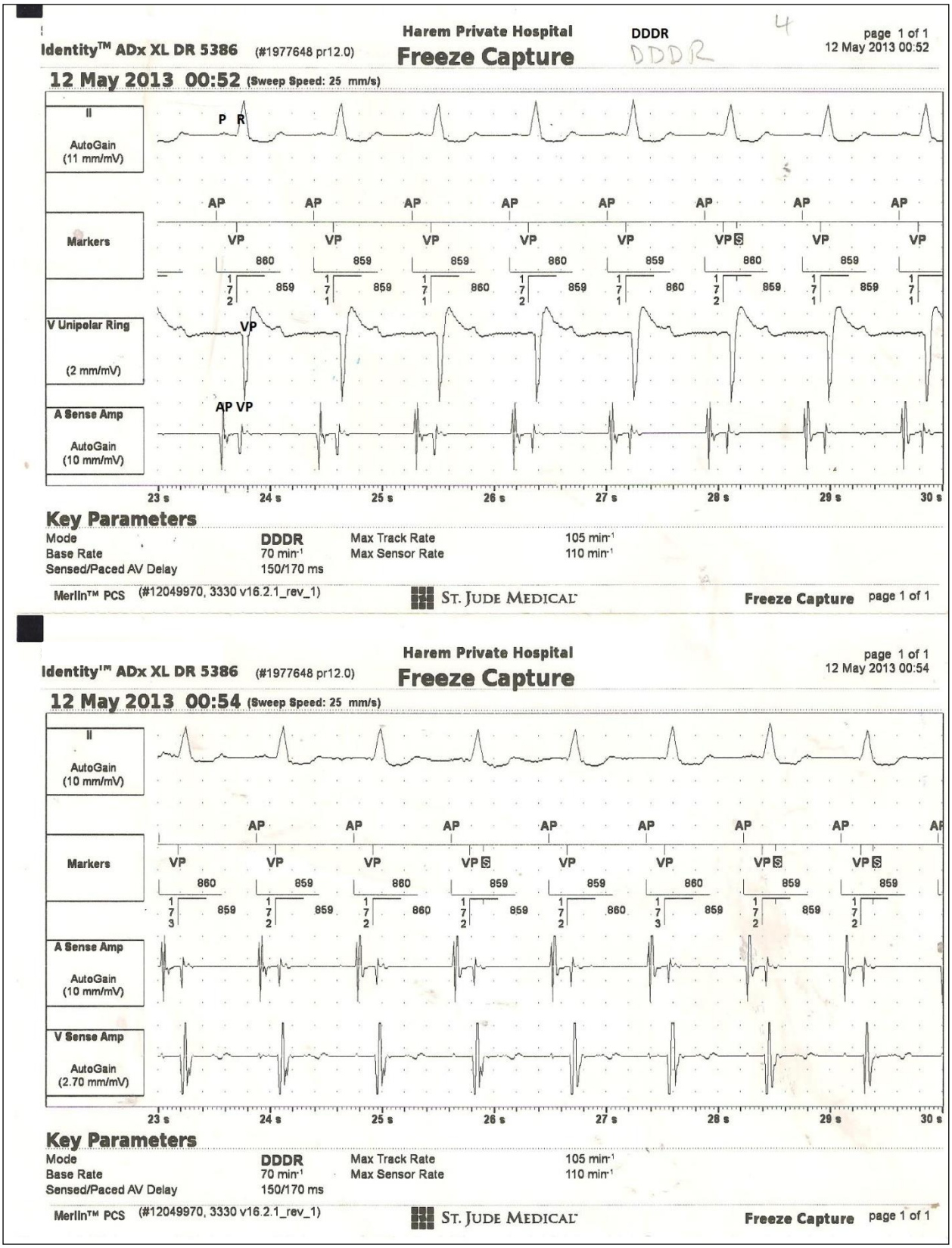

Figure 4. Superficial ECG lead II and EGMs after corrective procedure of the atrial and ventricular leads to the proper port. The atrial channel is showing atrial pacing (AP) and the ventricular channel is showing ventricular pacing (VP) properly in DDD mode.

DISCUSSION

In patients with complete atrioventricular block, switching of the atrial and ventricular leads manifests as syncope or cardiac arrest due to a lack of ventricular pacing. This lack of ventricular pacing may occur very easily during lead switching, as any sensed event in the ventricular channel (e.g. P waves or F/f waves if the patient has atrial fibrillation / flutter) or the atrial channel (e.g. diaphragmatic myopotentials, facilitated by low default sensitivity setting in this channel) would inhibit output from the atrial channel. Syncope may not occur if the P wave amplitude is lower than the sensitivity setting in the ventricular channel [3], a situation that may be life saving in patients with complete AV block and pacemaker dependency. If the amplitude of some or all P waves is high enough to be sensed in the ventricular channel and the patient is pacemaker dependent, symptoms will occur promptly after implantation and the lead switch can be corrected before discharge.[1]

Such a situation represents a rare non-intentional complication with only four cases reported in literature[1-4]. It is usually discovered few hours or days after implantation during interrogation of the newly implanted device before patient discharge.

In our patient programming the device in to AAI 70 bpm, when the mistake became apparent, has achieved a stable ventricular capture (*de facto* VVI pacing) which was going on well for three years. The symptoms of dizzy spells and pre-syncope that were present immediately after the pacemaker can replacement were likely due to temporary DDD mode pacing with occasion inhibition of atrial channel output by the sensed P wave (in the ventricular channel). Despite partial correction of the mistake by reprogramming the device form DDD to AAI mode, the symptoms of heart failure (SOB) appeared and likely were related to non-physiological mode of pacing with lack of atrio-ventricular synchrony. This was corrected during the current procedure, hopefully leading to gradual improvement of his heart failure symptoms.

In conclusion, we presented a very rare complication of permanent pacing with classic electrocardiographical and clinical manifestations of pacemaker lead switch at the header, and possible medical solutions to such problem.

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