SYNCHRONIZED DC SHOCK IN LONG STANDING PERSISTENT ATRIAL FIBRILLATION WITH BIFASCICULAR BLOCK ENDING IN CARDIAC ARREST: A CASE REPORT

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ABSTRACT

We report a case of long-standing persistent atrial fibrillation and bifascular block exposed to synchronized DC- cardioversion which resulted in cardiac arrest, the patient resuscitated including temporary and then permanent pacemaker implantation. The patient recovered fully and stayed in sinus rhythm. Patients with atrial fibrillation and symptomatic bifascular block, exposed to synchronized DC shock to revert into sinus rhythm, should receive either temporary pacing cover for the electrical cardioversion procedure, or should have at least a single ventricular permanent pacemaker prior to cardioverting them into sinus rhythm by applying synchronized DC – shock, as the likelihood of developing sinus arrest and escape rhythm failure is significantly high.

INTRODUCTION

Synchronized DC cardioversion has been successfully used to terminate highly symptomatic atrial fibrillation [(1)]. According to the current guidelines, atrial fibrillation may be cardioverted to sinus rhythm with proper anticoagulation [(2)].

Limited retrospective studies have shown that electrical cardioversion is a safe and efficient procedure [(3)]. Arrhythmia, most commonly bradyarrhythmia and sinus arrest, may complicate electrical cardioversion of atrial fibrillation [(4)]. The predicting factors for identifying high risk patients may be useful, but there are no large- scale studies on the incidence and risk factors of acute bradyarrhythmic complications after synchronized DC-cardioversion of atrial fibrillation. The presence of interventricular conduction disease and left atrial fibrosis with the atrial fibrillation as a risk of developing post DC shock bradyarrhythmia were reported in few case reports in the literature [(5, 6)].

The aim of presenting this case is to attract the attention to the presence of bifascicular block with atrial fibrillation as a significant risk factor for developing sinus arrest, as well as failure for escape rhythm appearance after DC application. The current case highlights the significant need for inserting a temporary pacemaker to cover the DC- cardioversion of atrial fibrillation in such a patient.

Keywords: *DC-Cardioversion, Atrial fibrillation, Bifascicular block.*

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CASE REPORT

SASH is a 60 Y old lady, not diabetic nor hypertensive, presented with one year history of recurrent palpitation, dizzy spells, pre syncope, syncope and mild shortness of breath on exertion. Cardiac examination was normal except for totally irregular pulse. The twelve lead electrocardiogram (ECG) revealed atrial fibrillation with reasonable ventricular rate, the QRS showed right bundle branch block (RBBB) and left axis deviation suggesting bifascular block of RBBB and left anterior hemiblock (LAH), Figure 1. Holter monitoring for 24 hours showed persistent atrial fibrillation with maximum heart rate of 95bpm, and a minimum of 55bpm, and no fast ventricular rate or slower rate than 40bpm. She was started on slowing drug, including metoprolol tartrate 50 mg a day, and started on novel anticoagulant, rivaroxaban, 20 mg daily.

Trial for reverting her in to sinus rhythm by DC- shock was considered to help to improve her outcome, and minimize the risk of passing into heart failure and reduce the incidence of systemic thromboembolism. Transthoracic and transeosophageal echocardiogram showed no thrombi in the left atrial cavity, normal left ventricular size and left ventricular ejection fraction. Accordingly, synchronized DC -cardioversion arranged seven days after starting rivaroxaban therapy. Under conscious sedation, a biphasic DC shock of 150 J delivered in synchronized mode. The patient went in to cardiac standstill where sinus arrest occurred, with no ventricular or atrial escape rhythm, Figure 2. External pacing applied, but failed to activate the ventricle. An urgent temporary pacemaker was inserted transvenously and VVI pacing started within 90 seconds with a base pacing rate of 70 bpm, which was a few minutes later reduced to 40 bpm to encourage the patient's sinus function recovery. She recovered fully from sedation, with full consciousness and no residual abnormal neurological abnormalities. The duration between cardiac arrest and full recovery was two minutes. The patient had a stable hemodynamic status. The blood pressure and other vital signs were within normal range. The ECG with temporary pacing with a base rate of 40bpm showed occasional spontaneous sinus beats with prolonged PR interval of 240 msc, bifascicular block composed of RBBB and left axis deviation of LAH, Figure 3 A&B.

Based on the patient's history of syncope and dizzy spells, and the observed bifascicular block prior to and after DC- cardioversion, and the occurrence of sinus arrest, a permanent pacemaker implantation was considered essential, and it was inserted in the left pre- pectoral region. The device chosen was a Sphera SR MRI compatible from Medtronic . The device was programmed in to VVI mode with a base pacing rate of 60 bpm, Figure 3B. The patient was moved to the ward at full consciousness and with a stable hemodynamic status. The temporary pacemaker was removed the following day and the patient was discharged home with VVI pacing almost 90% of the 24 hours of the day.

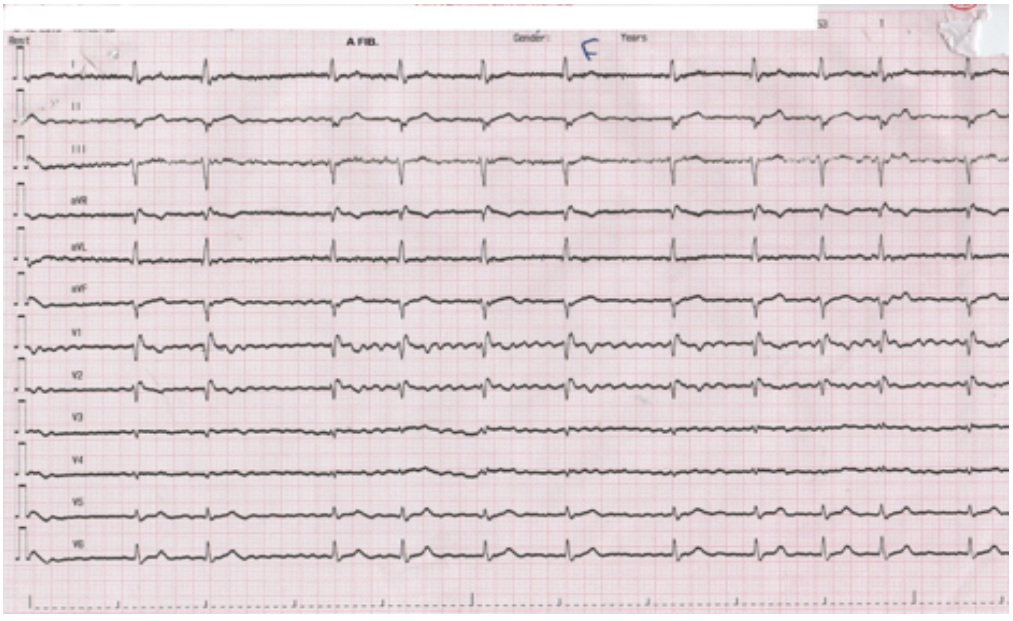

Figure 1. Twelve leads electrogram showing atrial fibrillation with well controlled ventricular rate With fascular block.

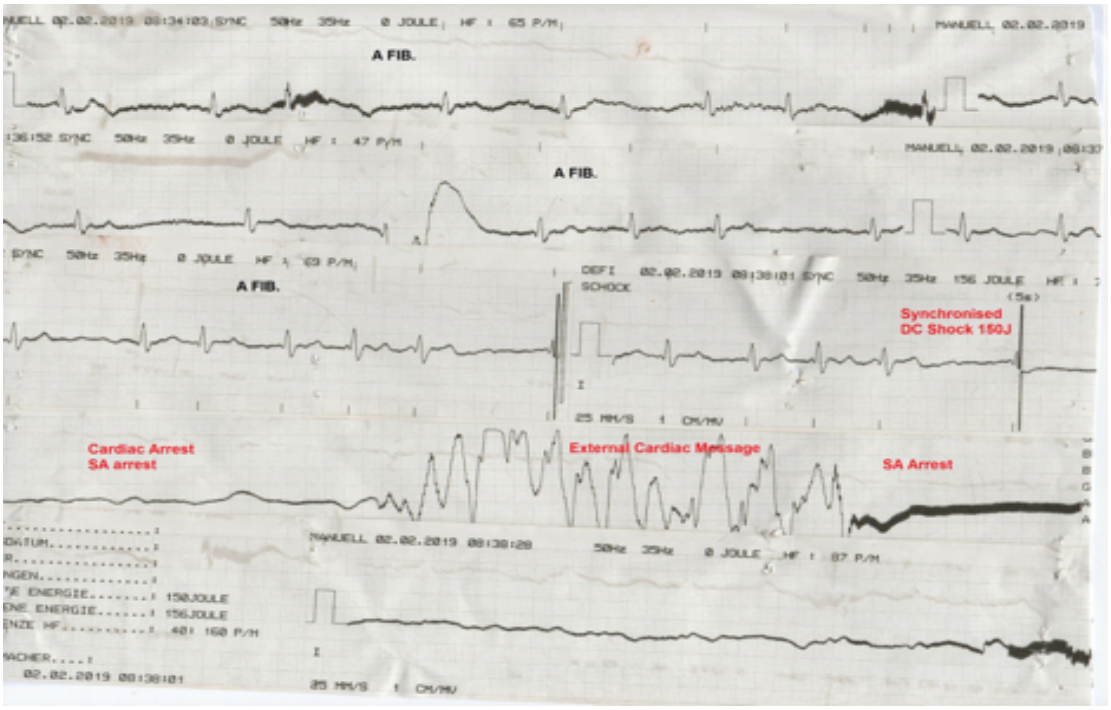

Figure 2 Continuous single lead ECG trace showing the synchronized DC shock (cardioversion) delivery ending in cardiac arrest.

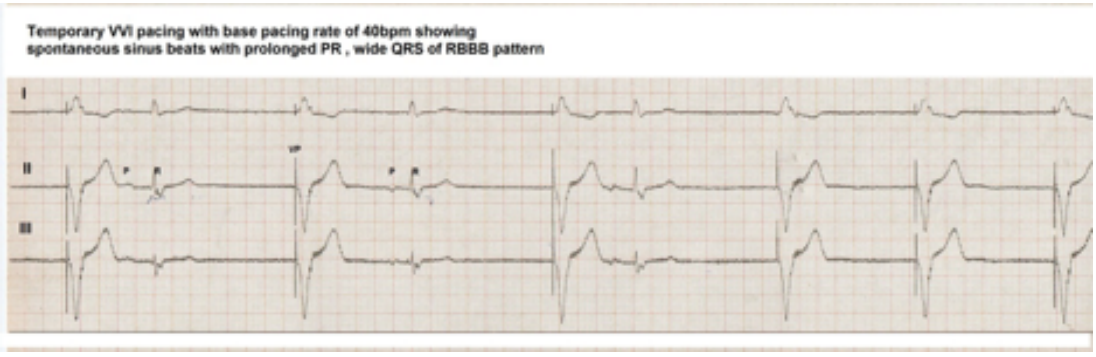

Figure 3A. ECG strip of leads I, II and III showing ventricular pacing with slow pacing base rate of 40 bpm and occasional sinus beats, with prolonged PR interval and wide QRS.

Figure 3B. The twelve lead ECG showing ventricular pacing and two sinus beats, arrow, with PR interval of 220 msc, RBBB and left axis deviation.

DISCUSSION

Studies indicate DC - synchronized cardioversion as a safe and quite effective procedure for reverting atrial fibrillation into sinus rhythm [1, 2, 3]. Complications with bradycardia or tachycardia arrhythmias are known to occur after applying the DC shock, and in particular, significant bradyarrhythmias [4]. Older age and being female gender are significant risk factors for developing bradyarrhythmia[4]. Sinus node disease in the context of atrial fibrillation is difficult to predict, but nonetheless represents the presence of significant atrial fibrosis [5]. There might be electrical remodeling near the sinus node in atrial fibrillation [5].

The interventricular conduction defect associated with atrial fibrillation may contribute to the highly significant risk during DC application for atrial fibrillation reversion. This patient discussed in this paper revealed baseline atrial fibrillation with reasonably controlled ventricular rate and bifascicular block. Following DC-synchronized cardioversion, the sinus node did not recover immediately, and sinus arrest occurred for 90 seconds, during which short resuscitation was conducted and external temporary pacing, which failed to stimulate the ventricle. No atrial or ventricular escape rhythm was observed. The patient ended with cardiac arrest and external cardiac message was done. Transvenous temporary pacing lead was immediately inserted through the right femoral vein and positioned using fluoroscopy down to the right ventricular apex and ventricular pacing started within 90 seconds. Similar cases have been reported previously, where DC- cardioversion in the setting of atrial fibrillation and RBBB with LAH saw the patient gone in to sinus rhythm with first degree heart block and bifascular bock that indicate trifascicular block but no high degree AV block occurred [6].

An electrophysiological study done to that patient which revealed prolonged below His interval (HV) of 110 msc, accordingly, a permanent pacemaker was inserted. As far as we know, that no similar case to the current case has been reported before where a patient experienced

cardiac arrest for 90 seconds with no escape rhythm, and needed urgent transvenous temporary pacing.

In conclusion: If a patient with atrial fibrillation with controlled ventricular rate presented with syncope, dizzy spells or pre- syncope, AV conduction defect should be excluded.

When DC-cardioversion is decided for such a patient with atrial fibrillation and symptomatic bifascicular block, a temporary pacing cover should be used to achieve immediate ventricular pacing if sinus arrest or significant bradyarrhythmias occurred after DC shock. This is considered a potentially lifesaving measure.

Complications related to post DC-cardioversion of atrial fibrillation, bradycardia generally indicate subtle sinus node disease, and often lead to permanent pacemaker implantation.

Permanent pacemaker implantation may well be considered in symptomatic bifascicular block with atrial fibrillation, prior to DC-cardioversion for associated atrial fibrillation.

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