Case study

High-degree atrioventricular block in young subjects induced by vagal hyperactivity (About 4 cases) and literature review.

Abstract

Vagal hyperactivity, which corresponds to excessive activity of the parasympathetic system, is a frequent cause of syncope, fainting and dizziness, hence the interest of exploring the autonomic nervous system (ANS) for confirmation.

High-degree atrioventricular (AV) block in patients with a history of syncope usually requires pacemaker implantation, therapeutic strategies should also be considered in young patients especially in the case of non-structural cardiopathy.

We report 4 cases of repeated episodes of syncope in young patients who presented at the emergency with a high degree atrioventricular block (AV-block) without any structural cardiopathy. The completion of the etiology findings in these patients came out positive for vagal hypersensitivity after ANS test. The patients were placed on diet and pharmacological therapy with a good clinical outcome without the immediate need for cardiac pacemaker implantation.

KEYWORDS: vagal hyperactivity; High-degree atrioventricular block; young subjects

Introduction

Conduction disorders in young subjects can have several etiologies. Most cases of dizziness or syncope referred to the emergency department or to services of internal medicine are caused by vasovagal syndromes. They comprise relative bradycardia with vasoplegia, the cardiovascular response to a neurological stimulus [1]. It should be noted that cardiac investigations are necessary, regardless of the diagnosis of syncope, whether reflex or orthostatic, in a patient with cardiovascular risk factors or an abnormality on the ECG. Indeed, it is important to eliminate a cardiovascular cause of syncope before concluding on the diagnosis of dysautonomic syncope [2]. Vagal hyperactivity, which corresponds to excessive activity of the parasympathetic system, is a frequent cause of syncope and fainting, hence the interest of exploring the autonomic nervous system (ANS) in young patients with conductive disorders without structural cardiopathy.
We report 4 cases of repeated episodes of syncope in young patients who presented at the emergency with a high degree atrioventricular block (AV-block) without any structural cardiopathy.

Case Presentation

We report the cases of 4 young patients aged 22, 28, 29 and 32 years respectively, with no particular history, followed in the cardiology department at the University teaching Hospital, Ibn Rochd of Casablanca. The first two patients initially presented at the emergency department for recurrence syncope whiles the two other patients consulted at the cardiology outpatient

department for dizziness during work efforts without syncope. The clinical examination was normal apart from arterial hypotension in the first patient. The baseline ECG was normal in the first patient (Figure 1), whiles the ECG of the second and third patient showed a second-degree AV-Bloc (Figure 2a and b) and fourth patient a high degree AV bloc with 2/1 conduction (Figure 3).

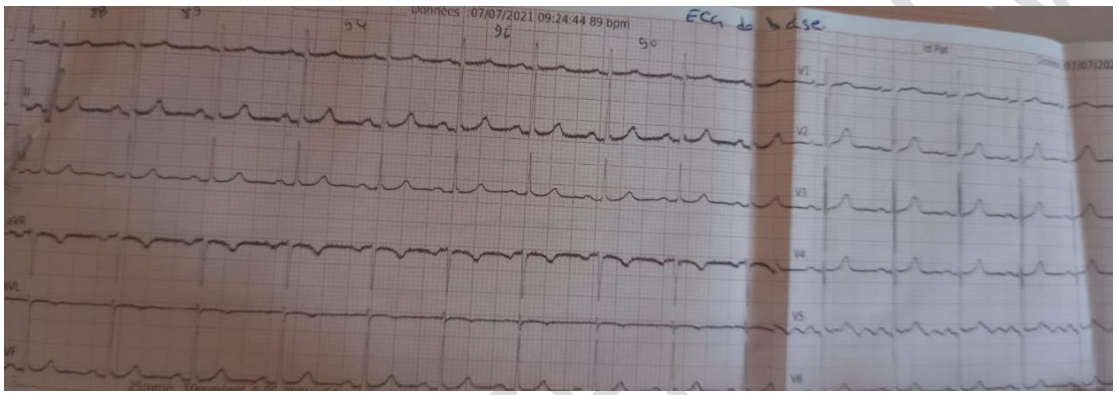

Figure 1: Electrocardiogram of Patient 1: Absence of abnormality.

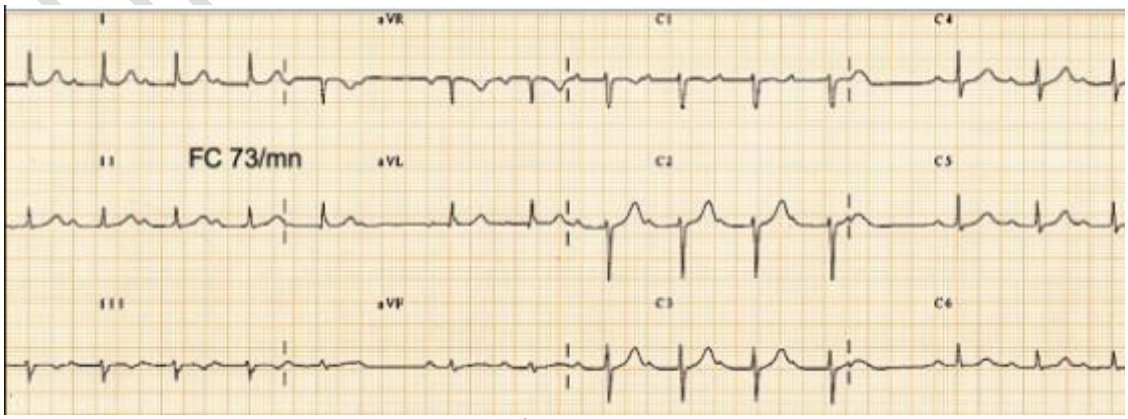

Figure 2: Electrocardiogram of Patient 2: 2nd Degree AV block

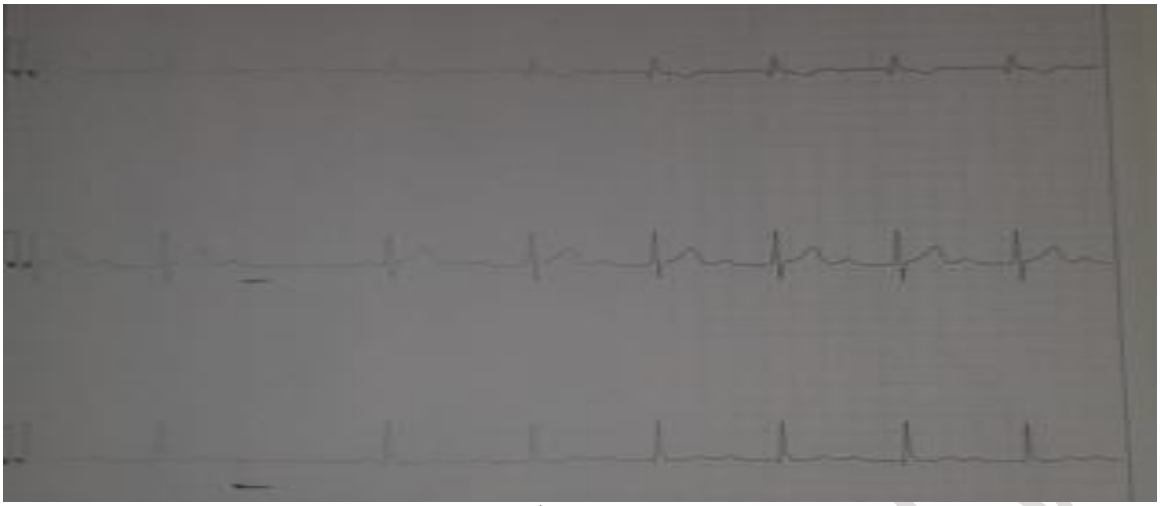

Figure 2b: Electrocardiogram of Patient 3: 2nd Degree AV block Mobitz II

Figure 3: Electrocardiogram of Patient 4: High degree AV block 2/1 conduction.

The 24 hours holter ECG showed a nocturnal paroxysmal first-degree AV block in the first patient whilst the other patients had a 2/1 atrioventricular block (Figure 4).

Figure 4: 24 Hours Holter ECG of our third Patient showing a high degree AV block of 2/1 conduction during the night recording.

A complete blood analyses was carried out in the patients including complete blood count test, electrolytes (especially magnesium, calcium, parathormone and thyroid hormones levels in the blood) came out within normal limits. Transthoracic echocardiography was done in all the patients which was normal. A complementary exam, the ANS tests was done in all patients, include deep breathing, isometric contraction, hyperventilation, orthostatic test, and mental stress. This exam showed a very high vagal response, a normal central and peripheral alpha and beta sympathetic response and a severe decrease in supine blood pressure in all 4 patients concluding a vagal hyperactivity which was responsible for the AV-block in the patients. The patients were put under nutritional diet based on enough rehydration with portable water up to a liter and half daily with additional salty food to bring up the blood pressure. This diet was

associated at the same time with pharmacological therapy based on Ethyl-phenyl- ephrine, a strong arterial vasoconstrictor (Effortil drops, 10drops par day titrated in respond to the blood pressure). Regular follow-ups in the patients were conducted, a good clinical outcome was observed in the patients 1 month after the treatment installation.

Discussion

The causes of syncope can be categorized into three groups; 48% non-cardiogenic (including reflex syncope and orthostatic hypotension), 18% cardiogenic, and 34% unknown. Of the non-cardiogenic, 5% can be attributed to situational syncope syndromes, including defecation, micturition, cough, and swallow due to the deficiency of the autonomic nervous system [8]. The Autonomic Nervous System (ANS), also called the Vegetative or Involuntary Nervous System, is responsible for the rapid and permanent regulation of the very unstable internal environment, to modulate, regulate and harmonize the vegetative life of the different organs, thus contributing to the maintenance of homeostasis [3].

The parasympathetic innervation is distributed mainly to the sinus node, atrioventricular node and, to a lesser extent, to the biauricular and ventricular myocardium [4]. The sympathetic innervation concerns the whole of the heart with a distribution as marked at the level of the ventricle as elsewhere. Parasympathetic modulation has a negative chronotropic effect [5].At rest, the HR is mainly under the vagal brake. Acetylcholine (ACh) released by parasympathetic neurons decreases the frequency of nervous discharge at the level of the sinus node. It has also a negative effect on the release of norepinephrine and attenuates the response to adrenergic stimulation[6].

Although high-degree atrioventricular (AV) block in patients with a history of syncope usually requires pacemaker implantation, therapeutic strategies should also be considered in young patients especially in the case of non-structural cardiopathy [7]. In this case report, our patients are of very young age whilst there clinical, biological and echocardiography findings were without abnormalities despite a notion of recurrence syncope in two of our patients, further exams were carried out to avoid pacemaker implantation. The ANS test which finally confirmed a vagal hyperactivity helped in choice of therapy strategies thus the interest of ANS test in young patients before invasive therapy.

Manifestationsrelated to vagal hyperactivity can take many forms. The set of clinical manifestations is called vagal syndrome [9,10] which was observed in our patients in this study ranging from dizziness, fainting and syncope.

Once the diagnostic of vagal syndrome was confirmed a medical treatment was chosen as a therapy strategy for our patients. In some case studies, Disopyramide a strong anti-cholinergic drug that acts not only on ventricular ectopic beats but also AV block and associated symptoms showed an effect on transient AV block related to vagal nerve activity. It has been proved that midodrine, an α-1 adrenergic agonist, may be recommended rather than disopyramide in case of neural mediated syncope[11,8]. In our patients, a simultaneous food diet and pharmacological therapy was opted based on enough rehydration up to a liter and half of water, fairly high salty food and Ethyl-phenyl-ephrine (“effortil” at a starting dose of 10drops par day titrated in respond of the blood pressure). However, in another study, phenobarbital was reported to insignificantly alter cardiac vagal discharge. The improvement in functional signs would be due to the reduction in vagal activity [12]. It has been noted in another study that cardiac pacemaker should be considered as alternative therapy in older patient [13].

The clinical outcome was positive in our patients one month after therapy installation and until present our patients did not need a pacemaker implantation. The real challenge is if medical

therapy should be interrupted after a period of good evolution in our patients or continued permanently.

Conclusion

Vagal hyperactivity can be a common cause of high-degree AV block in young subjects with no structural cardiopathy that needs exploration by an ANS tests for more adequate management. Invasive therapy such as pacemaker implantation should be considered in patients with failed pharmacological therapy.

Reference

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