

Cardiopulmonary Resuscitation for Recurrent Micturition Syncope with Prolonged Asystole: A Case Report

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Abstract

Background: Micturition syncope is an, in adults, uncommon type of reflex syncope, often thought to be benign; however in combination with an extreme cardioinhibitory response it could lead to a full cardiac arrest.

Case Summary: A 42-year old man was admitted to the cardiac ward for rhythm monitoring after being presented at the emergency room due to a syncope during urination with traumatic spinal fractures as result. During cardiac surveillance patient had the urge for urination and during micturition, while sitting on the edge of the bed, suddenly collapsed. Rhythm monitoring showed an asystole of over 40 seconds requiring cardiopulmonary resuscitation. After resuscitation patient regained consciousness without any neurological deficits. Due to the observed prevailing cardioinhibitory response leading to asystole and syncope during micturition it was decided to implant a dual chamber pacemaker with rate-drop response. Patient experienced no recurrent syncopal episode afterwards.

Discussion: This is the first case of a micturition syncope with an extreme cardioinhibitory response requiring cardiopulmonary resuscitation and pacemaker implantation in an adult. When evaluating patients with suspected recurrent reflex syncope caution should be taken into classifying the syndrome as purely benign, and patients should be analysed appropriately.

Keywords: Syncope; Micturition syncope; Cardiopulmonary resuscitation; Cardiac pacing; Case report

Introduction

Micturition syncope is a relatively uncommon form of reflex, or situational, syncope in adults, mainly occurring during or right after urination and is more prevalent in men than in women [1,2]. Although the true mechanism is unknown, it is hypothesized that during urination, the mechanoreceptors in the bladder are activated and a light Valsalva maneuver is exerted [3]. The Valsalva maneuver leads to a decreased venous return, resulting in inadequate filling pressures of the right ventricle. This triggers an increased vagal tone and decreased peripheral sympathetic tone, resulting in bradycardia and vasodilation, also known as the von Bezold-Jarisch reflex [4].

In most cases, syncope like micturition syncope is self-limiting and benign, with a predominant vasodepressive component [2]. The von Bezold-Jarisch reflex results in a transient loss of consciousness which lasts seconds to minutes, and patients recover spontaneously without any chemical or electrical intervention. Serious reflex syncope to the extent of necessitating cardiopulmonary resuscitation has not yet been described in the literature to date. We report a case of an adult male with micturition syncope with prolonged asystole treated with cardiac resuscitation and pacemaker implantation.

Case Presentation

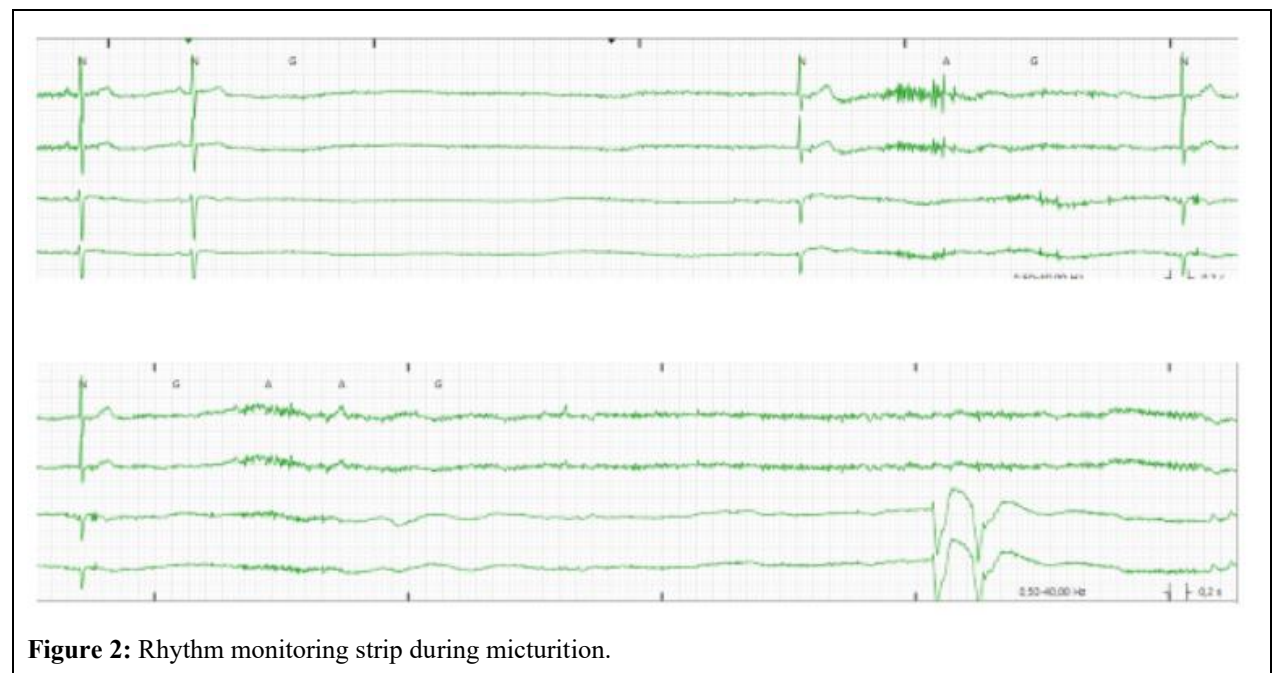
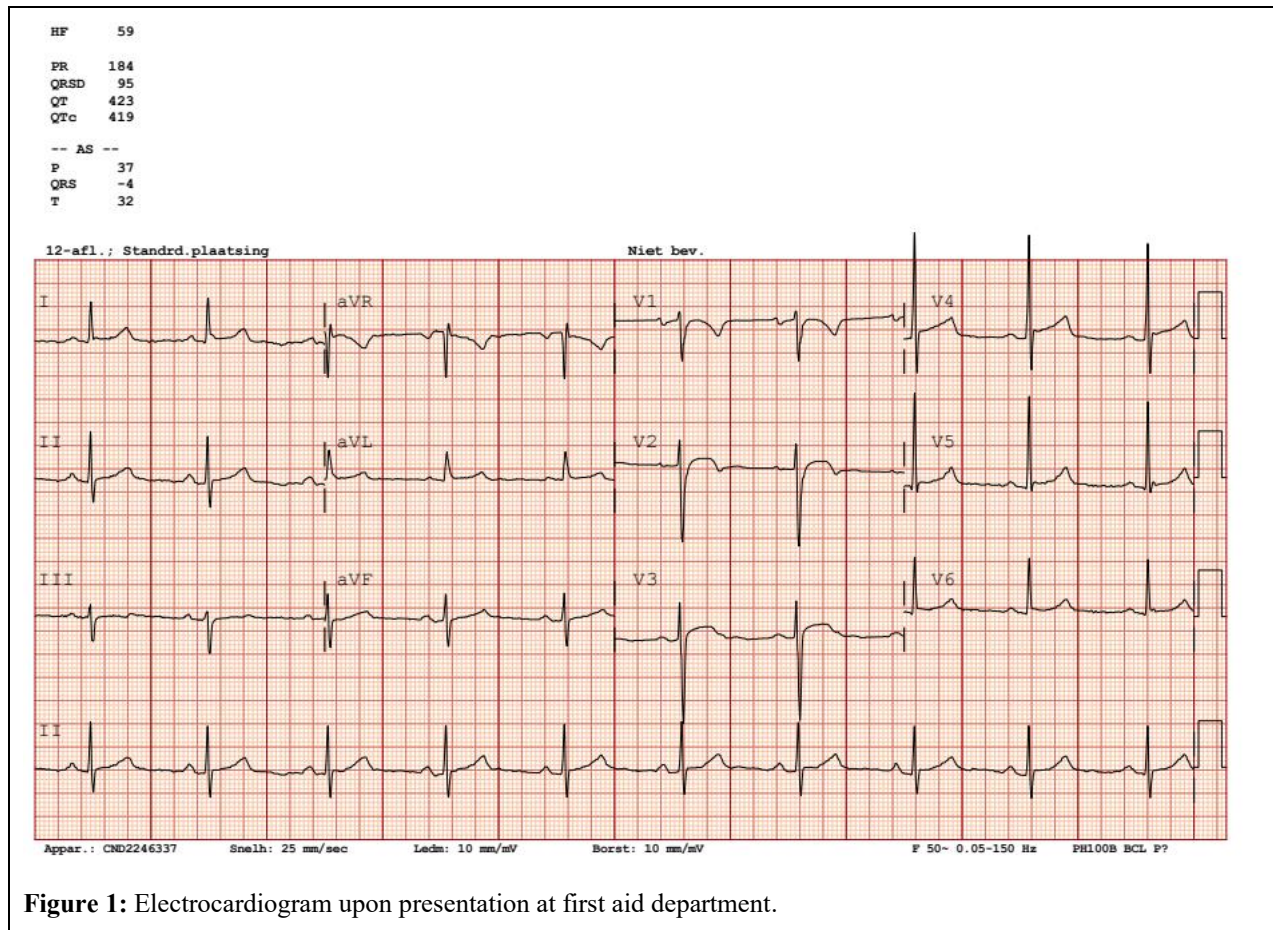
A 42-year old man without cardiac history presented at a university hospital emergency department (ED) for extreme back pain, vomiting and syncope. The patient reported that symptoms of malaise started during upright urination at night, after which he collapsed. Symptoms started suddenly, with little to no prodrome. Upon regaining consciousness, extreme back pain was present. The patient had a history of reflex syncope after painful stimuli in the past; besides this, the patient had no medical history. Additionally, the patient's father had experienced episodes of cardiac syncope due to sick sinus syndrome, for which he received a pacemaker.

At physical examination at the ED, the patient was hemodynamically stable without chest pain, normal cardiac, pulmonary, abdominal, and neurological examinations. There were no signs of orthostatic intolerance. The electrocardiogram (Figure 1) showed a sinus rhythm with mild convex ST-elevation in V2 and V3 and inverted T waves in V1 and V2. Further imaging with computed tomography (CT) excluded aortic pathology, pulmonary embolism and intra-abdominal pathologies. The CT did show compression fractures in the T9 and T11 vertebrae, explaining the back pain.

The patient was admitted for rhythm monitoring on the cardiac ward because of a highly traumatic syncope without identifiable cause. At the sixth hour of observation, the patient experienced the urge for urination, during which he collapsed again with loss of consciousness and prolonged circulatory arrest. On rhythm monitoring, an asystole of more than 40 seconds was observed without an adequate junctional or ventricular escape rhythm (Figure 2). In the absence of the option to perform temporary external pacing in the clinical wards, the attending nurse initiated basic cardiopulmonary resuscitation for two cycles, after which the patient regained consciousness and vomited.

An echocardiogram in the acute setting showed a normal left and right ventricular function, no pericardial effusion and no valvular abnormalities. Due to the length of the asystole, its proven relation to micturition, and the severity of the consequences (traumatic syncope and prolonged circulatory arrest with cardiopulmonary resuscitation as a response), the patient received a permanent dual chamber pacemaker. The pacemaker was programmed with a rate-drop response, so atrioventricular sequence pacing of 120 beats per minute would be initiated when the patient's heart rate dropped below the 30 beats per minute. Implantation was successful and uncomplicated.

After pacemaker implantation, the patient was admitted to the cardiac care unit for further observation. During observation, the patient had spontaneous micturition. Cardiac monitoring demonstrated a slowly decreasing heart rate, after which the pacemaker rate-drop response with atrial and ventricular pacing was initiated. The patient experienced no symptoms during micturition and experienced no complaints from the increased heart rate. In the year following the pacemaker implantation the patient reported no recurrent syncope (Figure 3).



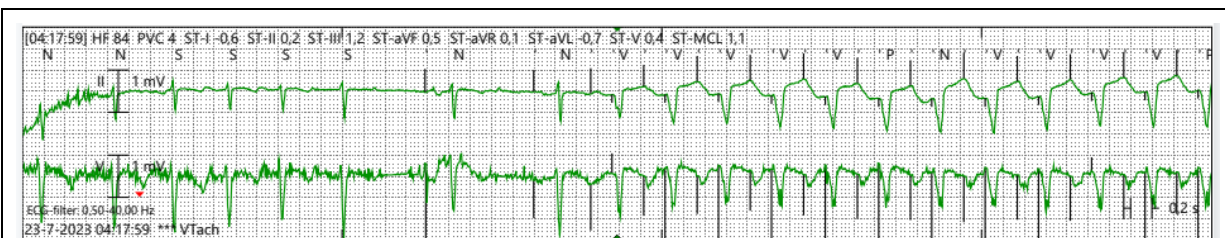


Figure 3: Rhythm monitoring strip during micturition after pacemaker implantation.

Discussion

This is the first case describing a patient with recurrent micturition syncope with an extreme cardioinhibitory response leading to prolonged asystole of over 40seconds until start of resuscitation, therefore the true duration of the asystole until spontaneous recovery remains unknown.

Micturition syncope is often thought to be a benign variant of reflex syncope, mostly occurring in children or the elderly. Carvalho et al. reviewed over 2000 head-up tilt test patients, of which 149 cardioinhibitory responses with asystole >3seconds were observed, with no serious events during long term follow-up [5]. Only eleven of these patients were described to have a prolonged (>30seconds) asystole, highlighting the rarity of this phenomenon. Although none of the patients described by Carvalho et al. experienced life-threatening events during long-term follow-up, multiple other cases with prolonged asystole (>30seconds) have been reported to result in polymorphic ventricular tachycardia, ventricular fibrillation, cardiac ischemia, cerebral ischemia, or cerebral white matter lesions, contradicting the claim that a reflex syncope is always benign [6-10].

The current European guidelines recommend discharging patients with a likely reflex or situational syncope when no high-risk features are present. Outpatient evaluation with tilt testing may be considered for recognition of symptoms, in order to educate patients on counter-pressure maneuvers preventing syncope [2]. Tilt testing has a positivity rate of only ~55% in patients with a likely reflex syncope, and therefore lacks in diagnostic value, and would provide no other insights in this case due to the already witnessed syncope while being under continuous cardiac surveillance [11,12]. Syncope patients with negative tilt-test have shown to benefit more from pacemaker therapy as compared to patients with positive tilt-test, therefore tilt-testing our patient could have provided additional information. However, tilt-testing was deemed inappropriate in this case where the patient had a fractured spine. In this case, when adhering to the guidelines, the patient would have been at home when the episode with extremely long asystole occurred, possibly having detrimental consequences.

Options such as a conservative approach and pacemaker implantation were carefully evaluated and discussed with the patient. Conservative treatment for reflex syncope include increasing the patient's salt and fluid intake, using compression garments and taking preventative measures such as sitting down during micturition (which the patient already reported doing). These preventative measures would most likely not have been sufficient in this case as the patient already, unconsciously, took the most important measures (such as sitting down during micturition) into practice. We considered the risks associated with pacemaker implantation to be lower compared to the possible risk of further injuries with recurrent syncope, with or without resuscitation. Additionally, the choice for a dual-chamber pacemaker is supported by clinical studies such as the Third International Study on Syncope of Uncertain Etiology-3 trial and the North American Vasovagal Pacemaker study [13-15].

These studies observed a significant reduction in syncope recurrences after dual-chamber pacemaker implantation with rate-drop response as compared to patients not receiving a pacemaker.

Another option that could have been considered, even though not offered in the treating hospital, was Cardioneural ablation (CNA). CNA has emerged as a promising investigational treatment for patients with severe cardioinhibitory mediated reflex syncope. It involves targeted ablation of autonomic ganglia within the atria, aiming to modify the cardiac vagal innervation, which would prevent excessive bradycardia or asystole. Early studies suggest that CNA can significantly reduce syncope recurrence rates in highly selected patients, however, CNA remains an evolving concept that is not yet part of routine clinical practice [16]. Current data are largely based on small observational studies and limited randomized controlled trials, and there is an ongoing debate about patient selection criteria [17,18]. Furthermore, while the results on syncope recurrence are promising, concerns about procedural risks, including atrial arrhythmias and incomplete denervation, persist. Therefore, current guidelines currently do not recommend CNA outside of clinical trials or specialized centers [2].

Conclusion

Dual-chamber pacemaker prevented recurrence of syncope in this patient with micturition syncope with extreme prolonged asystole. One has to realize that in the wide spectrum of presentations of reflex syncope, extremely long asystole may result in life threatening situations. The precise minimum duration of asystole required to be classified as malignant is not yet known.

Statement of Consent

The authors confirm that informed consent for this publication was provided by the patient in accordance with Committee on Publication Ethics (COPE) best practice guidelines.

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