

Recurrent Asystoles Associated with Vasovagal Reaction during Venipuncture

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A 17-year-old high school student presented with a history of habitual faintings. On 24-hour Holter monitoring, cardiac asystoles were recorded, the longest lasting approximately 7 or 8 seconds during venipuncture procedures. The asystole associated with venipuncture demonstrated the cardioinhibitory effects of vasovagal reaction with blood-injury phobia. He also had a positive response during head-up tilt test showing hypotension and relative bradycardia after intravenous isoproterenol injection. After administration of oral beta blocker, he did not show further or recurrent cardiac asystole during blood injury procedure on electrocardiographic examination.

Venipuncture is the most common invasive medical procedure performed in hospital settings. While venipuncture is considered to be reasonably safe, serious complication may occur even when only a small volume of blood is withdrawn. Therefore, medical personnel should be prepared to provide appropriate care.

Key Words : *Phlebotomy ; Syncope, Vasovagal*

INTRODUCTION

Patients often present themselves to hospitals, clinics and physicians' offices with previous histories of "feeling unwell" or "passing out" at the sight of blood. These warnings are often ignored in the setting of a busy emergency department, where venous blood samples are routinely obtained for diagnostic purposes. The present case, however, demonstrates that vasovagal reaction to blood and injury ("blood-injury phobia") can have profound effects on the heart, including asystole, and that a relatively simple measure might be useful in preventing dire consequences.

CASE

A 17-year-old male presented himself to our hospital

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for an earlier fainting spell 3 days before during rest. He had a history of syncopal attack on a blood injury procedure 3 years ago, and had cardiac surgery for closure of ventricular septal defect 10 years ago. At the time of presentation, vital signs were normal and physical examination revealed no abnormal findings. Electrocardiogram showed complete right bundle branch block. Echocardiogram revealed tricuspid valve regurgitation of mild degree.

On the second hospital day, he complained of dizziness with a pale appearance while a blood specimen was being taken. The Holter recording showed cardiac asystoles, one of which lasted 7 secs (Figure 1). Head-up tilt test revealed hypotension (80/60 mmHg) associated relative bradycardia (72 beats/min) 10 minutes following intravenous administration of isoproterenol (2 ug/min) (Table 1). On the third hospital day, 4-second cardiac asystole was reprovoked by a venipuncture procedure. Electrophysiologic study (EP) for the evaluation of sinus node function and atrioventricular conduction revealed negative finding. Fifty milligrams of atenolol were

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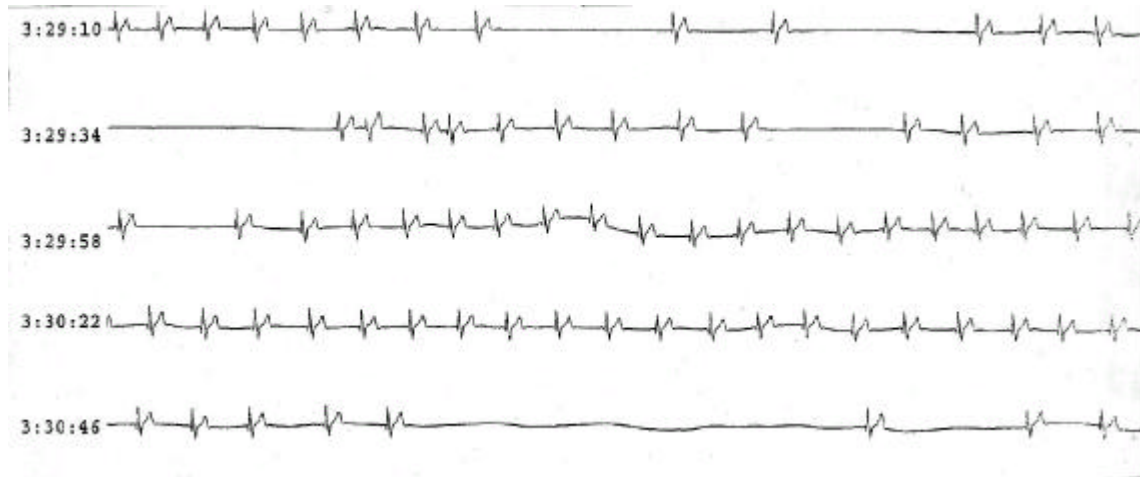


Figure 1. Twenty-four hour Holter monitoring record revealed cardiac asystoles, the longest lasting 7 seconds when the patient complained of dizziness and became pale during a venipuncture procedure.

Table 1. Head-up tilt test showed hypotension with relative bradycardia after intravenous injection of isoproterenol 2 ug/min.

A. Without medication

Position	Time(min)	Blood pressure (mmHg)	Heart rate (BPM)	Comments
supine	0	110/70	100	
60 degree	0	110/70	80	
"	2	120/80	90	
"	4	110/80	95	
"	6	120/80	85	
"	8	120/80	90	
"	10	120/80	90	
"	12	120/80	88	
"	14	120/80	90	
"	16	120/80	90	
"	18	120/80	90	
"	20	120/80	90	

B. With isoproterenol

Position	Time(min)	isoproterenol (μ g/min)	Blood pressure (mmHg)	Heart rate (BPM)	Comments
supine	0	1	110/70	100	
60 degree	0	"	120/80	106	
"	2	"	110/70	100	chest discomfort
"	4	"	100/70	120	
"	6	"	110/70	125	
"	8	"	110/60	121	
"	10	"	110/70	130	
"	12	2	110/60	130	chest discomfort
"	14	"	100/60	117	
"	16	"	100/60	117	dizziness
"	18	"	90/60	90	nausea, dizziness
"	20	"	80/50	72	presyncopal attack

started. Repeated venipuncture failed to provoke cardiac asystole or associated symptoms. He was discharged on oral atenolol. No syncope has been noted at the present time (6 months after discharge).

DISCUSSION

This case illustrates the profound cardioinhibitory effect of the vasovagal reaction to venipuncture. Intense fear of blood is relatively common, amounting to 4.5% of children and adults¹¹. Most other phobics experience a rise in heart rate when encountering their phobic object, and although many feel faint, actual syncope is rare²¹. Vasovagal syncope is a common cause of syncope. The mechanism of vasodepressor reactions remains controversial. Manifestations of symptoms and signs such as pallor, weakness and light headedness are suggestive of decreased peripheral perfusion. It is postulated that an initiating factor is the "fight-or-flight" mechanism, with an increased epinephrine output and an acute rise in blood pressure and pulse pressure. This stimulates baroreceptors, leading to the inhibition of norepinephrine and result in vagal output surge, causing bradycardia, arteriolar dilatation and venodilatation³. An alternative theory, through the Bezold-Jarish reflex, is as follows: upright posture decreases venous return, leading to a drop of blood pressure and a small ventricle. Decreased blood pressure causes increased epinephrine output. This causes the already shrunken ventricle to contract hyperdynamically, thus stimulating intracardiac vagal mechanoreceptors. Any given vasovagal event may be due to either one or both mechanisms⁴. A thorough history and physical examination may be invaluable in searching for the cause of syncope. A variety of diagnostic tests may be performed to document the etiology. The useful diagnostic test for vasovagal syncope is the upright tilt test combining with isoproterenol infusion. This methodology may reproduce profound bradycardia, hypotension, and syncopal symptoms in 87% of patients who have a history of syncope with prior negative EP studies, compared to 11% of those with positive EP testing and 11% of controls. The combination of an increased inotropic state achieved by isoproterenol infusion and a reduced central volume by the upright tilt may accentuate the afferent activity of ventricular mechanoreceptors and result in reflex cardiac slowing and vasodilatation⁵. General measures for the patient

with a history of syncope or presyncope with blood-injury phobia include precautionary EKG monitoring, administration of oxygen and placement in the Trendelenburg position. Lidocaine infiltration of the site of puncture is ineffective in preventing a vasovagal reaction⁶. Atropine is known not to be capable of preventing the drop of blood pressure nor vasovagal syncope during orthostatic stress, which suggests no justification for its routine use⁷⁻⁹. Although epinephrine increases arteriolar and venous tone, it carries the theoretical danger of exacerbating the Bezold-Jarish reflex and of worsening vasovagal reaction⁴. Transcutaneous pacemakers are sometimes efficacious^{10,11}. For severe and frequent cases of vasovagal reactions, permanent ventricular demand pacemakers may be useful¹², only for cardioinhibitory type of carotid sinus hypersensitivity. Cough CPR has been used by coronary angiographers to maintain patient's consciousness in the event of a lethal dysrhythmia¹³. If the patient is instructed to continue coughing at 1 to 3 second intervals throughout episodes of profound bradycardia, asystole, ventricular tachycardia or ventricular fibrillation, no loss of consciousness occurs. This may become a practical use in an emergency department setting. Long-term pharmacological interventions may be beneficial in preventing a vasovagal episode. Cardioselective beta-1 adrenoceptor blockade was used to decrease susceptibility to a vasovagal response¹⁴ and oral theophylline to preventing recurrent vasovagal episodes. But intolerable side effects resulted in poor compliance¹⁵. Disopyramide prevented the recurrence of attack¹⁶ and transdermal scopolamine was effective in normalizing the response of tilt testing¹⁵. Finally, patients with blood-injury phobia can be referred for psychotherapy, including repetitive exposure, biofeedback and behavior modification¹.

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