Original Article

Assessing the adherence to the current guidelines in the management of syncope patients

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Accepted for publication: 10 Oct 2018

Abstract

Background: There exist gaps in the implementation of guideline-recommended treatments and interventions to manage syncope. The present study aimed to investigate the adherence to the current guideline for the diagnosis and management of syncope patients referred to a tertiary center.

Methods: A cross-sectional study was carried out with the study group consisting of 324 consecutive patients, who were diagnosed with unexplained syncope with one or more attacks and were referred for head-up tilt table test (HUTT) between September 2009 and September 2011 to Tehran Heart Center. All the patients underwent a thorough evaluation, including a careful medical history and physical examination as well as a thorough history of all procedures performed before referral. The data collected was compared between patients with positive and negative HUTT results and also based on the referring physician, in order to assess the deviation from syncope guideline in their management. We compared the selected groups using a chi-square test for categorical variables and student t-test or analysis of variance (ANOVA) for continuous variables where appropriate.

Results: A total of 324 patients with a Mean (SD) age of 41.04 (17.74) years were enrolled in the study (158 patients, i.e. 48.8%, were male). HUTT was positive in 181 (55.8%) patients. Brain computed tomography scan and coronary angiography were performed more in the initial assessment of the patients with a negative HUTT compared with patients with negative HUTT (P=0.001 and P=0.01, respectively). Significantly higher rates of brain MRI (P=0.01), brain imaging (P=0.03), and electroencephalography (P=0.002) were observed among the neurologists' referrals while echocardiography (P<0.001), exercise tolerance test (P=0.001), electrocardiogram Holter monitoring (P<0.001), and coronary angiography (P=0.02) were significantly more performed in patients referred by a cardiologist.

Conclusion: We observed a noticeable deviation from the current guideline for the management of syncope although the patients underwent expensive tests with little benefit.

Keywords: Coronary Angiography; Exercise Test; Physical Examination; Syncope; Tilt-Table Test

Cite this article as: Rahnamoon Z, Shafiee A, Jalali A, Sadeghian S. Assessing the adherence to the current guidelines in the management of syncope patients. SDH. 2018;4(1):154-161. DOI: https://doi.org/10.22037/sdh.v4i3.17203

Introduction

Syncope is defined as a transient global cerebral hypoperfusion followed by a spontaneous recovery (1). Almost 40% of the adult population experience at least one syncope episode through their lifetime and 1%-3% of emergency rooms visits are due to syncope attacks (2, 3). Syncope is classified into subgroups based on its etiology and, therefore, head-up tilt-table test (HUTT) can help much to find out its etiology (4). It has been observed that the response to the HUTT is associated with age (5); therefore, great care should be taken regarding the management of syncope patients in various age groups. However, current policies for diagnosis of syncope vary widely among clinicians and among hospitals and range from simple methods to invasive measures (6, 7).

The management policy and model of care delivery for syncope should be most compatible with the existing practice and resources. The extent of screening prior to admission to the health care center, referral sources, and age of the patients are issues that can alter the model of care delivery (6). However, current evidence revealed that the management of patients with syncope who referred urgently to emergency department of general hospitals is not standardized (8, 9). As syncope is a frequent condition, performing unnecessary tests imposes extra costs on the health care system without any significant benefit. Therefore, the Task Force for the Diagnosis and Management of Syncope of the European Society of Cardiology (ESC) in collaboration with European Heart Rhythm Association, Heart Failure Association, and Heart Rhythm Society has prepared evidence-based Guidelines for the diagnosis and management of syncope. However, it seems that there exist gaps in the implementation of guideline recommended treatments and interventions to manage syncope. Hence, the degree of adherence to this guideline is still a challenge. The current study aimed to investigate the adherence to current ESC guidelines for the diagnosis and management of syncope patients who referred to a tertiary referral heart center.

Methods

A cross-sectional study was conducted and the study group consisted of 324 consecutive patients diagnosed as having unexplained syncope with one or more attacks and were referred for HUTT to Tehran Heart Center, Tehran, Iran, for further evaluation between September 2009 and September 2011. The inclusion criterion was referral to Tehran Heart Center for syncope management and no exclusion criterion was considered. A careful medical history was obtained followed by physical examination for all patients and supine and orthostatic blood pressures were measured according to the European Society of Cardiology Task Force on Syncope (10). We also asked the patients about their previous diagnostic tests before referral to our center and checked for their availability. Patients with potential signs and symptoms of the orthostatic hypotension were excluded. The protocol for our study was reviewed and approved by the institutional committee of Medical Ethics and the Cardiology Research Board of Tehran University of Medical Sciences, Tehran, Iran. All of the patients signed an informed written consent and gave permission for the anonymous use of their data for clinical research reasons.

Head-up tilt table testing

The HUTT was performed by means of an electrically controlled tilt table with a foot board for weight bearing using Task Force® hemodynamic monitor 3040i (CNSyetems Medizintechnik, Graz, Austria). Patients' hemodynamics, including blood pressure, heart rhythm, and rate, were continuously monitored and recorded according to a two-stage tilt protocol with nitroglycerin provocation.

HUTT was performed after an initial observation with the patient in the supine position for 10 minutes.

The test consisted of two consecutive stages based on the protocols of the European Society of Cardiology. In the first stage, the patients were tilted at 70˚ for 20 minutes with no medication and control of the heart rate and 3-lead electrocardiography. We continuously and non-invasively monitored the blood pressure during the HUTT. In case of the development of syncope or limiting symptoms, we rapidly stopped the test and returned the patient into supine position. Otherwise, the patients entered stage 2 where they received 400 micrograms sublingual nitroglycerin and continued to be titled for another 20 minutes. In case of the occurrence of syncope or limiting symptoms during the active phase, we promptly halted the HUTT, returned the patient to the supine position, and terminated the study.

Based on the collapse pattern, we considered five potential outcomes for HUTT: four sub-classes of the positive result, and a negative result. Positive tests were classified according to the Vasovagal Syncope International Study (VASIS) classification (11) as follows: 1) mixed type; 2) cardioinhibitory types 2A and 2B, and, type 3 or vasodepressor type.

Finally, the collected data regarding previous diagnostic and clinical measures were compared between the patients who were referred by a cardiologist versus a neurologist. We also compared the data between patients with positive and negative HUTT results.

We summarized the continuous data and categorical data using mean (SD) and frequency (percentages), respectively, Moreover, we compared the selected groups using a chi-square test for categorical variables and student t-test or analysis of variance (ANOVA) for continuous variables where appropriate. A *P* value <0.05 was considered as statistically significant. Statistical analysis was performed using PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc.

Results

During the study period, 324 patients (Male=158 (48.8%), Mean (SD) age=41.04 (17.74) years) suspicious for syncope were referred to our center for further evaluations. There was no significant finding in the brain imaging of these patients that could help identify the etiology of syncope. Based on the results of echocardiography, 11 patients had left ventricular concentric hypertrophy (10 mild-degrees and one moderate-degree) and moderate left ventricular dysfunction was observed in three patients. The valvular abnormalities observed in echocardiography included 14 cases of mitral valve prolapse, five cases with mild aortic insufficiency, four cases with mitral regurgitation, two cases with mild mitral prolapse, and two cases with moderate tricuspid regurgitation. Nevertheless, none of these findings could be linked to syncope. Among patients who had been evaluated by coronary angiography, five patients had significant coronary artery disease four of whom were advised for medical treatment and one was consulted for percutaneous coronary angioplasty. The results of angiography were unlikely to elucidate the cause of syncope. Out of eight patients who had undergone electrophysiologic study, only one had atrioventricular nodal reentrant tachycardia who was treated via radiofrequency catheter ablation but continued to have syncope attacks and thus referred for further evaluation. Only 49 (15.1%) individuals had previously underwent HUTT and only three (0.9%) patients were tested using carotid massage. General characteristics of the study population at the time of admission are summarized in Table 1.

Table 1. Baseline characteristics of the study population and subgroups based on the HUTT result

Variable*	HUTT (-) (N=143) Mean (SD)	HUTT (+) (N=181) Mean (SD)	Total (N=324) Mean (SD)	*P*†
Age (year)	42.8 (17.7)	39.6 (17.6)	41.0 (17.7)	0.1
BMI (Kg/m^2)	26.2 (4.3)	24.8 (5.0)	25.45 (4.78)	0.009
	N (%)	N (%)	N (%)	
Male gender	76 (53.1)	83 (45.9)	158 (48.8)	0.19
Past medical history				
Diabetes	10 (7.0)	9 (5.0)	19 (5.9)	0.14
Dyslipidemia	28 (19.6)	23 (18.2)	61 (18.8)	0.18
Hypertension	34 (23.8)	26 (14.4)	60 (18.5)	0.03
Smoking	21 (14.7)	14 (7.7)	35 (10.8)	0.03
Anemia	42 (29.4)	44 (24.3)	86 (26.5)	0.27
Chronic kidney disease	7 (4.9)	4 (2.2)	11 (3.4)	0.08
Myocardial infarction	12 (8.4)	5 (2.8)	17 (5.2)	0.01
Pacemaker	2 (1.4)	0 (0)	2 (0.6)	0.19
Arrhythmia‡	12 (8.4)	9 (5.0)	21 (6.5)	0.09
Valvular heart disease	16 (11.2)	8 (4.4)	24 (7.4)	0.02
Cerebrovascular accident	2 (1.4)	4 (2.2)	6 (1.9)	0.1
CPR	2 (1.4)	1 (0.6)	3 (0.9)	0.14
Family history				
Family history of syncope	13 (9.0)	17 (9.3)	30 (9.2)	0.85
Family history of seizure	10 (7.0)	8 (4.4)	18 (5.5)	0.35
Family history of sudden cardiac death	13 (9.0)	15 (8.2)	28 (8.6)	0.86
Previous measures				
Referred by a cardiologist	89 (62.2)	125 (69.1)	214 (66.0)	0.42
Referred by a neurologist	19 (13.3)	21 (11.6)	40 (12.3)	0.42
Neurologic consult	95 (66.4)	106 (58.5)	201 (62.0)	0.21
Psychiatric consult	19 (13.2)	14 (7.7)	33 (10.2)	0.1
Brain MRI	60 (41.9)	72 (39.7)	132 (40.7)	0.78
Brain CT scan	66 (46.1)	50 (27.6)	116 (35.8)	0.001
Brain imaging	90 (62.9)	95 (52.4)	185 (57.1)	0.09
EEG	80 (55.9)	94 (51.9)	174 (53.7)	0.61
Echocardiography	109 (76.2)	134 (74.0)	243 (75.0)	0.95
Exercise tolerance test	49 (34.2)	50 (27.6)	99 (30.6)	0.21
ECG Holter	71 (49.6)	66 (36.4)	137 (42.3)	0.03
Electrophysiologic study	3 (2.1)	5 (2.8)	8 (2.5)	0.69
Orthostatic hypotension evaluation	14 (10.2)	19 (11.0)	33 (10.2)	0.82
Carotid sinus massage	3 (2.1)	0 (0)	3 (0.9)	0.08
Coronary angiography	34 (23.8)	23 (12.7)	57 (17.6)	0.01
HUTT	27 (18.8)	22 (12.1)	49 (15.1)	0.1
Carotid ultrasonography	12 (8.4)	13 (7.1)	25 (7.7)	0.7

BMI: Body Mass Index, CPR: cardiopulmonary resuscitation, CT: computed tomography scan; ECG: Electrocardiography; EEG: Electroencephalography; HUTT: head-up tilt table test; MRI: Magnetic resonance imaging.

*Continuous variables are shown as mean (SD) while categorical data are shown as frequency (percentage).

†$P<0.05$ was considered as significant.

‡Included premature ventricular contraction and one case of atrioventricular nodal reentrant tachycardia

All patients were tested using HUTT and the test was positive in 181 (55.8%) patients. In patients with a positive test result, 61 (33.7%) had mixed type response, 25 (13.8%) cardioinhibitory type-A, 46 (25.4) patients cardioinhibitory type-B, and 49 patients (27.1%) had vasodepressor response. As depicted in Table 2, Body Mass Index (BMI) was significantly higher in patients with a negative test result (P=0.009). Moreover, hypertension, smoking and history of myocardial infarction were significantly more frequent in negative HUTT group (P=0.03, P=0.03, and P=0.01, respectively). Presence of valvular heart disease was significantly higher in patients with negative HUTT (P=0.02). Comparison of the groups based on the results of the HUTT showed that brain CT scan and coronary angiography was more performed before referral in patients with a negative HUTT (P=0.001 and P=0.01, respectively). The electrocardiogram (ECG) Holter monitoring was reported as normal in 116 (84.6%) of the patients, while in 21 (15.3%) patients rare premature ventricular contractions (PVCs) was observed. However, the findings of the ECG Holter monitoring did not help in diagnosing the etiology of syncope.

In the sub analysis based on the referring physician, it was observed that the patients who were referred by a cardiologist were significantly older (P<0.001) and there were more males in this subgroup (P=0.01). Significantly higher rates of brain MRI, brain imaging, and electroencephalography were observed in patients who were referred by a neurologist (Table 2). Contrary to this, the rates of echocardiography, exercise tolerance test, ECG Holter monitoring, and coronary angiography were significantly higher in patients who were referred by a cardiologist. However, there was no difference between the subgroups regarding the final result of HUTT performed at our center.

Discussion

Diagnosis of syncope is still a challenge in the current clinical practice. Despite the availability of guidelines for the management of syncope, extensive practice variations exist and patients may undergo expensive diagnostic measures without any apparent benefit (7, 12). In the present study, we observed that patients may undergo unnecessary clinical testing or may not be tested with essential and elemental measures. We also found out that the management of syncope patients who referred to our center was mostly dependent on the clinician's decision and his specialty rather than being consistent with the guidelines.

A wide variety of etiologies, diagnostic tests, and treatment options, as well as diversity in clinical practice have complicated the management of syncope (13). One reason for this diversity is that not all centers are specialized for syncope and another reason is the unawareness or slackness to use uniform algorithms and guidelines for the management of syncope in many centers (14). Our results confirm the previous findings and show how clinicians may undervalue the important role of using HUTT and even a simple test such as carotid massage in the assessment of a syncope patient.

HUTT is an important, non-invasive, and almost inexpensive test for syncope patients (15). The diagnostic yield of tilt table testing in the first admission of a syncope patient has been estimated to be about 47% (16). However, availability of the test is limited and its results should be interpreted in an experienced clinical setting (17). These would result in the low number of patients who undergo HUTT in their initial evaluations, as observed in our study.

It is documented that the final decision for the syncope patients is made based on the physician's personal clinical experience which is not necessarily derived from protocols and guidelines (18).

Table 2. Comparing the previous measures between the study groups based on the referring physician

Variable*	Cardiologist (n=214)	Neurologist (n=40)	*P*†
	Mean (SD)	Mean (SD)	
Age (year)	42.6 (17.9)	32.7 (12.7)	<0.001
	N (%)	N (%)	
Male gender	116 (54.2)	13 (32.5)	0.01
Brain MRI	76 (35.5)	23 (57.5)	0.01
Brain CT scan	70 (32.7)	15 (37.5)	0.69
Brain imaging‡	112 (52.3)	29 (72.5)	0.03
EEG	104 (48.5)	31 (77.5)	0.002
Echocardiography	176 (82.2)	11 (27.5)	<0.001
Exercise tolerance test	67 (31.3)	3 (7.5)	0.001
ECG Holter	92 (43.0)	5 (12.5)	<0.001
Electrophysiologic study	5 (2.3)	0 (0)	0.59
Orthostatic hypotension evaluation	24 (11.2)	2 (5.0)	0.2
Carotid sinus massage	3 (1.4)	0 (0)	0.99
Coronary angiography	41 (19.1)	2 (5.0)	0.02
HUTT	27 (12.6)	4 (10.0)	0.56
Carotid ultrasonography	14 (6.5)	2 (5.0)	0.65
Psychiatric consult	18 (8.4)	6 (15.0)	0.23
Positive HUTT result	125 (58.4)	21 (52.5)	0.34

CT: computed tomography scan; ECG: Electrocardiography; EEG: Electroencephalography; HUTT: head-up tilt table test; MRI: Magnetic resonance imaging.
*Continuous variables are shown as mean (standard deviation) while categorical data are shown as frequency (percentage).
† P<0.05 was considered as significant.
‡ Included brain CT, MRI, or both.

Thus, it seems that syncope patients undergo expensive and time consuming diagnostic tests that have little benefit for them and conversely are deprived from simple inexpensive tests that may play a key role in their diagnosis. This has also been documented in a recently published study that showed telemetry, ambulatory electrocardiography monitoring, and serum levels of cardiac markers were frequently ordered for the evaluation of syncope, despite their low diagnostic yield (19).

Based on our findings, there was a noticeable difference in the previous management of the patients who were referred by a cardiologist versus a neurologist. Brain imaging, in the form of brain CT scan or MRI, was performed significantly more in patients who were referred by a neurologist. According to the guideline, brain imaging is considered in the third level of evaluation, particularly in patients who are likely to have a non-syncopal cause for the loss of consciousness (10). As the syncope continued and the brain imaging did not help to identify the cause in these patients, patients were referred for further evaluation to our center. The high rate of brain imaging in our study, as compared with the previous ones (7, 20), is a good indicator to show that brain imaging was requested inappropriately, with no considerable benefit in finding out the etiology of syncope.

On the other hand, cardiac diagnostic measures were more performed in referrals by a cardiologist, although not all of these differences were statistically significant. For instance, echocardiography was performed in 75% of cases in our study, while Brignole et al. and Mendu et al. reported a frequency of 38% and 39%, respectively (7, 20). According to the ESC guideline, echocardiography should be done in cases with a high suspicion to structural cardiac diseases, but our results showed that 55.8% of patients had neurocardiogenic syncope and thereby echocardiography could not help to identify the real cause of syncope.

The current study was performed in a tertiary referral center for cardiovascular diseases; therefore, it is probable that syncope cases who were referred to our center were more complicated or had unusual symptoms and signs. Conversely, we are unaware of the management of cases who were diagnosed at primary care levels. A multi-center study, including primary health care centers and comparison of the centers based on the level of care would clarify this point better.

In the present study, we observed a noticeable deviation from the current guideline for the management of syncope patients. Although head-up tilt table test and carotid massage are useful diagnostic measures for syncope patients, clinicians (non-cardiologists) did not utilize them routinely. On the contrary, more specific tests with lower diagnostic values, such as brain imaging and echocardiography, were performed more, without any considerable benefit in discovering the etiology of syncope. We believe investment on continuous medical education in the field of syncope management is crucial in current clinical practice in order to reduce the use of unnecessary and expensive diagnostic modalities.

Acknowledgements

The present study was supported by Tehran Heart Center and Tehran University of Medical Sciences. This work is based on the thesis by Dr. Zahra Rahnamoon to obtain a degree on cardiology specialty.

Conflict of interest

Authors declare no conflict of interests.

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