Syncope: Clinical Study and Outcome of Diagnostic Evaluation

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Abstract

Background: Syncope is a common clinical presentation in emergency department. The diagnostic workup for syncope causes significant man-hour loss and expensive investigations. Most often the battery of investigations does not lead to any conclusive diagnosis.

Materials and Methods: This was a descriptive study in which included 50 consecutive patients with the diagnosis of syncope. These patients were admitted to a tertiary care hospital between Sep 2009 to Aug 2011. Patients of both sexes above 12 years of age were included in the study. The patients were evaluated on the basis of history, clinical examination, ECG, TMT (for exertional syncope), 2DECHO, HUTT, Holter monitoring and EEG.

Results: Mean age of males were 46.11 yrs and that of females were 41.33 years (confidence interval 95%). Out of 50 patients, 38 were males and 12 were females. The percentages of co morbidities in our sample population were CAD- 6.90%, CVA- 1.72%, Hypertension- 17.24%, APD-1.72%, Dyslipidemia- 3.45%, Hypothyroidism- 3.45%, RHD with Mitral Stenosis- 1.72%, Type 2 Diabetes Mellitus- 5.17% and no co morbidities in 55.17%. Out of 50 patients 30% had some or the other diagnosis rest 70% patients had no definitive diagnosis. 90% of the patients had cardiogenic syncope and rest 10% had non-cardiogenic syncope. None of the patients in our sample population had orthostatic hypotension. In our study 15 (30%) patients had history of recurrent syncope. On evaluation with ECG, 4 patients had Bundle Branch Block rest 46 had normal ECG. In 96% of the patients 2 DECHO was normal. Holter monitoring revealed Supraventricular tachycardia only in 2 patients. Out of 15 patients of explained syncope 10 had positive HUTT (66.7%) whereas 5 had negative HUTT (33.3%); compared to 35 patients with unexplained syncope HUTT was inconclusive. Neurological evaluation revealed no abnormal EEG though it was our exclusion criteria.

Conclusion: While evaluating syncope most often the battery of investigations does not lead to any conclusive diagnosis. There was male predominance in presentation. Out of 50 patients 10% had cardiogenic, 20% had neurocardiogenic and in 70% diagnosis was not established. Only 20% had HUTT positive. Echocardiography is the investigation of choice in patients of valvular heart disease. A thorough clinical evaluation is must, investigations are of limited value.

Editorial Viewpoint

- The findings of our study were well correlated with other studies.
- In recurrent syncope Holter monitoring has got definite added advantage.
- The predictive value of HUTT is not 100%.

Introduction

Syncope is a transient loss of consciousness and postural tone with spontaneous recovery and no neurological sequelae. Syncope is a common clinical problem that affects up to 3.5% of the general population. In 40% of cases presented with syncope the exact cause remains elusive. Approximately 30% of affected patients experience recurrent episodes. Syncope is caused by a decrease in perfusion to the reticular activating system in the brainstem which supports consciousness. Most often it occurs while standing. In the standing position blood pressure and blood flow to the brain are critically dependent on a normally functioning cardiovascular system. Abnormalities in cardiac output or in autonomic reflexes controlling blood pressure may cause syncope. Further complicating the appropriate diagnosis, some patients may present with pre-syncope, an often ill-defined
transient episode of altered consciousness accompanied with features of autonomic abnormality. Syncope causes significant loss of man-hours and costly investigations.

The aims and objectives of the study were:

- To evaluate and determine the cause in 50 consecutive patients who presented with syncope and admitted to a tertiary care hospital.
- To describe the various epidemiological variants e.g. age and sex distribution and various co-morbid conditions among patients presenting with syncope.
- Role and outcome of HUTT (Head Up Tilt Test) in determining the cause of syncope.

**Material and Methods**

This study was undertaken in 50 consecutive patients admitted in a tertiary care hospital with history of syncope between Sep 2009 to Aug 2011. The aim was to study the clinical profile and evaluate the outcome of various diagnostic tools e.g. ECG, 2DECHO, HUTT, TMT, Holter and EEG.

1. Place of study: The study was carried out at a tertiary care hospital in India.
2. Study Population: This was a descriptive study. The sample study included 50 consecutive patients with the diagnosis of “SYNCOPE” reported to a tertiary hospital between Sep 2009 to Aug 2011 (02 Years). The study population comprised of patients of both sexes above 12 years of age. These patients were evaluated on the basis of history, clinical examination, ECG, TMT, 2DECHO, HUTT, Holter monitoring and EEG.
4. Target Population: Employees and their dependents or cases referred to this hospital from various service hospitals.
5. Sample Population: A total of 50 patients were drawn from target population.
6. Performa Variables
   i. Baseline Characteristic:-
      a. Age,
      b. Sex,
      c. History of smoking,
      d. Anemia,
      e. Malnutrition,
      f. Hypertension,
      g. Diabetes Mellitus
   ii. Investigations:-
      a. ECG
      b. Echocardiography
      c. TMT
      d. HUTT
      e. Holter monitoring
      f. EEG
7. Inclusion Criteria
   The patients above 12 years of age with history of syncope were included in the study.
8. Exclusion Criteria
   a. Known seizure disorder
   b. Seizure recurrence
   c. Pre-syncpe
   d. Dizziness without clear loss of consciousness

**Results**

In an effort to evaluate the patients admitted with history of syncope, a total of 50 patients were evaluated, out of which 12 (24%) were females and 38 (76%) were males. The mean age of males were 46.11 years and that of females were 41.33 (confidence interval 95%). The P value was 0.432 (>0.05) i.e. this difference was not significant (Table 1).

Some patients had single and others had multiple co-morbidities with 3.45% functional (Depression) disability. The percentages of other co-morbidities (Table 2) in our sample population were Coronary Artery Disease- 6.90%, CVA- 1.72%, Hypertension-17.24%, Acid Peptic disease- 1.72%, Dyslipidemia- 3.45%, Hypothyroidism- 3.45%, Rheumatic Heart Disease with Mitral Stenosis 1.72%, Type 2 Diabetes Mellitus- 5.17% and no co-morbidities in 55.17%. Out of 50 patients 30% had some or the other diagnosis rest 70% had no definite diagnosis. 90% of the patients had cardiogenic syncope and 10% had non cardiogenic syncope. None of the patients had orthostatic hypotension.

15 patients of the study population had history of recurrent syncope. Out of these 15 patients who had history of recurrent syncope, 11(73.3%) were less than 60 years of age while 4 (26.7%) were more than 60 years of age compare to 35 patients with no history of recurrent syncope, 27 (77.1%) were less than 60 years of age and 8 (22.9%) were more than 60 years of age.

On routine evaluation 12 (24%), patients had haemoglobin less than 10 g/dl. On CVS evaluation none of the patients had carotid bruit. On evaluation with ECG, 4 patients had Bundle Branch Block and rest 46 patients had normal...
ECG. 4 patients had CAD and one had Brugada syndrome (Right Bundle Branch Block pattern with ST elevation in leads V1 to V3).

Echocardiography of the patients revealed normal ECHO in 48 (96%), 1 (02%) patient had RWMA (Regional Wall Motion Abnormality) and 1 (02%) patient was suffering from Severe Mitral stenosis. Out of the study population 2 patients had exertional syncope in which stress test was negative. On Holter monitoring 2 patients had SVT (Supraventricular Tachycardia).

Out of 15 patients of explained syncope 10 had HUTT positive (66.7%) (Table 3) whereas 5 had negative HUTT (33.3%) compared to 35 patients with unexplained syncope HUTT was inconclusive. 15 patients with history of recurrent syncope 4 (26.7%) were HUTT positive while 11 (73.3%) were HUTT negative. Out of 35 patients with no history of recurrent syncope 6 (17.1%) were HUTT positive while 29 (82.9%) had negative HUTT.

Neurological evaluation revealed no abnormal EEG though it was our exclusion criteria.

**Discussion**

Syncope is a common clinical presentation of varied aetiology. In our study population mean age of males were 46.11 years and that of females were 41.33 years (confidence interval 95%). The P value was 0.432 (>0.05) i.e. this difference was not significant. There was no correlation between age of the patient and history of recurrent syncope (P value 0.773). In contravention to our study, the findings of Olde Nordkamp et al.3 (Am J Emerg Med 2009; 27, Soteriades ES et al: NEJM 2002; 347, Moya A and Sutton R et al:5 Eur Heart J 2009; 30) women are more likely than men to report such an episode. The reason in our case could be young patients with prolong standing while at work.

Most of the patients in our study had no co-morbidities. Some had single and others had multiple co-morbidities with 3.45% had functional (Depression) problem. In our study none of the patients had orthostatic hypotension. In our study population 10% of the patients had orthostatic hypotension. Another study by Atkins D, Hanusa B et al5 revealed 31% of patients with syncope had orthostatic hypotension. In 90% of the patients this was apparent within 02 min of standing upright.

In our study population only 15 (30%) had definitive diagnosis. rest 35 (70%) had unexplained syncope. No definitive diagnosis was established in 54.4% of the patients in OESIL 2 (Osservatorio Epidemiologico della Sincope nel Lazio) study7. This variation in statistics is due to our study population (serving soldiers) admitted with history of syncope. In the study population 10% of our patients had Cardiogenic syncope whereas in Framingham Heart Study conducted from 1971 to 1998, the most frequently identified causes were vasovagal (21.2 percent), cardiac (9.5 percent), and orthostatic (9.4 percent). In 36.6 percent of the cases the cause was unknown.

In our series three or more episodes of syncope were considered as recurrent syncope. Out of 50 patients 15 had history of recurrent syncope, 11 (73.3%) were less than 60 years of age while 4 (26.7%) were more than 60 years of age compared to 35 patients with no history of recurrent syncope, 27 (77.1%) were less than 60 years of age and 8 (22.9%) were more than 60 years of age. Syncope may be the presenting symptom in elderly with acute MI. It rarely occurs with Coronary artery spasm and Aortic dissection. In our study 12 patients (24%) had anemia (haemoglobin less than 10 mg/dl), which could be the precipitating factor associated with valvular heart disease or congestive cardiac failure to cause syncope.

The carotid impulse may reveal evidence for aortic stenosis but a carotid bruit does not provide a direct cause of syncope. In our study none of the patients had carotid bruit.

On evaluation through ECG, 4 patients had bundle branch block and rest had normal ECG. 4 patients had CAD. Although the diagnostic yield of ECG was very low (5%), it is recommended in all patients of syncope since the test is risk free and relatively inexpensive. The evaluation of haematological and biochemical parameters are not of much help in discerning the cause. The random blood sugar level may indicate hypoglycaemia as cause.

2D echocardiography is an important tool to reveal valvular pathology (stenotic or regurgitant lesions). In our study most of the patients (96%) had normal echocardiography, one had RWMA with severe Left ventricular dysfunction (02%) and another had severe Mitral stenosis.

In our series Logistic Regression for cardiogenic syncope as dependent variable and ECG, 2DECHO, and past history of cardiovascular co-morbidities revealed no significant association between these tests and cardiogenic syncope. Valvular heart Disease constituted only 1.72%. The cause of syncope was severe Mitral Stenosis. Two patients had exertional syncope.
in which stress test was negative and in two patients it was not done because of contraindication (one had severe LV dysfunction and another had severe Mitral stenosis). It might precipitate complications like pulmonary oedema. Stress test (TMT) is indicated in patients who had history of Angina and had exertional syncope. TMT indicates ischemic event even though it is highly unlikely that it will induce syncope. Holter monitoring is a continuous ECG recording. Holter is indicated in patients in whom Ventricular Tachycardia or other rhythm disturbance is suspected. As per the study of Mark Linzer et al the Holter monitoring is non diagnostic in over 90% of cases. In our study out of 50 patients only 2 patients had supraventricular tachycardia rest 48 (96%) patients had normal Holter.

The main indication of HUTT is to investigate the vasovagal syncope. In our study the tilt angle was kept 70 degrees with duration of 50 minutes. Fitzpatrick et al have suggested tilt duration of 45 minutes⁹. Keeping with this result, tilt duration of 50 minutes would seem appropriate since it would encompass mean ± 2 SD. Blood pressure was measured at 5-minute intervals by an automated non-invasive blood pressure monitor. Blood pressure was also taken whenever patients reported symptoms. Passive head up tilt produces a significant reduction in central blood volume and this is known to trigger the vasovagal reaction¹⁰. In our study, out of 50 patients, 10 (20%) had HUTT positive while rest 40 (80%) had HUTT negative. Of 15 patients of explained syncope 10 had HUTT positive (66.7%) whereas 5 had negative HUTT (33.3%) compare to 35 patients with unexplained syncope HUTT was inconclusive (0%). Orthostatic intolerance in this condition has been associated with decreased peripheral vasoconstriction during orthostatic stress. All 35 patients had HUTT negative. 15 patients with history of recurrent syncope 4 (26.7%) were HUTT positive while 11(73.3%) had HUTT negative. Out of 35 patients with no history of recurrent syncope 6 (17.1%) had HUTT positive while 29 (82.9%) had HUTT negative. The association between history of recurrent syncope and HUTT positivity was not significant (P value >0.05). The fact that nearly 50% of patients with unexplained syncope had a positive tilt table test suggests that a neural mechanism is involved in its aetiology since prolonged upright tilt is known to trigger the vasovagal reaction¹⁰. The incidence of positive tests was higher in patients with recurrent syncope further supports a neural pathogenetic mechanism.

Neurological causes should be considered in patients with syncope, although syncope is an unusual manifestation of neurological diseases. In our study none of the patients had abnormal EEG, though it was our exclusion criterion (Patients with history of seizures were excluded from the study). Several studies¹¹–¹³ conclusively showed that EEG monitoring was of little use in unselected patients with syncope. In the absence of a history of seizure activity, electroencephalography has provided few diagnoses in more than 500 patients reported in the literature. Electroencephalography is not recommended for patients with routine syncope evaluation and may only be beneficial in patients with a history of seizures.

Conclusion

Syncope is a common clinical presentation in emergency department. In most of the patients the cause of syncope could not be established. HUTT is an important diagnostic tool in vasovagal syncope though the predictive value of HUTT is not 100%.

Echocardiography is the investigation of choice in valvular pathology. Dysautonomia and polypharmacy are much more common in elderly patients. It is therefore concluded that proper history taking and clinical examination are the most important steps in establishing the cause. Investigations are of limited value.

**Abbreviations**

CAD-Coronary Artery Disease; ECG-Electrocardiography; 2DECHO-2 Dimensional Echocardiography; TMT-Treadmill Test; HUTT-Head Up Tilt Test; EEG-Electroencephalography; APD-Acid Peptic Disease; RHD-Rheumatic Heart Disease; CVA-Cerebro Vascular Accident; HTN-Hypertension.

**References**