



Syncope

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Case Presentation - A 51 year-old gentleman, a lifetime non-smoker, had enjoyed good past health except diabetes mellitus for 10 years well controlled on diet. He presented 4 years ago to a local hospital for symptoms of heart failure. His symptoms were recent in onset and progressive in severity. CXR on presentation showed cardiomegaly and pulmonary oedema. Echocardiogram showed dilated and poor global left ventricular systolic function and mild functional mitral regurgitation. Basic blood screening and cardiac enzymes were normal. There was no evidence suggestive of viral carditis. Coronary angiogram showed normal coronary arteries. His symptoms responded to medical treatment promptly and regained full functional capacity at NYHA functional class 1 to 2. Over the past 4 years, he was put on optimum heart failure treatment regime including maximum B-blockade and remained compliant to medical treatment. Serial echocardiographic study was similar to initial assessment. 4 years from initial presentation, patient was found collapsed at home and failed resuscitation.

Syncope and Sudden Cardiac death

"The only difference between syncope and sudden death is that in one you wake up!"¹

Syncope can be a common clinical manifestation of highly variable and complex etiologies. It can vary from a benign condition with no significant morbidity, eg. vasovagal syncope, to a herald of a highly lethal condition, eg malignant arrhythmias. How to confidently differentiate the two remains a challenge. The aim of this article is to give some hints in identifying the high-risk candidates.

Evaluation of syncope starts with a careful history and physical examination. Detail enquiry of symptoms, presence of significant medical illness, presence of other life-threatening causes and family history of unexplained premature death often give important clues to the diagnosis. A diagnosis was made in over 60% of patients following the initial assessment and physical examination.^{2,3}

Clinical risk factors

Syncope happening in a young lady after prolonged standing, in particular, in quiet environment suggests benign vasovagal phenomenon.

Several retrospective analyses on sudden cardiac arrest victims had identified various clinical risk factors. The most important and consistent predictors include

coronary artery disease. Acute myocardial ischaemia and infarcted scars significantly increased the risk of out-of-hospital cardiac arrest. Increased voltage on EKG and left ventricular hypertrophy increase risk of malignant arrhythmias. Age is another important risk factor for sudden cardiac death (SCD). Syncope occurring in older patients is less likely vasovagal. The incidence of SCD increases with age. Most of the sudden deaths in the United States occur in patients 75 years and older. Advanced age is also associated with various classical risk factors for coronary artery disease.

Diagnostic Testing

No standard protocols of tests are available or indicated for evaluation of syncope. Diagnostic testing should be ordered, based on the initial clinical evaluation.

Electrocardiogram A resting EKG is one of the most important investigations and is essential in evaluating unexplained syncope. Table 1 showed the important EKG changes that suggest arrhythmic syncope.

Table 1. EKG Abnormalities Suggesting an Arrhythmic Syncope

Bradycardia and Heart Block
Sinus pauses (>2 sec) or symptomatic sinus bradycardia
Second-degree AV block
Bifascicular block (defined as LBBB or RBBB combined with left anterior or left posterior fascicular block)
Other intraventricular conduction abnormalities (QRS duration ≥0.12 second)
Abnormal QRS or QT
Preexcited QRS complexes or WPW syndrome
Prolonged QT interval
RBBB pattern with ST elevation in leads V1 to V3 (Brugada syndrome)
Negative T waves in right precordial leads, epsilon waves and ventricular late potentials suggestive of arrhythmogenic right ventricular dysplasia
Q waves suggesting myocardial infarction
Left ventricular hypertrophy
Ectopies or tachyarrhythmias
Polymorphic VPC's
Non-sustained or sustained VT
Atrial fibrillation (Paroxysmal AF or AF with slow ventricular response)

Ambulatory EKG

Several forms of ambulatory EKG are available in practice. The most common type is 24-hour Holter monitoring. The yield of this type is dependent on the duration of monitoring and the pre-test likelihood of any significant arrhythmias. It is highly variable, ranging from 2-20%.⁶⁻⁸

Another form of ambulatory rhythm monitoring is



wearable event recorder. It can be a small box or card that patient can activate when symptoms occur. The limitation is obviously the inability to record if syncope is not associated with prodrome or if it happens rapidly before any action can be taken.

An implantable loop recorder is a useful tool for detecting infrequent attacks when a 24-hour Holter cannot detect any arrhythmia. It is a small device implanted subcutaneously, most commonly in the pectoral region. Battery longevity is about 14-17 months. When significant tachy- or bradyarrhythmia can be recorded or clinical diagnosis made, the ILR can be explanted. A new device can be implanted in the same site as indicated.

Upright Tilt Testing

The tilt table test is a commonly performed test for the evaluation of syncope, particularly in young and otherwise healthy patients in whom the diagnosis of vasovagal or neurocardiogenic syncope is suspected. It is also useful in older persons with suspected neurally mediated syncope. It is widely accepted that hypotension and/or bradycardia during upright tilt testing is equivalent to spontaneous vasovagal syncope. With a negative baseline response to upright tilting, addition of pharmacological agents increase yield of the test but decrease the specificity. Commonly used agents include isoproterenol, nitrate or adenosine.

Electrophysiology Study

Because of the low yield of electrophysiological testing in patients without underlying heart disease, this test is not routinely recommended. In patients with coronary artery disease, left ventricular dysfunction with LVEF < 35% and syncope, electrophysiological testing is indicated for assessment of AV conduction and inducibility of ventricular arrhythmias.⁹

Role of electrophysiology study (EPS) in patients with non-ischaemic cardiomyopathy is limited with a low negative predictive value. It is not routinely recommended for risk stratification in this group.

Management

Syncope often causes significant anxiety to patients. Appropriate management strategy is important to identify potentially lethal conditions and to avoid unnecessary investigations that are expensive and potentially pose extra anxiety to patients. Table 2 lists important clinical conditions when immediate attention should be considered.

Table 2 When to consider admission for investigation and management:

Old Age > 60
Exertional syncope
History of CAD, congenital heart disease
History of CHF, ventricular arrhythmias
Scenario consistent with ACS
Evidence of CHF or valvular heart disease
Abnormal EKG
Family history of sudden death

Prevention of SCD

The key role of a physician in the management of patients with unexplained syncope is to identify the reversible and recurrent causes. Correction (or to be more realistic, modification) of the underlying etiology

is effective in preventing the recurrence of syncope. Cardiac arrhythmia occurring in the presence of a definite anatomical or cellular substrate can be recurrent and not totally correctable. An implantable cardioverter-defibrillator (ICD) will be indicated for prevention of sudden cardiac death.

The Role of the ICD in preventing SCD Secondary Prevention

The role of prophylactic ICD in improving survival of patients with resuscitated SCD was well addressed by various randomised prospective trials.¹⁰⁻¹² The single patient characteristic that best predicts an advantage of ICD therapy over anti-arrhythmic drug therapy is a left ventricular (LV) ejection fraction < or = 35%. This applies to both ischaemic as well as non-ischaemic in etiology.

Primary prevention Ischaemic CMP

In patients with ischaemic heart disease and reduced left ventricular ejection fraction (LVEF), ICD plays important role in preventing SCD. Several primary prevention trials¹³⁻¹⁵ had demonstrated survival benefits. The Multicenter Automatic Defibrillator Implantation Trial (MADIT I) and the Multicenter Unsustained Tachycardia Trial (MUSTT) had demonstrated significant survival benefits in patients with IHD, low EF and inducible ventricular arrhythmia at EPS.

MADIT II had eliminated inducibility of ventricular arrhythmia at EPS as inclusion criteria. ICD produced a 31% reduction in the risk of death at any interval among patients in the defibrillator group as compared with patients in the conventional-therapy group.

Non-ischaemic CMP

Benefit of prophylactic ICD in patients with non-ischaemic cardiomyopathy (CMP) is less profound and yet substantial. In the Defibrillators in Nonischemic Cardiomyopathy Treatment Evaluation (DEFINITE) trial, ICD was shown to significantly reduce the risk of sudden death from arrhythmia. The reduction in total mortality has not reached statistical significance.¹⁶

In Sudden Cardiac Death in Heart Failure Trial (SCD-HeFT), the ICD also improved survival; with the P value is just below statistical value at 0.06.¹⁷

The ICD was associated with a reduction in all-cause mortality that did not reach statistical significance but was consistent in terms of magnitude of effect (30%) with the findings of MADIT II and SCDHeFT.

In the ACC/AHA 2005 Guideline Update for the Diagnosis and Management of Chronic Heart Failure in the Adult¹⁸, ICD is recommended as a class I indication in patients with stage III heart failure and reduced LVEF resulting from both ischaemic (level of evidence: A) and non-ischaemic CMP (level of evidence: B) when medical therapy was optimised.

Conclusion

Syncope is a common and complex clinical problem. Careful evaluation of symptoms and underlying etiology can avoid unnecessary investigations, identify high-risk candidates and prevent sudden death.



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