

순환기 질환에 의한 어지럼증 및 실신



이 승 표

서울대학교병원 내과, 심혈관센터

Introduction to Syncope Guidelines with Clinical Vignettes

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For Those Who Want an In-Depth Review...

ACC/AHA/HRS GUIDELINE

2017 ACC/AHA/HRS Guideline for the Evaluation and Management of Patients With Syncope

A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Rhythm Society

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Developed in Collaboration with the American College of Emergency Physicians and Society for Academic Emergency Medicine
Endorsed by the American College of Emergency Physicians, the Society of Academic Emergency Medicine, and the Pediatric and Congenital Electrophysiology Society
ACC/AHA Task Force Members, see page viii



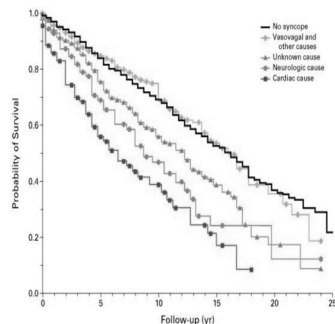
Prevalence of Cardiac Syncope, <25%

Type of syncope	Mean prevalence of syncope (%)*
Cardiac	
Arrhythmia	14 (4 to 38)
Structural disease	4 (1 to 8)
Neurally mediated	
Carotid sinus	1 (0 to 4)
Situational	5 (1 to 8)
Vasovagal	18 (8 to 37)
Neurologic	10 (3 to 32)
Orthostatic	8 (4 to 10)
Psychogenic	2 (1 to 7)
Unknown	34 (13 to 41)

Linzer M et al. Ann Intern Med 1997



Cardiac Syncope, Definitely the Worst Survival



Soteriades ES et al. N Engl J Med 2002



Not Only Death but Other Serious Morbidities!

Cause of Syncope	Hazard Ratio (95% Confidence Interval)	
	ADJUSTED FOR AGE AND SEX	ADJUSTABLY ADJUSTED*
Any cause	1.43 (1.25-1.64)†	1.31 (1.14-1.51)†
Death from any cause	1.47 (1.15-1.88)†	1.27 (0.99-1.64)
Myocardial infarction or death from coronary heart disease	1.19 (0.87-1.62)	1.06 (0.77-1.45)
Fatal or nonfatal stroke		
Cardiac		
Death from any cause	2.41 (1.78-3.26)†	2.01 (1.48-2.73)†
Myocardial infarction or death from coronary heart disease	2.56 (2.29-5.55)†	2.66 (1.69-4.19)†
Fatal or nonfatal stroke	2.67 (1.43-4.95)†	2.61 (1.69-3.89)§
Unknown		
Death from any cause	1.36 (1.13-1.65)†	1.32 (1.09-1.60)†
Myocardial infarction or death from coronary heart disease	1.43 (1.00-2.05)§	1.31 (0.92-1.86)
Fatal or nonfatal stroke	0.72 (0.43-1.22)	0.66 (0.39-1.11)
Neurologic (including seizure)		
Death from any cause	1.98 (1.45-2.72)†	1.54 (1.12-2.12)†
Myocardial infarction or death from coronary heart disease	1.02 (0.48-2.17)	0.79 (0.37-1.69)
Fatal or nonfatal stroke	3.12 (1.82-5.36)†	2.96 (1.69-5.18)†
Vasovagal or other†		
Death from any cause	1.17 (0.95-1.44)	1.08 (0.88-1.34)
Myocardial infarction or death from coronary heart disease	1.16 (0.89-1.68)	1.03 (0.71-1.49)
Fatal or nonfatal stroke	0.93 (0.57-1.52)	0.87 (0.54-1.42)

*The values are adjusted for age, sex, smoking status, presence or absence of hypertension, systolic blood pressure, presence or absence of diabetes, total cholesterol level, heart rate, reported use or nonuse of cardiac medications (including antihypertensive medications), and presence or absence of a history of cardiovascular disease (myocardial infarction, coronary heart disease, stroke, congestive heart failure, atrial fibrillation, and intermittent claudication).

Soteriades ES et al. N Engl J Med 2002



Factors Favoring Cardiac Syncope

- Older age (>60years)
- Male
- Presence of known ischemic heart disease, structural heart disease, previous arrhythmias, or reduced ventricular function
- Brief prodrome, such as palpitations, or sudden LOC without prodrome
- Syncope during exertion
- Syncope in the supine position
- Low number of syncope episodes (1 or 2)
- Abnormal cardiac examination
- Family history of inheritable conditions or premature SCD
- Presence of known congenital heart disease

Guidelines Emphasize Wise Use of 'Testing'

- After initial history, physical exam, and baseline ECG... a clinical decision based on the patient's clinical presentation, risk stratification, and a clear understanding of diagnostic and prognostic value of any further testing.
- A broad-based use of additional testing is costly and often ineffective.
- The most appropriate use of additional testing for syncope evaluation

Very Low Dx. Yield of Tests in Syncope Evaluation

Test	Obtained	Abnormal Findings ^a	Affected Diagnosis ^c	Helped Determine Etiology ^d	Affected Management ^e
Electrocardiogram	2081 (99)	438 (21)	147 (7)	72 (3)	153 (7)
Telemetry	2001 (95)	314 (16)	212 (11)	95 (5)	245 (12)
Cardiac enzymes test	1991 (95)	108 (5)	31 (2)	9 (0.5)	29 (1)
Head CT	1327 (63)	138 (10)	28 (2)	7 (0.5)	28 (2)
Echocardiogram	821 (39)	516 (63)	35 (4)	13 (2)	36 (4)
Postural BP recording	808 (38)				
Strict criteria ^d		230 (28)	142 (18)	122 (15)	202 (25)
Loose criteria ^d		445 (55)	212 (26)	173 (21)	241 (30)
Carotid US	267 (13)	122 (46)	2 (1)	2 (0.8)	6 (2)
EEG	174 (8)	68 (39)	2 (1)	1 (0.6)	2 (1)
Head MRI	154 (7)	46 (30)	20 (13)	3 (2)	19 (12)
Cardiac stress test	129 (6)	53 (41)	13 (10)	2 (2)	12 (9)

55YO Male with Recurrent Syncope

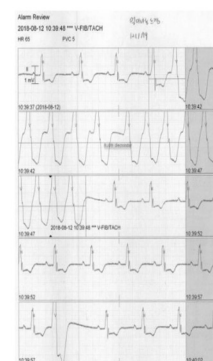
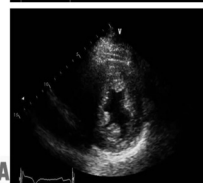
- Associated with chest pain
- Family history of SCD
- Heard that he had LVH? on routine ECG at health check-up



Factors Favoring Cardiac Syncope

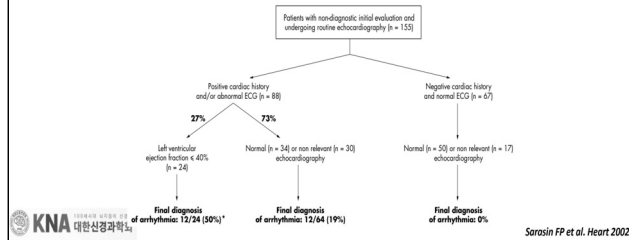
- Older age (>60years)
- **Male**
- Presence of known ischemic heart disease, structural heart disease, previous arrhythmias, or reduced ventricular function
- Brief prodrome, such as palpitations, or sudden LOC without prodrome
- Syncope during exertion
- Syncope in the supine position
- Low number of syncope episodes (1 or 2)
- **Abnormal cardiac examination**
- **Family history of inheritable conditions or premature SCD**
- Presence of known congenital heart disease

HCM with VT during Monitor



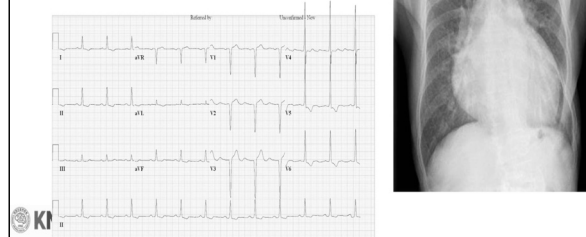
Echocardiography for Syncope

Recommendation	COR	LOE
Transthoracic echocardiography can be useful in selected patients presenting with syncope if structural heart disease is suspected.	IIa	B

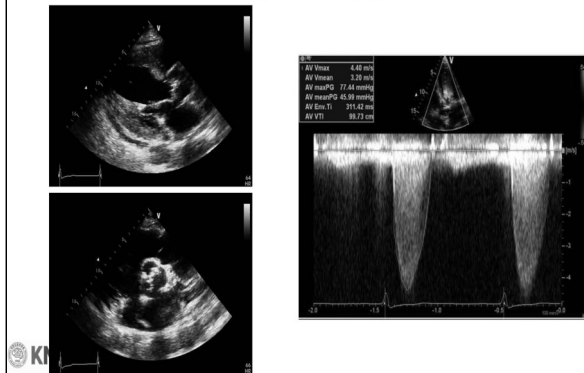


66YO Male with Dyspnea and Exertional Dizziness

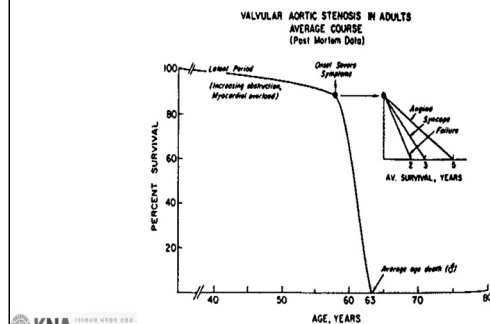
- ESRD on regular HD
- NYHA functional class III
- Systolic murmur on P/E



Severe AS with LV Systolic Dysfunction



Syncope Portends Worse Survival in AS Patients



Additional Cardiac Imaging for Syncope?

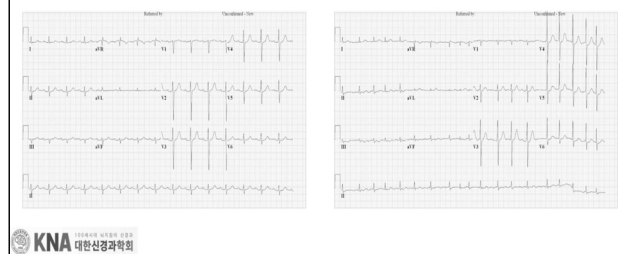
Recommendation	COR	LOE
Computed tomography (CT) or magnetic resonance imaging (MRI) may be useful in selected patients presenting with syncope of suspected cardiac etiology.	IIb	B

- When other noninvasive means are inadequate or inconclusive
- Use of CT/MRI increased from 21% in 2001 to 45% in 2010
- MRI is useful when there is a suspicion of ARVC or cardiac sarcoidosis.
- CT may be useful for detection of pulmonary embolism.

Syncope for Two Times...

Baseline ECG

ECG on Visit to ER for Syncope



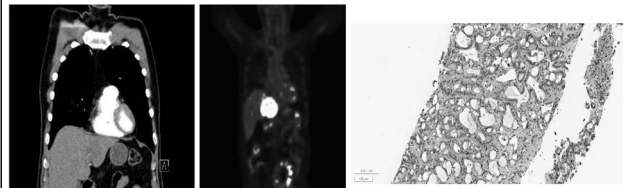
Pulmonary Thromboembolism

- D-dimer 23.07



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Metastatic AdenoCa. Detected... By Syncope!



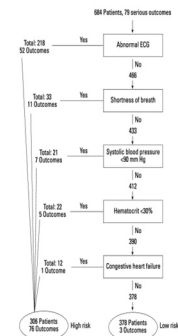
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Cardiac Imaging in All Syncope Patients?

Recommendation	COR	LOE
Routine cardiac imaging is not useful in the evaluation of patients with syncope unless cardiac etiology is suspected on the basis of an initial evaluation, including history, physical examination, or ECG.	III (No benefit)	B

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Putting a Gatekeeper Before 'Routine Tests'



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Quinn JV et al. Ann Emerg Med 2004

Very Low Cost-Effectiveness of 'Routine Tests'

Cardiac Test Result	Patients, No. (%)		P Value
	Met SF3R (n=807)	Did Not Meet SF3R (n=1299)	
Cardiac enzymes test			
Obtained	706 (86)	1225 (94)	.08
Affected diagnosis or management	27 of 706 (4)	4 of 1225 (0.33)	<.001
Helped determine etiology of syncope	8 of 706 (1)	1 of 1225 (0.08)	.003
Cost per effect on diagnosis or management, \$	10331	111518	
Telemetry			
Obtained	770 (95)	1231 (95)	.54
Affected diagnosis or management	146 of 770 (19)	99 of 1231 (8)	<.001
Helped determine etiology of syncope	54 of 770 (7)	41 of 1231 (3)	<.001
Cost per effect on diagnosis or management, \$	457	1078	
Echocardiogram			
Obtained	333 (41)	488 (38)	.10
Affected diagnosis or management	26 of 333 (8)	10 of 488 (2)	<.001
Helped determine etiology of syncope	9 of 333 (3)	4 of 488 (1)	.045
Cost per effect on diagnosis or management, \$	1877	7151	
Cardiac stress test			
Obtained	56 (7)	73 (6)	.22
Affected diagnosis or management	7 of 56 (13)	6 of 73 (8)	.56
Helped determine etiology of syncope	1 of 56 (2)	1 of 73 (1)	>.99
Cost per effect on diagnosis or management, \$	6582	13423	

SF3R: congestive heart failure, Hct <30%, abnormal ECG, shortness of breath, SBP <90mmHg

Mendu ML et al. Arch Intern Med 2009

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Stress Testing for Those with Syncope on Exertion

Recommendation	COR	LOE
Exercise stress testing can be useful to establish the cause of syncope in selected patients who experience syncope or presyncope during exertion.	IIa	C

- Exertion can result in syncope in a variety of conditions.
 - hypertrophic obstructive cardiomyopathy and aortic stenosis
 - interarterial anomalous coronary artery and pulmonary arterial hypertension
 - channelopathies, such as LQTS (type 1) & CPVT
- Must be done with extreme caution and with proper advanced life support.

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Dizziness on Exertion, Ass. with Hypotension

Phase	Stage	Time in Stage	Speed km/h	Grade %	MBTS	HR bpm	BP mmHg	RPP	PVC Min/hr
PRETEST	SUPINE	0:03	0.0	0.0	1.0	-1			0
	WARMUP	1:22	1.0	0.0	1.2	83	127/62	105	0
EXERCISE	STAGE 1	3:00	2.7	0.0	4.8	108	110/52	118	0
	STAGE 2	3:50	4.0	2.0	7.0	123	99/47	121	0
	STAGE 3	2:38	5.4	14.0	10.0	134	87/40	116	0
RECOVERY		9:04	0.0	0.0	1.0	94	119/65	111	0

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ST Depression on Exercise!

Baseline ECG

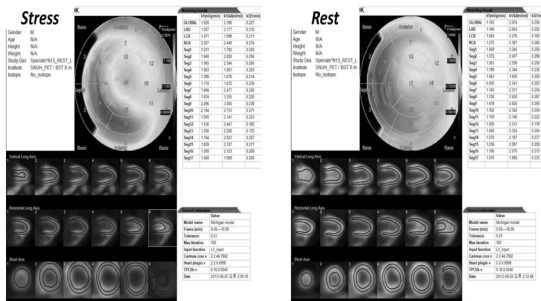


ECG at Stage III Exercise



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Large Ischemia Territory at the LAD & LCX



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Cardiac Monitoring, When do We Need it?

Recommendation

The choice of a specific cardiac monitor should be determined on the basis of the frequency and nature of syncope events.

COR LOE

I C

- ✓ Duration of monitoring
- ✓ Continuous versus intermittent monitoring
- ✓ Frequency of syncope
- ✓ Duration of prodrome
- ✓ Suddenness of incapacitation

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What Kind of Cardiac Monitoring can be Used...

Recommendation

To evaluate selected ambulatory patients with syncope of suspected arrhythmic etiology, the following external cardiac monitoring approaches can be useful:

1. Holter monitor
2. Transtelephonic monitor
3. External loop recorder
4. Patch recorder
5. Mobile cardiac outpatient telemetry

To evaluate selected ambulatory patients with syncope of suspected arrhythmic etiology, an ICM can be useful.

COR LOE

IIa B

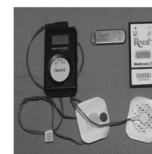
IIa B

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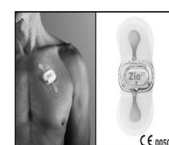
Types of Cardiac Monitoring



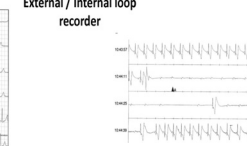
Holter monitor



External / Internal loop recorder

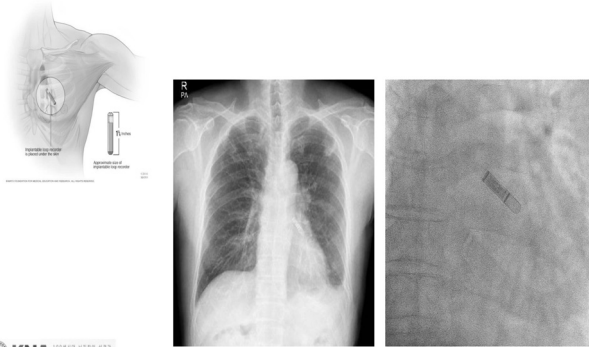


External patch recorder



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Intracardiac Loop Recorder, How it Looks



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Comparison of Cardiac Monitoring Devices

	Advantages	Limitations	Indications	Diagnostic yield	
Holter monitor	Low cost	Continuous monitoring	Short duration of monitoring with low diagnostic yield	Patients with very frequent symptoms (>1 per week)	8%-22% [9, 20, 21]
Transcatheter monitor	Low cost	Poor electrocardiographic recordings; Short lasting arrhythmias are not recorded; Patient activation required; Poor patient compliance to wearing device	Compliant patients with infrequent symptoms (<4 weeks)	23%-42% [17-19]	
External loop recorder	Retrospective and prospective electrocardiographic records; Possibility to record asymptomatic arrhythmias automatically	Poor electrocardiographic recordings; Poor patient compliance to wearing device; Continual device maintenance required	Compliant patients with infrequent symptoms (<4 weeks)	24%-47% [17-19]	
Mobile cardiac outpatient telemetry	Continuous monitoring; Patient activation to report symptoms	Poor patient compliance to wearing device; Continual device maintenance required; Cost; Not widely available	Compliant patients with infrequent symptoms (<4 weeks)	41%-61% [16]	
Implantable cardiac monitor	Prolonged monitoring without external electrodes; Highest diagnostic yield	Invasive implantation with risk of local complications; High cost	Early phase of evaluation of patients with recurrent syncope of uncertain origin who have absence of high-risk criteria that require immediate hospitalization or intensive evaluation and a likely recurrence within device battery longevity	43%-78% [25-30]	

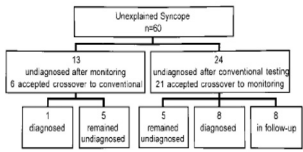
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Subbiah R et al. Curr Cardiol Rev 2013

Efficacy of ILR, Despite its Invasiveness

Clinical Characteristics of Conventional Group and Monitoring Group

	Conventional (n=30)	Monitoring (n=30)
Age, y	64±14	68±14
Male sex, n (%)	14 (47)	19 (63)
Normal baseline ECG, n (%)	22 (73)	20 (67)
Conduction disturbance, n (%)	7 (23)	5 (17)
Sinus bradycardia, n (%)	0 (0)	3 (10)
Atrial fibrillation, n (%)	1 (3)	2 (7)
Structural heart disease, n (%)	10 (33)	13 (43)
Ischemic heart disease, n (%)	5 (17)	9 (30)
Valvular heart disease, n (%)	5 (17)	1 (3)
Cardiomyopathy	0 (0)	3 (10)
LVEF, %	55±8	55±8
No. of syncope episodes		
Last year	2.8±2.7	2.3±1.3
Lifetime	5.8±6.6	4.1±3.3
Duration of syncope, y	8.7±26.6	6.6±12.1



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Krahn AD et al. Circulation 2001

Intracardiac Loop Recorder, Insurance Criteria

- 다른 검사로 원인이 진단되지 않는 다음의 경우에 요양 급여를 인정함
 - 재발성 실신
 - 단, 구조적 심질환에는 실신이 1회 발생한 경우에도 인정
 - 재발성 두근거림
 - 심방세동이 의심되는 원인불명의 재발성 뇌졸중

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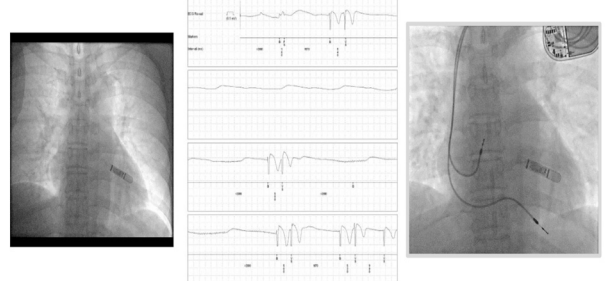
53세 여자, 3차례 반복적 실신

- 2013년 6월, 조깅 중 잠시 쉬다가...
- 2014년 10월, 등산하다가 심계항진 후에...
- 2016년 4월, 집에서, 화장실에서 나오면서 잠깐 어지럽다가...

- 2014년, Holter, head-up tilt test : WNL
- 2016년, Brain MRI, EEG, TMT, EchoCG : WNL
- 2017년, coronary CT angiography : normal
- 2017년, Holter: min HR 42/min (10am), max RR 1.58 sec (3pm)

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ILR에서 발견된 11초 정도의 sinus pause!



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