ESC/EHRA
Guidelines on Cardiac Pacing

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Guidelines for cardiac pacing and cardiac resynchronization therapy

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Reasons for European Guidelines?

Scientific reasons

Cultural and political reasons

Reasons Necessitating Uniform European Guidelines

- **Scientific reasons**
  - Rapid evolution of current knowledge in certain scientific areas
  - Results of recent published trials concerning the indications for pacing, mode selection, cost effectiveness, follow-up
  - Utilization of primary experience from new therapeutic modalities, first developed in Europe (CRT).

Reasons Necessitating Uniform European Guidelines

- **Cultural and political reasons**
  - The unified European guidelines support fruitful scientific collaboration which will benefit the diverse European requirements
  - The European guidelines are an exceptional worldwide ambassador for the European scientific community.

ESC/EHRA Guidelines

- ESC guidelines cover two main areas: the first includes permanent pacing in bradyarrhythmias, syncope and other specific conditions, while the second refers to ventricular resynchronisation as an adjunct therapy in patients with HF

ESC/EHRA pacing guidelines
Appendices

- The guidelines have been enriched with two appendices that refer not only to conventional pacemaker follow-up but also to technical considerations and requirements for implanting and follow-up of CRT devices.

ESC/EHRA Guidelines

Main topics

- Conventional indications for pacing.
- Pacing for specific conditions.
- Cardiac resynchronization therapy.

Conventional indications for pacing

The ESC/EHRA 2007 Guidelines

- present detailed definitions
- follow an up-to-date approach to the evaluation of patients with syncope.
- take into consideration the results of recent trials (MOST, CTOPP, PASE, DAVID etc) and the technological advances, providing
  - level of evidence in mode selection.
  - recommendations for the use of new algorithms (MPV, ANTITACHY)

Sinus node disease

Recommendations for cardiac pacing in SND

Class	Clinical Indication	Level of evidence
Class I	1. Sinus node disease manifests as symptomatic bradycardia with or without bradycardia-dependant tachycardia. Symptom-rhythm correlation must have been: ▪ spontaneously occurring ▪ drug-induced where alternative drug therapy is lacking. 2. Syncope with sinus node disease, either spontaneously occurring or induced at electrophysiological study. 3. Sinus node disease manifests as symptomatic chronotropic incompetence: ▪ spontaneously occurring ▪ drug-induced where alternative drug therapy is lacking.	C
Class IIa	1. Symptomatic sinus node disease, which is either spontaneous or induced by a drug for which there is no alternative but no symptom rhythm correlation has been documented. Heart rate at rest should be < 40 bpm. 2. Syncope for which no other explanation can be made but there are abnormal electrophysiological findings (CSNRT > 800 ms).	C
Class IIb	1. Minimally symptomatic patients with sinus node disease, resting heart rate < 40 bpm while awake and no evidence of chronotropic incompetence.	C
Class III	1. Sinus node disease without symptoms including use of bradycardia-provoking drugs. 2. ECG findings of sinus node dysfunction with symptoms not due directly or indirectly to bradycardia. 3. Symptomatic sinus node dysfunction where symptoms can reliably be attributed to non-essential medication.	C

Note: when sinus node disease is diagnosed atrial tachyarrhythmias are likely even if not yet recorded, implying that serious consideration should be given to anticoagulant therapy.

Conventional indications for pacing

ESC/EHRA 2007 vs ACC/AHA/HRS 2008 Guidelines

- **Differences in terminology:**
  - e.g. ACC/AHA/HRS QLs use the term "advanced second degree AV block" while in the ESC 2007 GLs we use the terms "second degree AV block Mobitz I or II"

- **Differences in classification and ranking:**
  - e.g. For asymptomatic patients with 3rd degree AVB pacing is considered to be class IIa, LoE C in ESC/EHRA 2007 GLs, while it is classified as I, LoE B in the presence of SHD, or if the site of block is below AVN and IIa, LoE C if there is no SHD in the ACC/ AHA/HRS QLs

Conventional indications for pacing

The ESC/EHRA 2007 Guidelines

- present detailed definitions
- **follow an up-to-date approach to the evaluation of patients with syncope.**
- take into consideration the results of recent trials (MOST, CTOPP, PASE, DAVID etc) and the technological advances, providing
  - level of evidence in mode selection.
  - recommendations for the use of new algorithms (MPV, ANTITACHY)

Recommendations for cardiac pacing in carotid sinus syndrome

Class	Clinical Indication	Level of evidence
Class I	1. Recurrent syncope caused by inadvertent carotid sinus pressure and reproduced by carotid sinus massage, associated with ventricular asystole of more than three seconds' duration (patient may be syncopal or presyncopal), in the absence of medication known to depress sinus node activity.	C
Class IIa	1. Recurrent unexplained syncope, without clear inadvertent carotid sinus pressure, but syncope is reproduced by carotid sinus massage, associated with a ventricular asystole of more than three seconds' duration (patient may be syncopal or presyncopal), in the absence of medication known to depress sinus node activity.	B
Class IIb	1. First syncope, with or without clear inadvertent carotid sinus pressure, but syncope (or pre-syncope) is reproduced by carotid sinus massage, associated with a ventricular asystole of more than three seconds' duration, in the absence of medication known to depress sinus node activity.	C
Class III	1. Hypersensitive carotid sinus reflex without symptoms.	C

Recommendations for cardiac pacing in VVS *(ESC/EHRA 2007 GLs)*

Class	Clinical Indication	Level of evidence
Class I	None.	
Class IIa	1. Patients over 40 years of age with recurrent severe vasovagal syncope who show prolonged asystole during ECG recording and/or tilt testing, after failure of other therapeutic options and being informed of the conflicting results of trials.	**C**
Class IIb	1. Patients under 40 years of age with recurrent severe vasovagal syncope who show prolonged asystole during ECG recording and/or tilt testing, after failure of other therapeutic options and being informed of the conflicting results of trials.	**C**
Class III	1. Patients without demonstrable bradycardia during reflex syncope.	**C**

Recommendations for cardiac pacing in VVS
(ACC/AHA/HRS 2008 GLs)

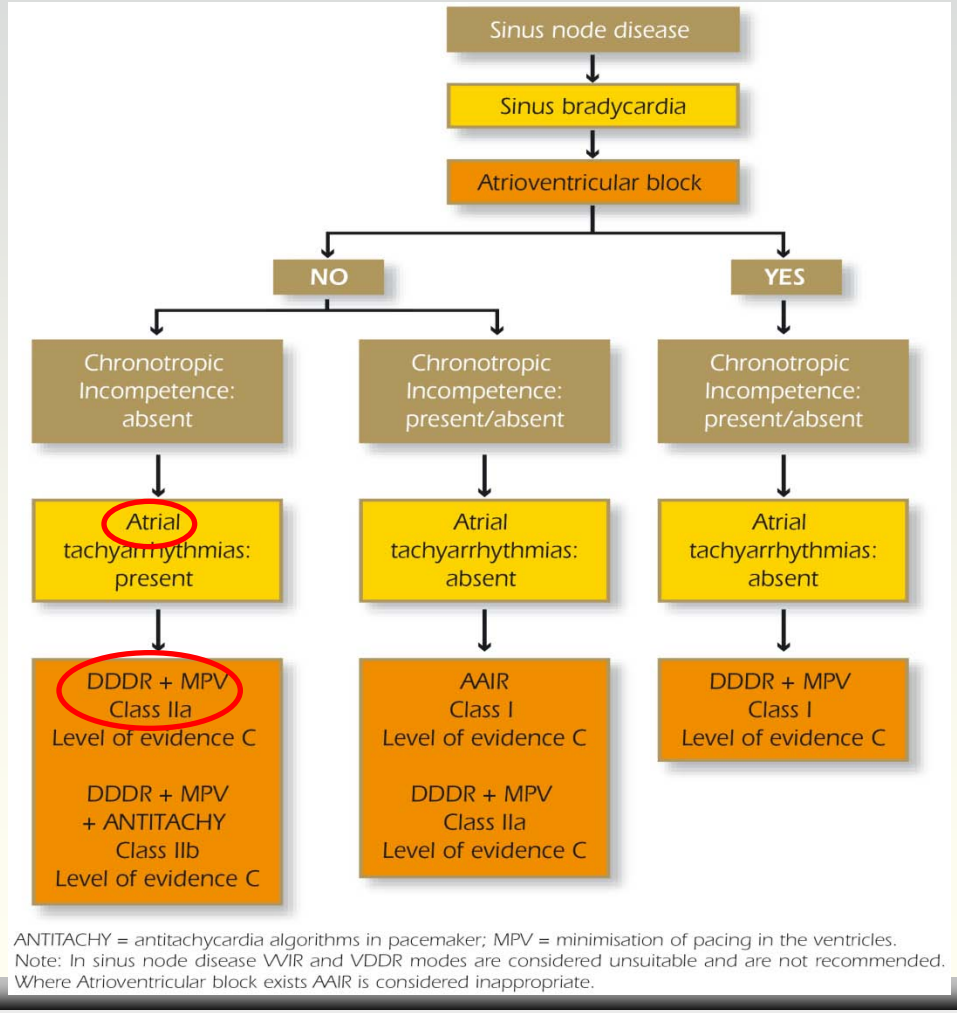
- Significantly symptomatic neurocardio-genic syncope associated with bradycardia documented spontaneously or at the time of tilt-table testing is **class IIb LoE B**

Conventional indications for pacing

The ESC/EHRA 2007 Guidelines

- present detailed definitions
- follow an up-to-date approach to the evaluation of patients with syncope.
- take into consideration the results of recent trials (MOST, CTOPP, PASE, DAVID etc) and the technological advances, providing
  - level of evidence in mode selection.
  - recommendations for the use of new algorithms (MPV, ANTITACHY)

Pacemaker mode selection in sinus node disease



ANTITACHY = antitachycardia algorithms in pacemaker; MPV = minimisation of pacing in the ventricles.
Note: In sinus node disease VVIR and VDDR modes are considered unsuitable and are not recommended.
Where Atrioventricular block exists AAIR is considered inappropriate.

Pacing for specific conditions

- New chapters:
  - Sleep–apnoea syndrome
  - Adenosine– sensitive syndrome

Sleep-apnoea syndrome

- Atrial overdrive pacing at a rate of 15 b.p.m. higher than the mean nocturnal heart rate had a positive effect on sleep apnoea, reducing both obstructive and central apnoeic episodes in patients who were already paced for conventional indications.

  Garrigue S, et al. N Engl J Med 2002

- These positive results, were not confirmed by other studies that included patients with pure obstructive sleep apnoea.

  Simantirakis EN e al . N Engl J Med 2005 Krahn AD, J Am Coll Cardiol 2006

- More studies are needed to clarify the possible effect of atrial pacing on sleep apnoea and to determine in which subgroups of patients this approach might be beneficial.

Adenosine- sensitive syndrome

- There has been no well-designed randomized study able to determine the utility of pacing in patients with a positive ATP test, thus no definitive recommendations can be made.

Cardiac Resynchronization Therapy

ESC/EHRA 2007

Recommendation for the use of cardiac resynchronization therapy by CRT-P and CRT-D in HF patients

Heart failure patients, who remain symptomatic in NYHA classes III – IV, despite optimal medical therapy, with:

- LVEF $\leq$ 35 %
- QRS $\geq$ 120 ms
- LV dilatation
- Normal sinus rhythm
- Class I, level of evidence A for CRT-P to reduce morbidity and mortality

CRT-D is an acceptable option for patients who have expectancy of survival > 1 year

Cardiac Resynchronisation Therapy

The ESC/EHRA 2007 GLs

- From a theoretical point of view it may be more appropriate to target mechanical dyssynchrony, rather than electrical conduction delay
- However, the existence of mechanical dyssynchrony in HF has not yet been established as a patient selection criterion for CRT

CRT for specific issues

ESC/EHRA 2007 Guidelines

	Class	LoE
Patients with mild HF or asymptomatic LV systolic dysfunction	III	C
Patients with permanent AF and indication of AVJ ablation	IIa	C
Patients with bradycardic indications for pacemaker implantation	IIa	C
Patients who already have a pacemaker implanted	IIa	C
Should all CRT patients have an ICD back-up?	I	B

Cardiac Resynchronization Therapy

ESC/EHRA 2007 vs ACC/AHA/HRS 2008 Guidelines

- There are many similarities in classification, ranking and patient selection criteria

- However
  - In the ACC/AHA/HRS 2008 GLs, LV dilatation is not included in the selection criteria
  - In the ACC/AHA/HRS 2008 GLs, AF is a class IIa LoE B indication while in ESC/EHRA 2007 GLs only patients with AF who are candidates for AVJ ablation have a class IIa LoE C indication

Issues to be addressed in the future

- Patient selection criteria
  - Electrical or mechanical asynchrony
- Mild heart failure (REVERSE study)
- No heart failure
  - Pacemaker dependent patients
  - Patients with dyssynchrony

Conclusions

- The recently published Guidelines from both sides of the Atlantic, based on the latest scientific evidence contribute to the improved management of PM candidates
- Undoubtedly, the rapid advances in our scientific field require the frequent updating of such GLs to include all the facts that are important for contemporary evidence-based medicine
- Our next target is the implementation of ESC/EHRA 2007 GLs

ESC POCKET GUIDELINES

Committee for Practice Guidelines
To improve the quality of clinical practice and patient care in Europe

Cardiac Pacing

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