

Pacing for Symptoms Attributable to First Degree AV Block: When and How: Standard Pacing vs. CRT

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MY CONFLICTS OF INTEREST ARE:
Consultant to Medtronic
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Pacing First Degree AV Block

This subject has received little attention in the literature.

PubMed search of Pacing, First degree AV Block, Haemodynamics reveals 44 hits only 3 of which are relevant, 3 more appear as possibly relevant.

Despite this lack of attention, the story begins long ago.

Pacing First Degree AV Block

What is the problem?

First degree AV Block results in fusion of the E and A waves and reduced LV filling in diastole.

This may mimic Pacemaker Syndrome especially if PR is long enough to impose atrial contraction during left ventricular systole

Pacing First Degree AV Block

What do Guidelines say?

Patient must be symptomatic and the symptoms attributable to the PR delay and PR interval >300ms

Indication for cardiac pacing for first-degree atrioventricular block

Recommendations	Class	Level
Permanent pacemaker implantation should be considered for patients with persistent symptoms similar to those of pacemaker syndrome and attributable to first-degree atrioventricular block (PR >0.3 s).	IIa	C

Pacing First Degree AV Block

Margarethe Hochleitner, C-K Ng and others may have started the story in Innsbruck in 1980s.

They took patients who failed drug therapy and were on waiting list for Cardiac Transplantation or were refused Tx and paced them DDD AVd 100ms. Of 16 patients all improved and some ceased to require transplantation.

Pacing First Degree AV Block

Hochleitner M, et al Am J Cardiol 1990;66:198-202.

16 patients failed drug therapy and either on Tx waiting list or refused Tx

DDD pacing with AVd 100ms (preceding PR ?)

LVEF 16 to 26% $p < 0.001$

NYHA 3.6 to 2.1 $p < 0.001$

SBP 108 to 126mmHg

DBP 67 to 80mmHg

Heart rate normalised

All discharged home. At 1yr 4 died of SUD or stroke

Pacing First Degree AV Block

Hochleitner M, et al Am J Cardiol 1992; 70: 1320-1325.

17 patients up to 5 yrs FU.

All failed drug therapy and either on Tx WL or refused TX

DDD pacing AVd 100ms

Mean survival 22/12

4 Tx, 9 SUD, 3 survivors

Pacing was switched off for 2-4 hours with immediate symptomatic deterioration

Tendency to progressive LV deterioration during FU

Pacing First Degree AV Block

Comments

No attention was paid to the normalisation of PR interval in these studies

This was probably the major effect of DDD pacing
Brains behind these studies were those of C-K Ng, a cardiac surgeon, who departed Innsbruck around 1998-9 to head Cardiac Surgery in the National Hospital in Singapore.

He left there after one year

Pacing First Degree AV Block

Other studies followed with a deeper understanding of the role of AV delay

The next milestone was Cazeau S et al PACE 1994; 17: 1974-1979. Four chamber pacing in a 54yr male presenting NYHA IV HF with LBBB and PR 200ms

DDD pacemaker connected to 4 leads via 2 Y-connectors

Patient improved dramatically to NYHA II

He later sustained a pacing failure with emergency readmission. When problem was solved his condition returned to NYHA II

Pacing First Degree AV Block

More recent literature is dominated by Serge Barold who published rather similar papers in J Interv Card Electrophysiol 2006; 17: 139-152. and Europace 2012; 14: 1414-1419.

His main points were:

1. First degree AV Block is only usually symptomatic if PR >300ms
2. Symptoms will improve when AV interval is shortened by pacing
3. Pacing must be at least dual chamber but given the required RV pacing BiV pacing should be preferred
4. P wave undersensing is common and requires careful avoidance by selecting short PR and short PVARP

Pacing First Degree AV Block

Serge Barold J Interv Card Electrophysiol 2006; 17: 139-152.
and Europace 2012; 14: 1414-1419.

His main points were:

5. Symptomatic patients with long PR may have severe cardiac disease accompanied by poor prognosis
6. Episodes of undetected desynchronisation of CRT will also adversely affect prognosis
7. It may be necessary to perform AV junctional ablation in order to control PR interval in some of these patients
8. 50% of CRT patients have PR >200ms

Pacing First Degree AV Block

Further PubMed search of CRT and First degree AV Block revealed 9 hits of which 2 were relevant.

Januszkiewicz L et al Prognostic implications of baseline PR interval in CRT recipients. Heart Rhythm 2015; 9:

283 CRT patients 158 N-PR and 125 PR >200ms at baseline

Cox prop hazard ratio univariate analysis PR >200ms 1.49 (1.02-2.17) P=0.04 but not significant in multivariate analysis, association with HF hospitalisation and lack of response especially poor with non-LBBB QRS

Pacing First Degree AV Block

Further PubMed search of CRT and First degree AV Block revealed 9 hits of which 2 were relevant.

Lee YH et al Effects of AV conduction delay on outcome of CRT J Electrocardiol 2014; 47: 930-935 from Mayo Clinic

Patients paced CRT with PAV 130ms and SAV 100ms

N-PR vs. Long PR

	199	204	
NYHA reduction	0.7	0.5	P=0.03
EF improvement	9.4%	5.9%	P=0.007

Thus, Barold's understanding has been confirmed

Pacing First Degree AV Block

Conclusions

First degree AV Block has received little attention

But it is an adverse prognostic sign

In First degree AV Block pacing is indicated if PR interval $>300\text{ms}$ and symptoms are attributable

Selection of device for implantation today favours CRT with careful programming to avoid atrial undersensing and desynchronisation

A less vivid response to CRT may be expected