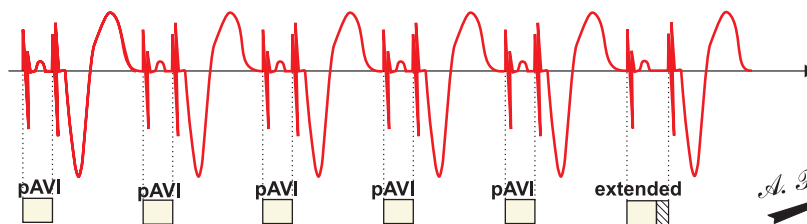


ATRIOVENTRICULAR INTERVAL (AVI)

- * AV delay - paced and sensed
- * Rate-adaptive AV delay
- * How to program the AV delay ?
- * AV search hysteresis



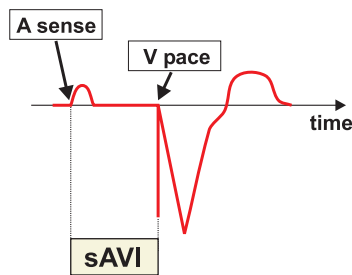
A. J. Sinnaeve

The AV DELAY or ATRIOVENTRICULAR INTERVAL (AVI)



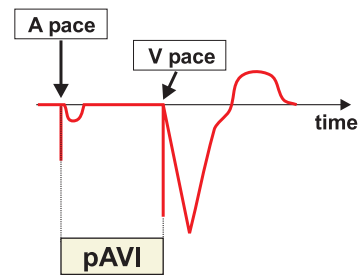
AVI is the interval between an atrial event (either sensed or paced) and the scheduled delivery of a ventricular stimulus

After sensing






sAVI starts with an atrial sensed event

After pacing



pAVI starts with an atrial stimulus

-  Separate AV intervals for paced and sensed atrial events are available
-  Usually $sAVI < pAVI$
typically sAVI is 30-50 ms shorter than pAVI
-  The AV intervals may be programmed to fixed values or (optionally) rate-adaptive i.e. shortening with increasing atrial rates

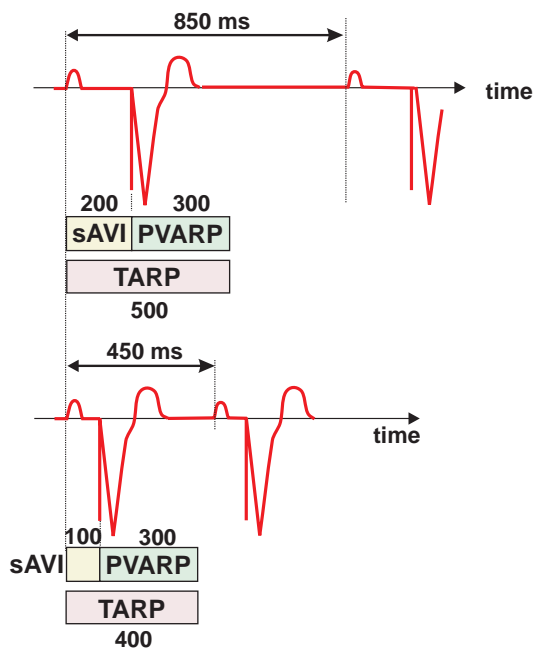
A. F. Pinnaere

THE RATE-ADAPTIVE AV INTERVAL



My AV delay is normal or physiologic.
It shortens whenever I exercise !

The rate-adaptive AV interval mimics the
physiologic response of the heart



RELATIVELY SLOW ATRIAL RATE
→ LONGER AV DELAY

Spontaneous atrial interval SAI = 850 ms
Spontaneous atrial rate SAR = 71 bpm
Sensed atrioventricular interval sAVI = 200 ms

FASTER ATRIAL RATE
→ SHORTER AV DELAY

Spontaneous atrial interval SAI = 450 ms
Spontaneous atrial rate SAR = 133 bpm
Sensed atrioventricular interval sAVI = 100 ms

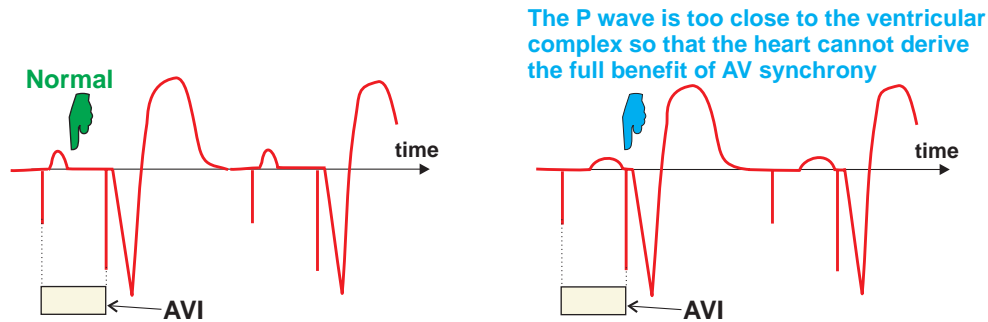
THE PROGRAMMER MAY CHANGE

- * the maximum value of sAVI
- * the minimum value of sAVI
- * the value of the gradual decrement of sAVI between these 2 rates
- * the range of rates where the change in the sAVI occurs

pAVI can also shorten according to the input of a nonatrial sensor that
reflects increased activity

HOW TO OBTAIN AN OPTIMAL AV DELAY ?

- * In healthy individuals at rest, the optimal basic PR or AV interval normally lies between 120 and 210 ms
- * The optimal value varies greatly from one patient to another as a function of several physiologic and pathologic factors including age (shorter in young people)
- * Optimization of the AV delay (AVI) is needed at rest and exercise

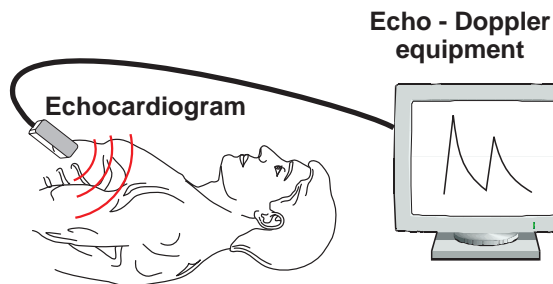


The electrical AV delay on the right side of the heart controlled by programming the pacemaker must produce an appropriate mechanical AV delay on the left side of the heart to preserve the atrial contribution to the cardiac output and optimize left ventricular function !!!

The optimal AV delay cannot be determined from the surface ECG !!!

Doppler echocardiography is required to determine the optimal AV delay that produces the best stroke volume and cardiac output for each individual

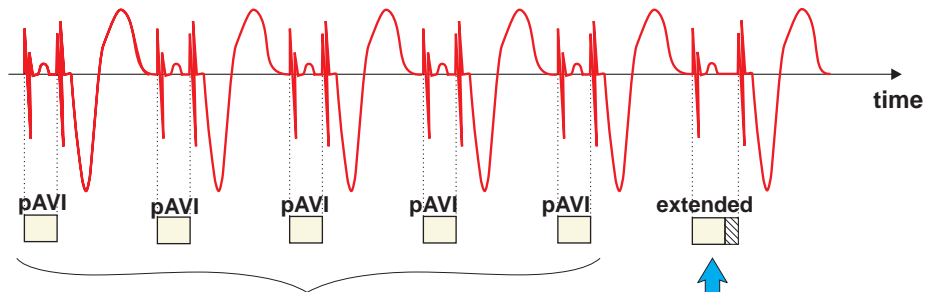
This is not an easy subject because the duration of the programmed electrical AV delay of the pacemaker may not correlate with the best relationship between left atrial systole and left ventricular systole. What is important is the optimal mechanical AV delay on the left side of the heart



A. F. Pinnaev

AV DELAY HYSTERESIS

Facilitation of normal AV conduction to promote normal ventricular depolarization



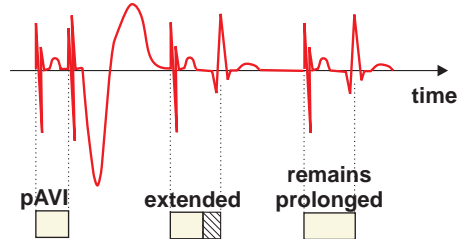
After "n" consecutive ventricular paced complexes, the AV delay is prolonged for "1" cycle

There are only two possibilities



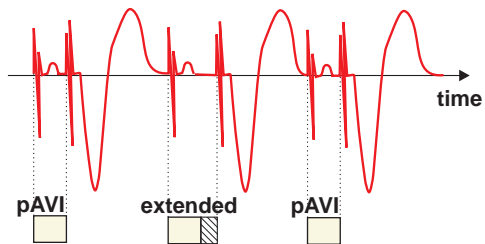
1

If an intrinsic ventricular event is sensed, the AV delay remains prolonged



2

If no intrinsic ventricular event is sensed, the AV delay returns to the programmed value



Abbreviations : AV = atrio-ventricular ; pAVI = paced atrioventricular interval