

# PROTOCOL: PACEMAKER AV OPTIMIZATION

## Inclusion Criteria

- Complete study has been performed within the current clinical episode
- Referral is pacemaker optimization
- Patient has operational atrial lead and one or more ventricular leads
- Pacemaker nurse is available (call 4-8600 or 4-8539)

## EIMS Data

**Procedure Components:** 2D-Limited, Doppler Limited (unless a complete study is also performed)

**Referral Diagnoses:** Biventricular pacemaker A-V optimization

**Serial Study:** None (unless complete study performed)

**First Impression:** Echocardiogram performed during pacemaker optimization.

**Findings:**

1. Optimal A-V delay =
2. Optimal V-V offset =
3. Unable to optimize A-V delay (if applicable)
4. Unable to optimize V-V offset (if applicable)

**Billing Diagnosis:** Pacemaker Cardiac Status Post (also: echo findings, symptoms, physical exam, etc.)

**Procedure:** (TTE) 2D Limited with Limited Doppler

if complete echo also performed (TTE) 2D Echo Doppler Color

## Caveats

- Pacemaker optimization studies require a high degree of cooperation between Echo Lab consultants, device nursing staff, sonographers, and desk personnel. Pacemaker optimization may not be performed without the input of a consultant
- A device nurse is held on standby - **notify the pacemaker department immediately if the pacemaker device optimization portion is deemed unnecessary**
- It is preferred that V-V optimization be performed before A-V optimization

## Obtain the following:

Doppler	Measurement
<b>Parasternal</b>	
	LVOT diameter
<b>Apical</b>	
PW - Mitral inflow CW - AV TVI	Visually assess degree of E/A fusion AV TVI / velocity

## V-V Optimization

Aim: Find the V-V interval (LV-RV offset) that gives the largest LV stroke volume.

- 1) Obtain CW Doppler through aortic valve at multiple V-V intervals roughly 20-30 ms apart, measure the TVI, and calculate SV. Start at a V-V delay of 0(12).

### Caveats and Tips

- Do not over gain CW Doppler signals (as this leads to an overestimated SV)
- PW LVOT Doppler signals can also be used but can be technically difficult to reproduce (for this reason CW Doppler is preferred)

First Chamber Activated	V-V Delay	AV Delay	Adjusted AV Delay	LVOT or AV TVI
LV first	80	AV delay		
LV first	60	AV delay		
LV first	40	AV delay		
LV first	20	AV delay		
LV first (Start Here)	0 (12)	AV delay		
RV first	-20*	AV delay –VV offset (20)		
RV first	-40*	AV delay –VV offset (40)		
RV first	-60*	AV delay –VV offset (60)		
RV first	-80*	AV delay –VV offset (80)		

\*Decrease the AV interval by this amount when the RV is stimulated first to maintain an unchanged interval of contraction between LA and LV.

## A-V Optimization

Aim: Find the A-V interval which maximizes the amplitude and duration of mitral inflow “A” wave.

- 1) Assess pulsed wave Doppler of mitral inflow at multiple A-V intervals roughly 20-30 ms apart (e.g. 80 ms to 200 ms). **Caution: Do not prolong the A-V interval so long as to lose biventricular stimulation in CRT patients.**

A-V interval (msec)	Comments
80	
100	
120	
140	
160	
180	
200	
<b>Optimal A-V delay:</b>	