Methods: 38 patients (age 70.9 ± 7.3 yrs M/F 34/4) with advanced heart failure, NYHA class III/IV (20/18), left bundle branch block at ECG(mean QRS duration 174 ±32 msec) underwent a biventricular pacemaker implantation. Standard echocardiogram and Pulsed Wave Tissue Doppler Imaging (PW-TDI) were performed at baseline and 1 day, 1 week, 6 months and 1 year after the implantation. We defined electro-mechanical delay of left ventricular lateral wall, interventricular septum, and right ventricular free wall as the QS time interval between the onset of QRS at ECG and the onset of S wave at PW-TDI on the respective wall segments. The difference between lateral wall and interventricular septum QS intervals, and between lateral wall and right ventricular free wall QS intervals, were defined respectively IntraV- and InterV dissynchrony.

Results: Patients were divided in a severe (SEV) and a moderate (MOD) group on the basis of the baseline value of InterV dissynchrony, respectively above and below 70 msec. Before implantation, we observed no significant difference in NYHA functional class (3.43±0.51 vs 3.10±0.32 p=0.07) and ejection fraction (24±9% vs 23±8% p=0.80) between SEV (27 pts) and MOD (11 pts) groups.

After 1 year from implantation

-NYHA class (1.94±0.24 vs 2.80±0.42 p=<0.0001) and rehospitalizations for heart failure (0.00 vs 0.50 ± 0.57 p=0.04) was lower in SEV than MOD.

-the ejection fraction increased in all the patients (from 24±9% to 32±10% p=0.0015), without differences between groups (32±10% SEV vs 36±7% MOD p=0.39).

- a higher reduction (81.82 ± 50.19 msec vs -0.1 ± 33.52 msec respectively p=0.0002) of interV delay in SEV than MOD Conclusion: Patients with severe interV dissynchrony at pre-implant PW-TDI show, with biventricular pacing, a better improvement on NYHA functional class and less rehospitalizations for heart failure. These effects are not associated to a different changes in left ventricular ejection fraction, but to a better interV resynchronization.

1138-7 Minimizing Ionizing Radiation: A New Alternative Method for Minimally Invasive Surgical Biventricular Resynchronization

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BACKGROUND:Percutaneous biventricular resynchronization therapy has become an acceptable therapeutic regimen in patients (pts) with CHF and intraventricular conduction delay exceeding 120 ms. Although the percutaneous approach is successful in most patients, technical difficulties may preclude adequate left ventricular (LV) capture. The purpose of this study is to describe a new technology involving minimally invasive thoracoscopic lead placement for biventricular resynchronization.

METHODS: From March 2001 to April 2002, 274 pts were referred to one hospital for biventricular resynchronization. Of those, 23 pts failed the percutaneous approach and were managed with thoracoscopy-guided minimally invasive ventricular lead placement.

RESULTS: The surgical group consisted of 9 females and 14 males with a mean age of 65±14 yrs (range: 28 to 98 yrs). Mean preoperative EF as 20±8% (range: 5-35%). Fourteen pts had non-ischemic cardiomyopathy and 9 pts had a history of coronary artery disease (5 pts had prior coronary artery bypass grafting). The pacing parameters for the surgically-treated pts revealed a mean threshold of 1.3±0.9 volts (range: 0.3 to 2.6 volts). Mean current was 2.7±1.9 mA and mean impedance was 648.8±200.2 ohms. Mean R-wave amplitude was 10.6±6.1 mV. Postoperative length of stay was 4±3 days. While no pts sustained postoperative myocardial infarctions or procedure-related wound infections, 2 pts required postoperative interventions for emphysema. One patient died on postoperative day 9, despite a successful surgical lead placement. On 120 days follow-up, no pts required repeat lead placement.

CONCLUSIONS: Minimally invasive LV lead placement is a new alternative technique for biventricular resynchronization. In the current series, we have shown that LV placement can be successfully performed in this high-risk patient cohort with minimal morbidity and mortality and with no need for ionizing radiation.

1138-8 Importance of the Coronary Sinus Lead Position on the Clinical Benefit of Biventricular Pacing

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Background: Biventricular (BiV) pacing has emerged as a new therapy for patients with congestive heart failure (CHF). The best anatomical location of the left ventricular (LV) in the coronary sinus (CS) is still a matter of controversy. The objective of this study is to evaluate the clinical response to BiV pacing in patients who had a transvenous LV lead placed in different anatomical segments.

Methods and Results: We evaluated 62 patients (mean age 61 years, 66% males) with severe (NYHA class III-IV) CHF who had a successful placement of a LV lead transvenously through a CS venous branch. Patients were divided in 2 groups, based on the lead anatomical position. Group 1 was classified as an anterior position and included leads in the anterior, antero-lateral and septal segments. Group 2 was classified as posterior and included leads in the posterior, postero-lateral and lateral segments. Post implant, functional capacity improved from an average of NYHA 3.0 to 2.5 (p=0.0028) and LV ejection fraction (EF) measured by transthoracic echocardiography improved from 19 to 22% (p=0.003). The results for the different groups are summarized in the table.

	NYHA Functional Class			LV EF (%)		
	Pre-BiV	Post-BiV	Change (p value)	Pre-BiV	Post-BiV	Change (p value)
Group 1 (n=20)	3.1	2.5	0.53 (0.004)	18.0%	17.75%	-0.25 (0.84)
Group 2 (n=42)	3.0	2.4	0.56 (1.7 x10-7)	19.0%	24%	4.71 (0.001)

Conclusions: LV lead placement in the posterior-lateral segments appears associated with moderate but significant improvements in functional capacity and LV function. When the anterior circulation is the only possible transvenous target, an epicardial lead in the postero-lateral wall may be considered a better alternative.

1138-9 Anatomic Features Impacting Left Ventricular Implant: Comparison of Normal Heart and Failure Hearts

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Background: Cannulation of the coronary sinus (CS) for left ventricular lead placement to achieve cardiac resynchronization is often unexpectedly challenging. Anecdotal reports suggest that CS and right atrial (RA) anatomy is different in failure (HF) patients (pts). Methods: We compared 109 pts with HF left ventricular ejection fraction (LVEF) 25 +/-10%, 74% male, 100% with structural heart disease who underwent LV lead implant with 108 pts without HF (LVEF 55+/-14%, 44% males, 22% with structural heart disease), in a prospective manner. Anatomy was assessed by using digital contrasts cineangiography of the right atrium and CS in multiple projections, and transthoracic echocardiography. Selected pts also underwent transesophageal, and/or intravascular ultrasound to clarify or confirm unconclusive radiographic features. Results: The following major anatomic differences were found. Contrary to previous reports, there was no significant difference (p>0.05) between the two groups with regard to diameter of the CS (overall 10+/-4mm) or the diameter of the CS ostium (overall 15+/-mm). Conclusion: CS and RA anatomy is significantly different in HF hearts vis a vis normal hearts: the CS ostium lies higher, the CS is angulated more steeply superior, and the RA dimension is larger. These differences may account for greater difficulty encountered during CS cannulation in this group.

	CS Height*	CS Angulation**	RA Dimension
HF group (n=109)	12+-9 mm	24+-22 degrees	40+-7 mm
Non-HF group (n-108)	6+- mm	7+-22 degrees	36+-8 mm
p-value	p<0.001	p=0.001	p=0.037

*Distance from inferior margin of CS ostium to RA floor

**Angulation of CS with respect to horizontal, LAO 30 view

1138-10 Importance of Interventricular Delay to Optimize Cardiac Resynchronization Therapy

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Purpose. We studied the influence of the inter-ventricular pacing delay on biventricular pacing therapy in heart failure.

Methods. A biventricular pacing system was implanted in 13 pts with heart failure and left bundle branch block. Left ventricular maximum dP/dt (mm Hg/s) was measured with a 0.014" guidewire with tip mounted pressure transducer. Measurements were done at a constant rate during atrial (AP), biventricular (BP) and left ventricular (LP) pacing. After choosing the optimal atrio-ventricular interval during BP, the inter-ventricular interval was varied delaying the right (left ventricle first, LVF) or the left ventricle (right ventricle first, RVF) up to 80 ms.

Results. Maximum dP/dt was better in 9 pts with LVF and 1 pt with RVF compared to BP. The optimal inter-ventricular interval in LVF was 48 ± 23 ms. When LVF was compared to LP, there was no difference in optimal dP/dt (p – 0.864) or atrio-ventricular interval (respectively 151± 36 ms and 157 ± 29 ms). Optimal dP/dt was reached in 6 pts with LVF and 5 pts with LP, in 2 pts both with both modes.

Conclusion. In a majority of pts, activation of the left before the right ventricle significantly improves dP/dt compared to simultaneous biventricular pacing, even with the same atrio-ventricular delay . Left ventricular pacing alone has similar results but at an atrio-ventricular delay when fusion with normal conduction is likely, mimicking biventricular pacing with activation of the left ventricle first.

Maximum dP/dt according to pacing mode

Pacing mode	dP/dt	Difference with AP	Difference with BP
AP	749 ± 138	-	p=0.0013
BP	902 ± 182	p = 0.0013	-
LVF	966 ± 184	p = 0.0002	p = 0.0191
RVF	890± 157	p = 0.0008	p = 0.3033
LP	971 ± 195	p = 0.0003	p = 0.0107