

1042-159 A Bidirectional Superior Cavopulmonary Anastomosis Improves the Mechanical Efficiency of Dilated Atrio-pulmonary Connections: Quantitative In Vitro Studies

A.C. Lardo, S.A. Webber, I. Frenhs, P.J. del Nido, E.G. Cape. *Children's Hospital of Pittsburgh, University of Pittsburgh, PA and Boston Children's Hospital, Harvard University, Boston, MA, USA*

Background: Besides cardiac transplantation, there are few therapeutic options for patients with failing dilated atrio-pulmonary connections (APC). While conversion to a total cavopulmonary connection has been suggested as an option, this procedure is technically difficult and requires additional intra-atrial suture lines. We addressed the hypothesis that the use of a bidirectional superior cavopulmonary anastomosis (BSCA) improves the fluid dynamic efficiency of the dilated APC.

Methods: Dilated APC were performed on explanted sheep heart preparations and perfused in an in vitro flow loop. A mechanical energy balance was performed for five flow indices (2-6 l/min/m²) both prior to, and following incorporation of the BSCA. Caval flow ratio (IVC/SVC) was held constant at 1.5. A novel contrast echocardiographic technique was used to quantify the distribution of inferior vena cava flow (hepatic venous return) into the branch pulmonary arteries. Laser induced fluorescence particle tracking flow visualization was performed on transparent cast replicas both with and without the BSCA and compared to qualitatively delineate regions of flow inefficiency.

Results: Fluid power losses and right atrial pressure decreased 32% and 25% respectively with the use of the BSCA at a flow index of 4 l/min/m² (p < 0.001). The distribution of total and IVC flow to the right pulmonary artery with a BSCA was 62 and 38% respectively. Flow visualization confirmed less disordered flow in the right atrium with the BSCA due to a reduction of caval flow collision.

Conclusions: A BSCA reduces fluid power losses and provides a physiologic distribution of total flow, while maintaining IVC flow (hepatic venous return) into each branch pulmonary artery. Incorporation of the BSCA may be a technically simple and effective alternative to complicated APC take-down procedures and conversions to total cavopulmonary connections in selected patients with failing APC.

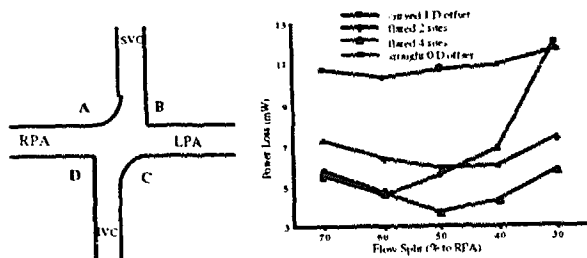
1042-160 Flaring of the Vessels at the Total Cavopulmonary Connection (TCPC) Site Further Reduces Power Losses

A. Ensley, P. Lynch, D. Norman, C. Lucas, G. Chatzimavroudis, A. Yoganathan, S. Sharma. *Georgia Institute of Technology, Atlanta, GA, USA; Emory University, Atlanta, GA, USA*

Background: We have previously investigated the effect of offsetting and curving the cavae at the TCPC site. Under certain flow conditions, curving the vessels forced flow to turn around large angles with resultant high energy losses. We hypothesize that the introduction of smooth flaring at the site would reduce losses.

Methods: Glass models of five flared designs with 0 and 1 SVC diameter offsets were used to mimic the TCPC site. Flaring was done as either combinations of two sites (e.g. A, C) or all four sites. The SVC:IVC flow ratio was fixed at 40:60 while the RPA:LPA flow ratio was varied from 30:70 to 70:30 in 10% increments to model variable pulmonary resistance. Steady flow power loss measurements, MRI gradient echo, and flow visualization were all done at 4 l/min.

Results: Figure 2 shows that the flared-all design with one diameter offset had the least power losses. Unlike in the curved models varying flow splits had no significant effect in the flared models. Compared to the flared-all offset design, the two site flared designs had higher losses. Two dimensional MRI gradient echo flow analysis shows that the flared-all design makes a smoother transition of flow from cavae to PA. This is also consistent with the flow visualization.



Conclusion: The incorporation of fully flared caval inlets optimizes the energy conservation within the TCPC connection under all flow conditions, making flaring a clinically suitable option.

1043 Beta-Blockade: New Uses and Old Indications Revisited

Monday, March 30, 1998, Noon-2:00 p.m.
Georgia World Congress Center, West Exhibit Hall Level
Presentation Hour: 1:00 p.m.-2:00 p.m.

1043-53 Significance of Propranolol Effects on the Irregularity of Ventricular Rate in Chronic Atrial Fibrillation

S. Rokas, S. Gaitanidou, S. Chatzidou, N. Agrios, J. Antonellis, J. Darsinos, S. Stamatelopoulos, S. Mouloupoulos. *Alexandra University Hospital, Athens, Greece*

Background: Propranolol (P) suppresses the atrioventricular node (AVN) conduction and is widely used to slow the ventricular rate (VR) in patients (pts) with chronic atrial fibrillation (AF) and rapid ventricular response. However, in many cases despite the reduction of VR the pts report deterioration of their condition after initiation of P therapy.

Methods: We studied 23 pts (mean age 63 ± 7 years, no serious heart disease) with chronic AF and rapid ventricular response who responded to P treatment (120 mg PO daily) to assess whether the changes in RR interval irregularity (RR-IRR) induced by P could affect the clinical outcome of these pts. "Responders" were considered those pts who had at least a 15% reduction of the average VR. Group I included 13 pts who reported constant improvement and group II included 10 pts who reported deterioration of their clinical condition during the P treatment. Both groups were comparable for age, sex, rate of slowing of the ventricular response and changes in the systolic blood pressure. Twenty-four hour ambulatory ECG recordings were obtained and exercise tolerance tests were carried out before and 15-20 days after initiation of P treatment. The RR-IRR was estimated by analysis of all the 24 hour RR intervals using two methods: the autocorrelation method (lags 1-5) and the variance of differences of each RR interval from the preceding one. The outcome from both methods was almost the same. The results are provided from the second method and comparison between the two groups was made by using the Levene test.

Results: In all 23 pts, linear regression analysis demonstrated an inverse relation between the RR-IRR and the duration of exercise capacity during P treatment (r = 0.857, p < 0.001).

	Before P - After P (differences)		
	RR-IRR	Exercise time (min)	NYHA class
Group I	0.017 ± 0.07	0.25 ± 0.8	1.3 ± 0.4
Group II	0.055 ± 0.023	2.30 ± 1.0	+0.4 plusmn. 0.2
	p = 0.001	p = 0.05	p = 0.001

Conclusion: These data suggest that in pts with chronic AF responding to P treatment, the deterioration of their clinical condition may be attributed to the increase of RR irregularity induced by P.

1043-54 Beta-Blocker Utilization in Congestive Heart Failure: A Survey on 4408 Italian Outpatients Over the Last Two Years

A.P. Maggioni, C. Rapezzi, G. Sinagra, M. Gorni, D. Lucci, L. Tavazzi. *On behalf of IN-CHF Investigators; ANMCO Research Center, Florence, Italy*

Background: Several trials have shown that beta-blockers (βB) reduce morbidity and mortality of the pts with congestive heart failure (CHF). However, only a minority of pts who might benefit from this treatment are actually treated.

Aims of the study were to evaluate in a large population of Italian outpatients: (a) the rate of use of βB over the last two years; (b) clinical determinants associated with their utilization.

Methods: Data were collected by locally trained clinicians using an ad-hoc software. Univariate and multivariate analyses were performed to evaluate the association between clinical variables and βB prescription.

Results: A total of 4408 pts entered the database. Overall, 498 (11.3%) pts were on treatment with βB at study entry. The rate of prescription increased from 9% to 15.7% (March 1995 to January 1997) (p < 0.001). The relationship between clinical-epidemiological variables and βB prescription is shown in the table.

	Age		EF%			Etiology			NYHA		VT	
	<70	≥70	>30	30-30	CHD	DCM	Other	I-II	III-IV	yes	no	
n of pts	2985	1423	961	1852	1849	1361	1198	3054	1354	310	801	
βB%	13.7	6.3	10.5	11.8	10.8	14.2	8.9	12.5	8.5	14.8	13.5	
p	< 0.001	NS	< 0.001	< 0.001	NS							

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