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ENDOTHELIN CONSTRICTS SMALL CORONARY ARTERIES TO PRODUCE MYOCARDIAL ISCHEMIA IN INTACT MINIATURE SWINE

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Endothelin (ET) is a recently discovered peptide that constricts isolated coronary arteries in vitro. We have examined ET's coronary effects in 10 anesthetized closed chest miniature pigs in vivo. Epicardial coronary diameters (CD) by quantitative angiography, transit time for contrast medium (TT), ECG and hemodynamics were measured when normal saline vehicle or porcine ET (1 to 1000 pmol/kg) was infused via a catheter placed in the proximal left anterior descending coronary artery (LAD). Bolus infusion in doses more than 100pmol/kg into LAD invariably resulted in myocardial ischemia as detected either by regional ECG ST segment shift (>0.2mV) or abnormal lactate extraction rate. Angiograms obtained during ET-induced ischemia revealed ≤ 40% CD reduction at any site of LAD. However, a marked decrease in TT along LAD (64±12% of control value) was observed, while TT along circumflex coronary artery was minimally affected (10±9% of control, p<0.01 vs LAD). Arterial pressure and heart rate did not change until severe ischemia occurred. Severity of ET-induced ischemia and decreased TT were significantly attenuated after pretreatment with nifedipine (n=4) or diltiazem (n=5) 0.1mg/kg. In conclusion, ET in doses adopted in the present study caused constriction primarily of small coronary arteries that was severe enough to produce significant myocardial ischemia. Moreover, a Ca^{++} influx into smooth muscle cells via a Ca^{++} channel appears to be involved in the mechanism of ET-induced coronary vasoconstriction.

AORTIC ANNULUS CONTENTION. SURGICAL CORRECTION OF AORTIC VALVE INSUFFICIENCY WITH ANNULUS DILATATION.

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Aortic annulus distension is a major component of aortic valve insufficiency. Restoration of a normal aortic annulus diameter is difficult because aortic annulus has a complex geometry. Contention of the annulus was used in 35 patients by a continuous suture placed at the mid distance between the commissures and the lower part of the sinus of Valsalva. The goal was to restore a normal surface of coaptation of the aortic cusps.

The age ranged from 5 to 65 years (mean 26). Aortic insufficiency was due to idiopathic dilatation (7 patients), rhumatism (15), congenital lesions (10), bacterial endocarditis (3). An associated aortic valve repair was used in 30 patients and mitral valve surgical was added in 10 patients.

The hospital mortality was 1/35, 3% (CL 70% : 0% - 9%). Reoperation for recurrent aortic insufficiency was necessary for 3 patients 9% (CL 70% : 4% - 17%). Post operative assessement of the aortic valve function was performed in 26 patients with Echo Doppler. Insufficiency was minimal in 5 19%, mild in 16 77% and moderate in 4 15%.

Our conclusions are that aortic annulus contention used with the other techniques of conservative surgery is usefull

1- for children in whom valvular replacement is always mandatory,

2- in idiopathic dilatation provided that leaflet pliability is normal.

Monday, March 19, 1990
2:00PM–3:30PM, Room 16
Valvular Heart Disease

EVALUATION OF THE PRESSURE-FLOW RELATIONSHIP FOR NORMAL BIOPROSTHETIC AORTIC VALVES.

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Recently proposed methods of evaluating valve function use pressure-flow relationships (PFR) different from those used by the classic Gorlin equation. The Cannon equation for valve area and the valve resistance use a linear PFR whereas the Gorlin equation presumes a square root PFR. The actual PFR for aortic valves has never been determined in humans, however. We therefore studied 100 patients (mean age 57) undergoing aortic valve replacement with bioprosthetic valves (Hancock and Carpentier-Edwards valve sizes 19-31 mm) to determine the effective exponent of the pressure flow relationship (EXP). Mean pressure gradients (MPG) were measured with Millar catheters and cardiac outputs by thermodilution. Measurements were repeated during pacing, volume infusion, and with inotropic support for a total of 319 observations. The EXP was calculated by regressing the log of the flow rate against the log of MPG adjusting for valve size

Results: Flow rates ranged from 68-521 cc/sec (mean 210 cc/sec) and MPG from 2-41.8 (mean 14) mm Hg. The overall EXP was 0.63 ± 0.07 (P<0.001) and was significantly (P<0.05) different from the value of 0.5 predicted by the Gorlin equation (which considers only convective forces) and was also significantly different from the value of 1 predicted by either the recently proposed Cannon equation for valve area or by purely viscous effects (P<0.005). For the larger valve sizes (25-31 mm) the EXP ranged from 0.70 to 1.16.

Conclusion: The EXP of the pressure-flow relationship for normal aortic bioprosthetic valves in humans lies between that predicted by the Gorlin and the Cannon equations and is significantly different from both. Thus, the choice of parameter for evaluating valve function cannot be based on the "correctness" of either pressure-flow model.

INTRA-OPERATIVE EVALUATION OF MITRAL VALVE RECONSTRUCTION BY TRANSESOPHAGEAL COLOUR CODED DOPPLER ECHO-CARDIOGRAPHY

Stan Reichert MD, Renee vd Brink MD, Wybren Jaarsma MD, Harry v Wezel MD, Ad Moulijn MD, Cees Visser MD, FACC
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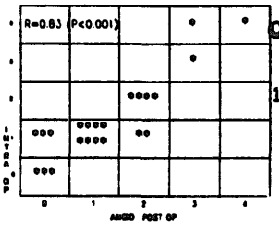
As mitral valve competence after mitral valve reconstruction (MVR) is difficult to evaluate during this procedure, we evaluated in this respect transesophageal colour coded Doppler echocardiography (TEE) in 23 pts undergoing MVR for severe mitral regurgitation (MR). TEE was performed before and immediately after MVR (but before decannulation), at similar mean Ao pressure and echo instrument settings. Degree of MR by TEE was visually quantified on a 5 point scale (0-4) pending LA extent of the regurgitant jet. This was compared with MR by LV cineangiography, performed within 3 weeks.



Conclusions

1) Residual MR after MVR, as assessed by TEE in the operatingroom in cannulated pts, highly correlates with the ultimate MR by cineangiography

2) Therefore, TEE can be helpful to evaluate mitral valve competence during MVR and hence may avoid reoperation