FRIDAY 21 MAY 1993

from 8.15 Registration
9.00–10.30 Grand Hall
Plenary Session: Ventricular architecture heart failure
(chairman: Prof P Poole-Wilson)
(a) The mechanical consequences of changes in ventricular size and shape (Prof M Noble (Chelsea and Westminster Hospitals))
(b) Detection of ventricular enlargement after myocardial infarction (Dr M St John Sutton (Royal Brompton and National Heart and Lung Hospital))
(c) The biology of the renin angiotensin system in the myocardium (Prof S Ball (St James Hospital, Leeds))
(d) Clinical evidence for delay in ventricular enlargement and the onset of heart failure by drug intervention (Dr K Swedberg (Gothenburg, Sweden))

10.30–11.15 Coffee – Exhibition Hall
Sundry Posters – Read Codes, Data on access and availability of CABG and PTCA, Technicians

11.15–12.45 Grand Hall
British Cardiovascular Intervention Society
Panel: Dr R Balcon
   Dr A Fenech
   Dr D Ramsdale
   Dr R Hall
Speakers: Dr Ian Hutton – Complex PTCA
   Dr A Timmis – Graft PTCA
   Dr M Rees – Cardiopulmonary support for PTCA

Avon I & II
General Cardiac Surgery
(chairman: Mr J Dark)
Papers 127–132

9.00–4.00 Avon III
TECHNICIANS’ DAY
9.00 Registration – Coffee on Concourse
9.30 Business meeting
11.00 Poster viewing in Exhibition Hall
1.00 Lunch
2.00 Scientific Presentations
   (a) Ambulatory blood pressure, monitoring principles and practices (Geoffrey Wade (University of Leeds))
   (b) R-R variability in ambulant and bedridden subjects with a normal ECG (Tomasz Kurdziel (Leeds General Infirmary))
   (c) The Leeds experience with 30 implantable cardiac defibrillators (Ann Forrester (Leeds General Infirmary))

12.45–2.00 Lunch in the Exhibition Hall – Sundry Posters

15TH ANNIVERSARY CELEBRATION OF MAJOR EXHIBITION
Complimentary wine and snacks available to all delegates
Meeting ends
MECHANISMS OF PLATELET DYSFUNCTION FOLLOWING CARDIOPULMONARY BYPASS

P Kallis, J A Tooze, S Talbot, D Cowens, D H Bevan, T Treasure
Departments of Cardiological Sciences, Haematology & Cardiothoracic Surgery, St George's Hospital Medical School, London

Platelet dysfunction following cardiopulmonary bypass (CPB) plays a pivotal part in post-operative bleeding. Further understanding of the mechanisms of this platelet dysfunction is required in order to enable more specific therapy by pharmacological manipulation and transfusion of blood products. We studied the changes in platelet function, in 71 patients undergoing elective coronary bypass surgery, pre-operatively (A) and half an hour after reversal of bypass (B).

<table>
<thead>
<tr>
<th>Variable</th>
<th>A (Mean)</th>
<th>B (p value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platelet count (10^9/L)</td>
<td>219</td>
<td>118</td>
</tr>
<tr>
<td>Mean platelet volume (fL)</td>
<td>7.5</td>
<td>7.2</td>
</tr>
<tr>
<td>Plasma vWF activity (IU/dL)</td>
<td>129</td>
<td>99</td>
</tr>
<tr>
<td>Platelet vWF activity (IU/dL/10^11 platelets)</td>
<td>111</td>
<td>152</td>
</tr>
<tr>
<td>Fibrinogen (g/L)</td>
<td>3.1</td>
<td>1.8</td>
</tr>
<tr>
<td>FDPs (mg/L)</td>
<td>151</td>
<td>19.2</td>
</tr>
<tr>
<td>GPlb receptor and aggregation &amp; GPib receptor expression, a decrease in plasma vWF activity but an increase in platelet vWF activity.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PRE-OPERATIVE ASPRIN THERAPY INCREASES POST-OPERATIVE BLOOD LOSS FOLLOWING AORTO-CORONARY BYPASS SURGERY

P Kallis, J A Tooze, S Talbot, D Cowens, D H Bevan, T Treasure
Departments of Cardiological Sciences, Haematology & Cardiothoracic Surgery, St George's Hospital Medical School, London

Pre-operative aspirin therapy has been shown to improve post-operative vein graft patency. The risk of discontinuation of pre-operative aspirin therapy has not been formally assessed in a prospective, randomised, double blind clinical trial. One hundred patients awaiting to undergo aorto-coronary bypass surgery, for the first time, had their aspirin and non-steroidal anti-inflammatory drugs discontinued 2 weeks pre-operatively. They were randomised into two groups. One group received aspirin 300 mg daily and the second group received placebo until the day of operation. Patient compliance was confirmed by serum and urinary salicylic acid analysis. The two groups were similar in demographic characteristics, bypass time, number of grafts placed and number of internal mammary arteries used. All patients survived to be discharged home.

<table>
<thead>
<tr>
<th>Variable (Mean)</th>
<th>aspirin</th>
<th>placebo</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood loss (ml)</td>
<td>1185</td>
<td>791</td>
<td>0.001</td>
</tr>
<tr>
<td>Blood transfused (Units)</td>
<td>3.1</td>
<td>2.1</td>
<td>0.01</td>
</tr>
<tr>
<td>Fresh Frozen Plasma (Units)</td>
<td>0.4</td>
<td>0</td>
<td>0.01</td>
</tr>
<tr>
<td>Platelets (Units)</td>
<td>0.5</td>
<td>0</td>
<td>0.06</td>
</tr>
<tr>
<td>Resternotomy (Number of patients)</td>
<td>4</td>
<td>0</td>
<td>0.05</td>
</tr>
<tr>
<td>Pre-operative Hgb (g/L)</td>
<td>14</td>
<td>14.3</td>
<td>N/S</td>
</tr>
<tr>
<td>Discharge Hgb (g/L)</td>
<td>10.8</td>
<td>11.5</td>
<td>0.001</td>
</tr>
<tr>
<td>% platelet aggregation</td>
<td>59</td>
<td>59</td>
<td>0.01</td>
</tr>
<tr>
<td>Collagen pre-op</td>
<td>50</td>
<td>72</td>
<td>0.001</td>
</tr>
<tr>
<td>Collagen post-op</td>
<td>70</td>
<td>70</td>
<td>0.001</td>
</tr>
<tr>
<td>Ristocetin pre-op</td>
<td>90</td>
<td>92</td>
<td>0.14</td>
</tr>
<tr>
<td>Ristocetin post-op</td>
<td>74</td>
<td>81</td>
<td>0.06</td>
</tr>
<tr>
<td>Arachidonic acid pre-op</td>
<td>4.4</td>
<td>5.2</td>
<td>0.001</td>
</tr>
<tr>
<td>Arachidonic acid post-op</td>
<td>5.8</td>
<td>3.5</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Aspirin decreases platelet aggregation to arachidonic acid and to collagen at a lesser degree, both pre and post-operatively. The benefit of pre-operative aspirin therapy has to be balanced against the risk of increasing post-operative blood loss and transfusion requirements.

DIFFERENTIAL TRANSMYOCARDIAL OXIDATIVE STRESS IN COLD INTERRMITENT AND CONTINUOUS NORMOTHERMIC RETROGRADE BLOOD CARDIOPLEGIA

E D Grech, R Steyn, C M Bellamy, M Baines, E B Faragher, R A Perry, A Rashid, D R Ramadass. Department of Cardiology, The Cardiothoracic Centre, Liverpool

Oxidative damage to ischaemic but viable myocardium may impair functional recovery following bypass surgery. Increased formation and release of cellular oxidised glutathione (GSSG) has been shown to be a sensitive and specific index of myocardial oxidative stress.

We studied 10 patients (mean age: 58.2 SD: 8.7) undergoing aorto-coronary bypass grafting; 5 patients were randomised to intermittent retrograde cold cardioplegia (Group A), and 5 patients to continuous retrograde normothermic potassium blood cardioplegia (Group B) at a flow rate of 200 ml/min. Simultaneous aortic root and coronary sinus blood samples were taken before aortic cross-clamping, and at timed intervals (1, 5, 10, 15 mins) after its removal. Samples were added to N-ethylmaleimide and assayed for GSSG. Trans-myocardial oxidative stress (TMOS) was assessed by the coronary sinus-aortic root GSSG concentration (nmol/L plasma) difference.

Results: In Group B there was no significant change in TMOS after cross-clamp removal. However in Group A there was a sharp increase within 1 min of clamp release (114.5 ± 46.8 to 736.2 ± 264.1, p<0.001), followed by a decline reaching baseline levels at 10 mins. Significant differences between groups were apparent at 1 min (p<0.001) and 5 mins (p<0.05) only.

Conclusions: This is the first study to demonstrate that normothermic retrograde continuous blood cardioplegia does not result in significantly elevated myocardial oxidative stress as is observed with cold intermittent cardioplegia. This may offer cardio-protection against free radical mediated reperfusion injury.

THE EFFECTS OF CARDIOPULMONARY BYPASS UPON GUT MUCOSAL BLOOD FLOW, OXYGEN UTILISATION & INTRAMUCOSAL PH IN A CANINE MODEL IMPLICATIONS FOR GUT BARRIER FUNCTION

SK Obrt, BE Keogh, J Beckett, J Brauma, KM Taylor, Cardiothoracic Unit, Hammersmith Hospital, London W12 OHS

Endotoxaemia following cardiopulmonary bypass (CPB) may play a key role in the development of low output syndrome in the postoperative period. Studies documenting rise in endotoxin and cytokine levels following CPB have postulated gut mucosal hypoperfusion. We have investigated alterations in jejunal mucosal blood flow using laser doppler flowmetry (LDF) and jejunal mucosal pH (pHi) with tonometry and oxygen utilisation within the small bowel in a canine model. Eleven dogs underwent non-pulsatile, hypothermic (28°C) CPB using a bubble oxygenator. After ten minutes of the hypothermic CPB phase, despite no significant reduction in the superior mesenteric arterial flow, mucosal blood flow decreased by 38.2 ± 9.3% (P=0.002), whilst serum flow decreased by 47.3 ± 11.3% (P=0.002). During this hypothermic phase, small bowel O2 consumption fell from 23.0 ± 2.1 to 9.8 ± 1.0 ml/min/kg (P=0.001) and O2 delivery fell from 240.3 ± 27.8 to 116.2 ± 15.3 ml/min/kg (P=0.0002) whilst small bowel O2 extraction fraction remained unchanged at 103.3 ± 1.6%. There was no significant change in jejunal pH. However during the re-warming phase, there was a substantial increase in mucosal LDF above pre-bypass values peaking after 35 minutes at 169.8 ± 26.4% (P=0.02), whilst serum blood flow returned to pre-bypass values. These changes coincided with a surge in O2 consumption (33.7 ± 4.3 ml/kg; P=0.003), whilst O2 delivery remained reduced at 108.6 ± 12.2 ml/min/kg (P=0.0005).

Therefore, the small bowel O2 extraction fraction rose threefold to 35.9 ± 3.8% (P=0.001). The jejunal pHi, an index of overall mucosal perfusion fell to 7.33 ± 0.000 (P=0.001) with an associated drop in mesenteric venous O2 content from 59.4 ± 4.5 to 35.2 ± 1.4 mmHg (P=0.0004) indicating small bowel hypoxia. This study demonstrates that the gut wall undergoes considerable alterations in microcirculatory haemodynamics despite steady large vessel flow. Shunting of blood towards the metabolically active mucosa occurs during the re-warming phase of CPB. There is a disparity in O2 consumption and delivery during this period with resultant mucosal acidosis and villus tip ischemia. These effects may represent the pathophysiological processes contributing to the development of intra-abdominal complications following CPB.
APROTININ REDUCES POST-OPERATIVE BLOOD LOSS BY INHIBITING FIBRINOGENOLYSIS AND IMPROVING PLATELET ADHESION

P Kallis, JA Tooke, S Talbot, D Cowens, D H Bevan, T Treasure
Departments of Cardiological Sciences, Haematology & Cardiothoracic Surgery, St George's Hospital Medical School, London

The present recommendation is that aprotinin should be started before cardiac surgery, but as bleeding is only a problem in a minority, most patients are treated unnecessarily. In a double blind trial we have studied the use of aprotinin, given only to the minority of patients who bled significantly post-operatively. Sixty patients who bled in excess of 400ml in the first 3 post-operative hours were randomised to receive either aprotinin (2x10^11 UU loading dose followed by an infusion of 0.5x10^11 UU per hour for 4 hours) or placebo, in addition to conventional treatment. The surgical procedures performed and the demographic characteristics were similar in both groups. Haematological variables were measured (A) before and (B) at the end of the infusion. Three patients were re-explored for excessive bleeding and one died in each group.

Variable (Mean) aprotinin placebo p value
Blood loss (mL) 895 1206 0.02
Pre-operative Hgb (g/dL) 14.1 14.3 N/S
Discharge Hgb (g/L) 11.5 10.5 0.01
IP-A antigran(ng/mL) 15.8 10.7
IP-A antigen(B) 13.5 14.0 0.03
Fibrinogen (A) (g/L) 1.6 1.6
Platelet vWF activity(A) 136 147
Platelet vWF activity(B) 122 101 0.01

(UU/dL/10^11 platelets)
IP/A = Tissue Plasminogen Activator, vWF = von Willebrand Factor

In addition, we increased the number of surface GPB platelet receptors as estimated by flow cytometry (36% versus 5%, p<0.01).

There was no significant difference in D-Dimers, Fibrin Degradation Products, plasma vWF activity and antigen, platelet: vWF antigen, platelet aggregation (collagen, arachidonic acid and ristocetin), platelet count or translation of blood products between the two groups. Aprotinin used post-operatively reduces blood loss by inhibiting fibrinolysis and replenishing platelet GPB receptors and vWF activity thus improving platelet adhesion.

CARDIOPULMONARY BYPASS INDUCES OXYGEN FREE RADICALS MEDIANED GUT INJURY.

SK Oelt, J Fleming, C Beelegh, J Kechett, J Brannan, KM Taylor
Cardiothoracic Unit, Hammersmith Hospital, London W12 OHS

Clinical studies in patients undergoing cardiopulmonary bypass (CPB) have found impaired intestinal transport and rise in gut permeability, with a tendency towards mucosal hypoxia following hypothermic CPB. We have investigated the role of oxygen free radicals (OFR) species mediated injury of the small intestine following CPB in a canine model. Ten dogs underwent non-pulsatile hypothermic CPB employing a bubble oxygenator. Four dogs were controls, whilst 6 dogs received low dose (2.5 ml/kg; n=3) or high dose (10 ml/kg; n=3) of a perfluorocarbon (Supercytes, Hemagen, USA) suspension during CPB. Jejunal biopsies were taken 1 hour prior to the commencement of CPB and 30 minutes after the termination of the operation. As an index of OFR species injury of the small intestine, the lipid hydroperoxide content of the gut was assayed using a ferric thiocyanate procedure with t-butyl hydroperoxide as the reference standard.

![Graph showing lipid peroxidation levels](image)

The control group had a 146.5 ± 39.1% increase in lipid peroxidation (p<0.03) compared to pre-CPB values, whilst the low dose perfluorocarbon group had a 154 ± 81.8% rise; there was no significant difference between these two groups (p=0.48). However, the high dose perfluorocarbon group had only a 14.2 ± 32.1% increase in lipid peroxidation following CPB, which was significantly lower than the control group (p=0.03). This preliminary study suggests that reperfusion injury may play a key role in the pathogenesis of mucosal damage following hypothermic CPB, which may be ameliorated by increasing oxygen delivery with perfluorocarbons.

WOMEN AFTER CORONARY ARtery BYPASS GRAFT (CABG) SURGERY: HIGHER MORTALITY AND MORBIDITY THAN MEN BUT SIMILAR IMPROVEMENT IN QUALITY OF LIFE?

M Farrer, CJ Albers, KGGM Alberti, PC Adams. Cardiology Department of the Royal Victoria Infnirmary Newcastle upon Tyne and University of Newcastle upon Tyne

Little information is available about differential quality of life outcomes between men and women after a "a" major surgery. Women have been perceived to be doing better for a long time (greater perceived well-being prospectively in 90% of the survivors of 333 consecutive elective CABG operations (age 29-73 yrs, 55 women), using a validated questionnaire, the Nottingham Health Profile (NHP). The NHP has two parts. The first comprises 38 statements relating to 6 areas of normal life. Statements for each area are grouped and scored from 0 (at best) to 100 (at worst). The second part covers 7 activities of daily living and the proportion of subjects with difficulties related to these is recorded. Women had higher 12 month; mortality (15% vs 6% p<0.005), readmission risk (41% vs 29% p<0.05), angina prevalence (35% vs 25% p<0.01), and poorer self-perceived effort tolerance. Part 1 NHP scores were lower in men than women at baseline: Energy 46 ± 31%, pain 25 ± 3%, emotion 23 ± 34%, sleep 30 ± 49%, social isolation 8 ± 15%, mobility 16 ± 38%. All dimensions for men and women were improved by surgery (p<0.001 Wilcoxon signed rank pairs). One year after CABG surgery scores were the same for men and women; pain 9 ± 5, emotion 9 ± 11; but remained higher in women for; energy 23 ± 12, sleep 37 ± 24 **, social isolation 8 ± 4 **, physical mobility 16 ± 7 ** (Mann-Whitney U test). The proportion of women improved was as great as that of men for all part 1 NHP dimensions. For part 2 NHP at baseline a greater proportion of men had difficulties with their; job of work (57% vs 35%), and sex life (63% vs 46%). A smaller difficulties with mood; care of the home (58% vs 91%), and social life (57% vs 74%). Men and women were equally affected for relationships (22% ± 26%), hobbies (75% vs 62%), and holidays (65% vs 78% comparisons by chi square). One year after CABG surgery all areas of life were less affected for men and women (p<0.05 McNemars test) and an equal proportion of men and women affected for all areas except holidays where more women had difficulties (21% vs 15% p<0.05). We conclude that despite higher post operative mortality and morbidity women who survive have similar improvement in self perceived well-being to men.

(131)

(132)

(133)

(134)
NON-INVASIVE ASSESSMENT OF EFFECT OF SUBLINGUAL GTN ON FLOW IN INTERNAL MAMMARY ARTERY GRAFTS
N J Samani, T Harthorne, B Laurie, D Evans, D de Bono
Departments of Cardiology and Medical Physics, University of Leicester.

We have recently described a transcutaneous ultrasound technique for measuring blood-flow in internal mammary artery (IMA) to coronary artery grafts (Lancet 1992; 339: 379-381). In this study we used this technique to assess the effect of sublingual glyceryl trinitrate (GTN) on flow in such grafts. Ten patients (male, age range 42-70 years) who had undergone surgery 3-6 months previously involving a left IMA graft to a previously totally occluded left anterior descending artery were recruited. All patients were asymptomatic. Flow parameters in the IMA graft, blood pressure and heart rate were measured every 5 minutes for 25 minutes after administration of GTN and on a separate control day without drug. The table shows the results as area under the curve changes (+SEM) over the 25 minutes of the study when values were expressed as percentages of value at time 0:

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>GTN</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP (mmHg)</td>
<td>-1.4 (0.7)</td>
<td>-9.0 (2.0)</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>DBP (mmHg)</td>
<td>-0.4 (2.7)</td>
<td>-9.0 (3.4)</td>
<td>0.03</td>
</tr>
<tr>
<td>HR (beats/min)</td>
<td>-0.7 (0.5)</td>
<td>-5.4 (3.1)</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>TAVs (arterial)</td>
<td>-8.4 (5.7)</td>
<td>-22.3 (6.6)</td>
<td>ns</td>
</tr>
<tr>
<td>TAVd (venous)</td>
<td>-8.0 (5.1)</td>
<td>-5.4 (13)</td>
<td>ns</td>
</tr>
<tr>
<td>TF (systolic)</td>
<td>-9.0 (6.3)</td>
<td>-6.8 (8.9)</td>
<td>ns</td>
</tr>
</tbody>
</table>

The lack of significant effect of GTN on time averaged velocities in systole (TAVs) and in particular diastole (TAVd), despite significant decreases of systolic (SBP) and diastolic (DBP) blood pressures, indicates that there is a GTN responsive element in the coronary circulation downstream of the origin of the IMA graft. However the finding that total flow (TF) was not increased by GTN suggests that the effect of GTN on peripheral haemodynamics and hence cardiac work is as important (if not more so) in explaining its anti-ischaemic effect as any direct modulation of coronary flow.

Allopurinol pretreatment improves early post operative cardiac function and reduces lipid peroxidation.

In this prospective, randomised, double blind, placebo controlled trial, the impact of low dose (6 - 9mg/kg) allopurinol on post operative recovery, of cardiac function, was assessed. Of 50 patients admitted for routine C.A.B.G., 25 received allopurinol (A) and 25 a matched placebo (P), one tablet at 8pm on the day before and the operation and one tablet with their premedication. Post operative intropin support was required significantly less frequently (5/25 v's 13/25; p < 0.01) and the rate of peripheral warming increased (11.4 ± 8.5 hours v's 14.4 ± 21 hours; p < 0.02) in those receiving A. Twenty of these patients underwent additional invasive haemodynamic monitoring and coronary sinus cannulation. The cardiac index increased over the first 24 hours, in the active treatment group (2.3 ± 1.5 1/min/m² to 3.3 ± 2/min/m²; p < 0.01) but not in the P group (2.6 ± 1.6 1/min/m² to 2.8 ± 1.2/min/m²; p = NS). No differences in capillary wedge pressures between groups were found at any time (up to 24 hours). Thiobarbituric acid reactive substances (TBARS) increased significantly only in the P group, by 19.4 ± 5.8 nmol/mg albumin (p < 0.005) and 24.5 ± 5nmol/mg albumin (p < 0.001) in the coronary sinus at two and five minutes after reperfusion respectively. Expressed as, area under the curve, the increase in TBARS in the coronary sinus, during the first ten minutes of reperfusion was significantly greater in the P group (320 ± 37 mmol min/g albumin v's 113 ± 38 nmol/min/g albumin; p < 0.03).

Conclusion: Prophylactic allopurinol improves post operative recovery in cardiac function. This improvement may be due to a reduction in free radical activity.

QUANTIFICATION OF THE INTRINSIC FIBRINOLYTIC ACTIVITY OF SAPHENOUS VeIN AND THE EFFECT OF SURGICAL PREPARATION PRIOR TO CORONARY SURGERY
The Departments of Cardiac Surgery* and Cardiology**, Groby Road Hospital, Leicester.

The correlation between decreased intrinsic vessel blood flow and reduced fibrinolytic activity and increased HSV thrombosis is well documented. We assessed the effect of distention on the fibrinolytic activity of human saphenous vein prepared prior to coronary artery surgery. Control vein (CV) was obtained using a no touch technique. Dissected vein was distended using uncontrolled techniques (A) or to 120 (B) or 230mmHg (C). Punch biopsies were incubated on fibrin plates and areas of lysis quantified. Tissue (TPA) and urokinase (uPA) type plasminogen activator levels (mg tissue) were measured in homogenised samples using chromogenic substrates.

Sample Lysis/mg TPA/10³IU/mg uPA/10³IU/mg CV* 138.5 (17.8) 6.1 (0.8) 2.4 (0.3) A** 52.3 (8.5) 2.5 (0.3) 0.6 (0.1) B** 114.7 (14.2) 5.4 (0.7) 1.7 (0.3) C** 130.4 (11.5) 4.0 (0.6) 1.9 (0.5) CV* 132.2 (13.0) 6.1 (0.7) 2.2 (0.3) C* 69.4 (8.2) 2.4 (0.3) 0.7 (0.9) *(n=8, *n=9, +n=12) Results expressed as Mean (SD). Uncontrolled distention and distention to 230mmHg impaired fibrinolytic activity v CV (p<0.05) (Wilcoxon test). Distention to 120mmHg maintained activity on fibrin plates (p<0.90). TPA (p<0.38) and uPA (p<0.31) activity was not significantly decreased with increasing distention.

This study is the first to document the effect of distention on the fibrinolytic activity of HSV. Uncontrolled distention by reducing this may contribute to the aetiology of thrombotic HSV graft occlusion.

VIDEOLASER ASSISTED THORACOSCOPIC SURGERY FOR PERICARDIAL EFFUSION
J. Forty, D.A. Waller, G.N. Morris
Department of Cardiothoracic Surgery, Freeman Hospital, Newcastle-upon-Tyne.

Open pericardial fenestration for recurrent pericardial effusion carries a 30 day mortality of up to 60%. Videolaser thoracoscopic surgery (VATS) offers a safer alternative with significant benefits for patients. We have treated four patients with pericardial effusions in this way. Two had malignant effusions (one of bronchial origin and one a mesothelioma), one had severe post pericardiectomy syndrome and one had an idiopathic effusion. Mean age was 43 years (17-60). Three patients underwent repeated aspiration for symptomatic tamponade prior to surgery with minimal relief. The patient with mesothelioma had previously undergone pleurectomy and was admitted directly for fenestration. The procedures were performed under general anaesthesia with the patient in a semi-lateral position. Three 2cm stab incisions in the chest wall were needed; one for the camera and two to perform the surgery. Single lung ventilation was unnecessary and the pericardiectomy was easily visualised and opened without injury to the phrenic nerve. In each patient a window measuring approximately 5cm square was created and a single intercostal drain was left in the pleural space. The median operating time was 52 minutes (45-60) and there were no post-operative complications. Two patients had immediate intra-operative haemodynamic improvement. Median post-operative hospital stay was 4.5 days (2-7). At follow-up at up to 8 months no patient has a recurrent effusion. VATS is a safe and effective way of treating patients with recurrent pericardial effusion, especially appropriate for those with malignant effusions who may be systemically unwell and for whom early discharge from hospital is important.
PREDICTORS OF THE RATE OF PROGRESSION OF AORTIC VALVE STENOSIS.

SW Davies, AD Timmis, MT Rothman, CA Layton, R Balcon.
The London Chest Hospital, London E2.

It is well recognised that mild aortic valve stenosis may progress to severe stenosis requiring valve surgery. However decisions as to the follow-up are often arbitrary as the rate of progression varies widely between individual patients and is difficult to predict. We have therefore studied clinical and cardiac catheterisation data in 115 patients with aortic valve gradients ≥10 mmHg, each of whom had undergone cardiac catheterisation on at least two separate occasions. They comprised 65 men and 50 women aged 17 - 83 (median 56), and the interval between catheter studies was 1 - 26 (median 6) years. The initial aortic valve gradient was 0 - 60 mmHg, and at the second study was 10 - 120 mmHg. The rate of increase in aortic valve gradient ranged from 0 to 37 mmHg per year, median 5.3 mmHg per year. The rate of increase was the same in men and in women, and did not vary with age. The rate of increase was the same in those with an aortic valve gradient at the first catheter study and in those with no evidence of aortic valve disease at the time of the first study, nor did it correlate with the size of the gradient in the former group. It was faster in those with calcification and/or regurgitation at the first catheter study and correlated with the grade of calcification (R=0.38, p<0.001) and grade of regurgitation (R=0.34, p=0.002). The rate of increase was slower in those with rheumatic heart disease than in those without (p<0.01). In contrast with other reports, we found no correlation with serum calcium levels or calcium-phosphate product (p=47, p=N.S).

These data indicate that the rate of progression from mild to severe aortic stenosis varies widely, but is likely to be faster in patients with a calcified and/or regurgitant valve. In these patients more frequent clinical review may be advisable, and early valve replacement might be considered if cardiac surgery is proposed for coexisting coronary artery or mitral valve disease.

ARE BED-SIDE TESTS OF CARDIAC AUTONOMIC FUNCTION USEFUL IN AORTIC VALVE DISEASE?

DR Wallbridge, AAS Rlyami, MK Mandawat, PW MacFarlane, SM Cobbe Department of Medical Cardiology, Royal Infirmary, Glasgow, G31 2ER

Significant aortic valve disease is associated with a risk of sudden death. Autonomic function may be impaired, although testing has been inconclusive. Impaired cardiac autonomic function, assessed non-invasively by spontaneous heart rate variability (HRV) on Holter monitoring, is associated with increased cardiac risk in diabetic, non-diabetic and non-cardiac infarction. We studied the prevalence of impaired cardiac autonomic function in aortic valve disease using bed-side tests and related these findings to heart rate variability.

The study group consisted of 47 patients (mean age 56 yrs) requiring invasive assessment for aortic valve disease (predominant lesion: 23 stenosis; 8 regurgitation; 16 combined) and 49 controls. Patients with hypertension, diabetes, previous MI or beta blocker therapy were excluded. Left ventricular mass index (LVMI) was determined by echocardiography.

Cardiac autonomic function was assessed at the bedside by the heart rate response to the valsala manoeuvre (ratio of longest to shortest R-R interval), to deep breathing (difference between minimal and maximal heart rate), and to standing (ratio of R-R interval of the 30th and 150th beats); and by the blood pressure response to standing (mm Hg fall). Heart rate variability (HRV) was measured on 24 hour ambulatory ECG recordings by overall standard deviation (SDNN) and triangular index (TI).

The aortic group demonstrated an impaired heart rate response to bedside tests (Valsala 1.37 ± 1.90 vs 0.001; breathing 12.65 ± 22.3 vs 0.001; standing 1.10 vs 1.15 ± 0.03); and a greater postural fall in blood pressure (10.1 ± 4.2 mm Hg vs 0.007). In the aortic group, LVMI was increased (208 vs 82 g/m2, p<0.001), and HRV was reduced (SDNN 105.0 vs 137.9 ms, p<0.001; TI 29.7 vs 35.4, p<0.004). Bed-side tests correlated poorly with HRV, apart from heart rate response to deep breathing (r=0.11, p<0.001). A significant inverse relationship was apparent between HRV and LVMI (SDNN r=0.561, p<0.001; TI r=0.411, p<0.01). The only bedside test to correlate with LVMI was heart rate variance on standing (r=0.459, p<0.01).

Conclusions: Cardiac autonomic function is significantly impaired in aortic valve disease. Left ventricular mass index is an important determinant of cardiac autonomic tone. Bed-side tests of cardiac autonomic function correlate poorly with non-spectral measures of heart rate variability.

THE EFFECT OF AORTIC STENOSIS ON CORONARY BLOOD FLOW

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Myocardial ischaemia in aortic valve stenosis (AS) is believed to be due to reduced coronary vascular reserve secondary to left ventricular hypertrophy. Aortic valve replacement (AVR), however, improves angina even when left ventricular hypertrophy persists and other mechanisms of ischaemia may therefore be implicated. The distal left anterior descending coronary artery may be imaged and coronary blood flow (CBF) velocity profiles measured using high frequency transthoracic echo/Doppler. We used this non-invasive technique to examine resting CBF velocity profiles before and after AVR in patients with pure AS and normal coronary arteries. Ten patients (6 male, 4 female, mean age 68 years, range 50-82) were studied the day before and 1 week after AVR. Peak aortic valve gradient ranged from 48 to 150 mmHg, mean 86. Heart rate, blood pressure and peak systolic and diastolic forward flow velocities were not significantly changed following AVR. However, reversed coronary flow in early systole, mean velocity 20.6±3.6 cm/s, was seen in 6 patients before AVR. Commencement of forward systolic CBF was significantly longer before AVR (pre, 0.17±0.02sec; post, 0.08±0.01sec, p<0.001 by t-test). The onset of diastolic CBF was unaffected (pre, 0.48±0.06sec; post, 0.42±0.05 sec). The time from onset of diastolic flow to peak diastolic velocity was significantly longer prior to AVR (pre, 0.15±0.02sec; post, 0.07±0.01sec, p<0.001 by t-test). This is the first study to examine CBF in AS under physiological conditions. Reversal early systolic flow, a delay in onset of forward systolic flow and in attainment of peak diastolic velocity were demonstrated. The reversal of these abnormalities by AVR may reflect reduced ventricular wall stress and increased aortic root systolic pressure and may contribute to the relief of angina when left ventricular hypertrophy persists.

THE ADVANTAGES OF THE INQUE BALLOON CATHETER IN MITRAL BALLOON VALVOTOMY

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Percutaneous mitral balloon valvotomy (PMV) using the Inque balloon catheter was performed in 140 out of 144 attempted consecutive patients (pts) (98%) with severe mitral stenosis (MS), their age range was 10-63 (mean 36) years. Seven pts had had previous surgical commissurotomy, 8 pts were pregnant, 13 pts were in atrial fibrillation.

Results: The mean fluoroscopy time was 15.5 ± 6.4 minutes, mean procedure time was 109 ± 76 min. PMV resulted in a decrease in LA pressure from 23.6 ± 5.2 to 14.3 ± 4 mm Hg (p<0.001). The mitral valve gradient decreased from 15.8 ± 4 to 6 ± 3 mm Hg P < 0.001. The mitral valve area increased from 0.8 ± 0.1 to 1.9 ± 0.3 cm2 (P < 0.001).

Complications: No pts died and there were no embolic episodes. Mitral regurgitation (MR) was encountered in 27 pts (19%). Mild MR developed in 14 pts (10%) and increased by one grade in 9 other pts (6.4%). Moderate MR was encountered in 2 pts and severe MR occurred in 2 pts. A small ASD (Qp/Qs ≤ 1.3) detected by oximetry in 5% of pts and by color flow mapping in 33% of pts. Eighty-five percent closed within 3 months. No hypotension or loss of consciousness was encountered during inflation of the balloon. Conclusions: The advantages of the Inque System are: 1) it has a large diameter (25-31 mm) with low profile (4.5 mm), so it is effective with low incidence of ASD, 2) a shorter procedure and crossing time, 3) a good inflation and deflation rate compared to the reported double balloon technique.
EVALUATION OF THE IMEDIATE RESULTS OF MITRAL BALLOON VALVOTOMY
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Fifty-eight consecutive patients with a mean age of 26 years with severe mitral stenosis underwent mitral balloon valvotomy using the Inoue balloon catheter. All patients had an echo score of 5-8. The mean mitral gradient (MG) was measured by simultaneous pressure recording of left atrium and left ventricle with Doppler examination five minutes after mitral dilatation. The mitral valve area (MVA) measured by the catheter Gorlin method, the Doppler pressure half time (P 1/2 T) method and two dimensional echocardiography (2DE) five minutes after dilatation. The results were compared using the linear regression analysis and the agreement between these methods were assessed using the Bland and Altman statistical method. Results: 1. The MG by catheter was 5.6 ± 1.8 mmHg which had a good correlation with the Doppler derived MG; 4.6 ± 1.7 mmHg with r = 0.7 and using the agreement method it showed that Doppler and Catheter agree well in measuring the MG. 2. The catheter derived MVA was 1.7 ± 0.43 cm² was poorly correlated with the Doppler and 2DE derived MVA. 3. The MVA derived by Doppler P 1/2 T was 1.97 ± 0.24 cm² and had a good correlation with 2DE derived MVA 1.96 ± 0.28 cm² with r = 0.63 and an agreement exists between the MVA derived by P 1/2 T and 2DE. Conclusion: 1. Doppler is accurate in measuring the mean mitral gradient immediately after mitral dilatation and is comparable to catheter. 2. Contrary to the report in literature, the P 1/2 T method is accurate in calculating MVA immediately after mitral dilatation and is comparable to 2DE.