



PRE Operative Care of the High Risk Surgical Patient

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Perioperative Optimization

Shoemaker
oxygen delivery
goal directed therapy

ITS NOT JUST ALL ABOUT

Maximising

DO₂

best available evidence

? High Risk

Investigation +
Diagnosis



Anaes. Review

Costs

Staff

Patient

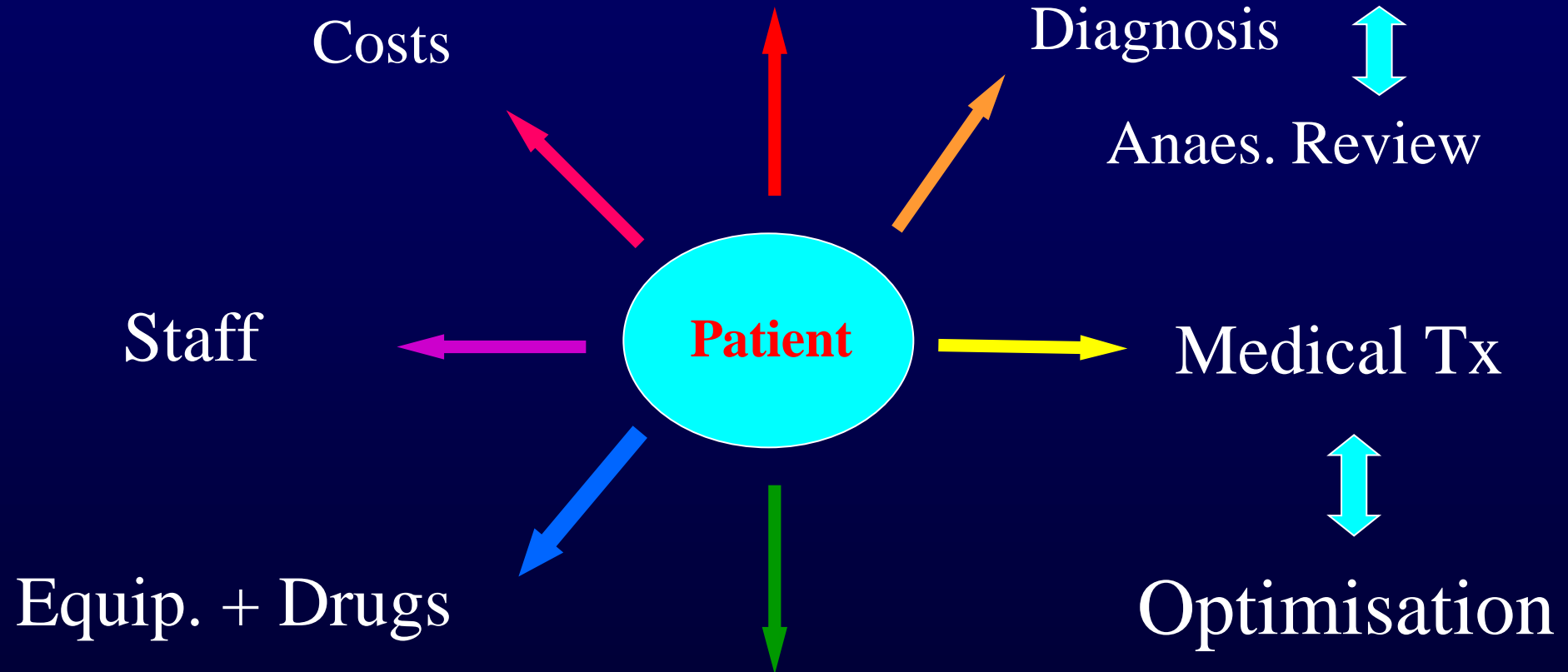
Medical Tx



Optimisation

Equip. + Drugs

Timing of surgery





EUROPEAN
SOCIETY OF
CARDIOLOGY

European Heart Journal (2009) 30, 2769–2812
doi:10.1093/eurheartj/ehp337

Guidelines for pre-operative cardiac risk assessment and perioperative cardiac management in non-cardiac surgery

The Task Force for Preoperative Cardiac Risk Assessment and Perioperative Cardiac Management in Non-cardiac Surgery of the European Society of Cardiology (ESC) and endorsed by the European Society of Anaesthesiology (ESA)

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Incidence in Europe of complication following major non-cardiac surgery

- Cardiac death 0.5-1.5%
- Major cardiac complication 2-3.5%
- EU population 490 million, 7 million high risk procedures per annum
- 150,000 to 250,000 life threatening cardiac complications in EU per annum

High Risk Case

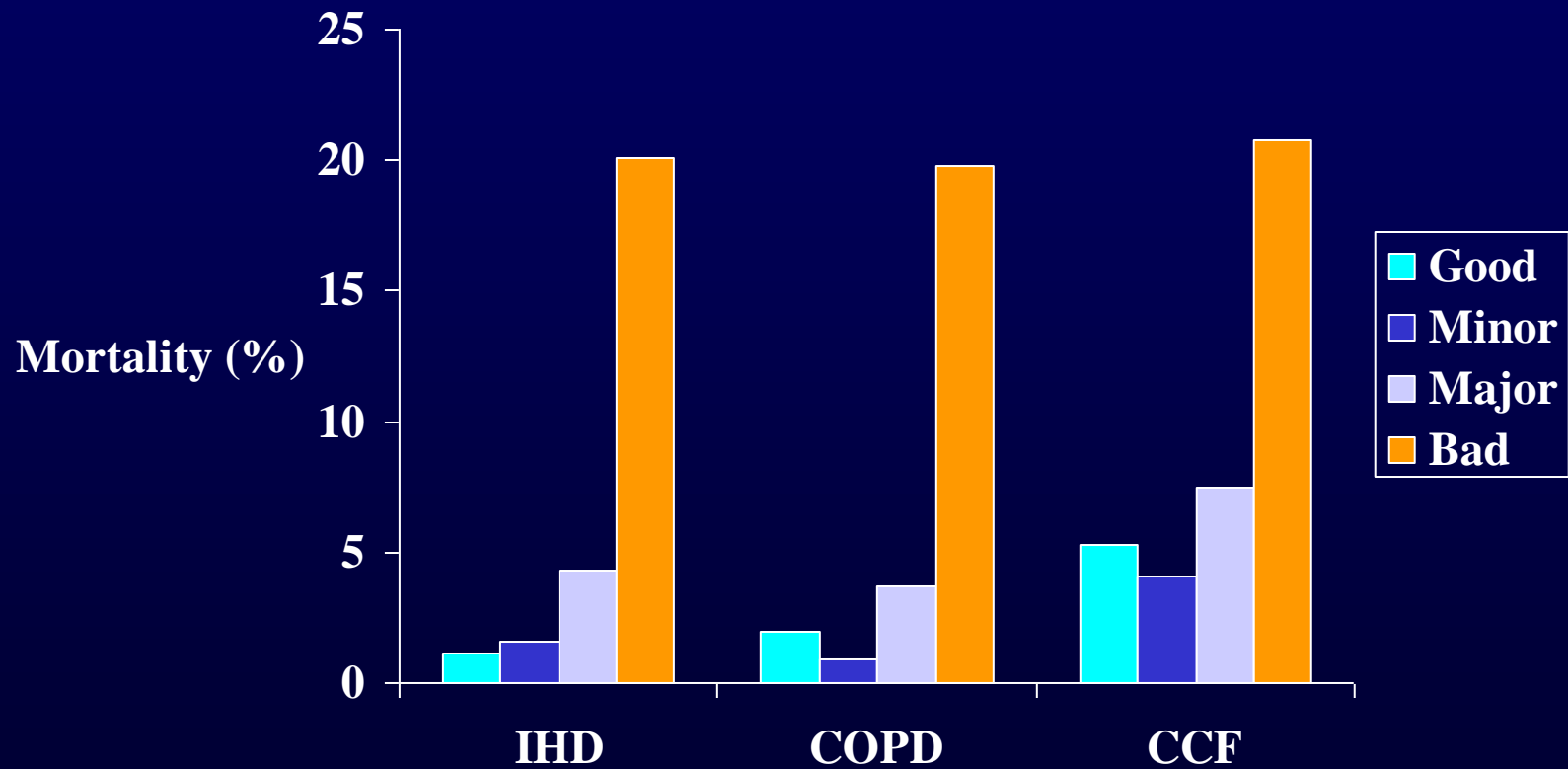
- Condition of patient
- Co-morbidities
- Magnitude and Duration of surgery
- Non cardiac complications
- Cardiac complication
 - Chronic mismatch myocardial supply/demand
 - Acute plaque rupture
 - LV failure

Surgical factors

body cavity surgery/vascular surgery

- Changes core temperature
- Blood loss
- Fluid shifts
- Stress response
 - Hypertension
 - tachycardiac
- Prothrombotic

Surgical Mortality



Farrow, BJA, 82

Patient Selection

Shoemaker et al Crit Care Med 1982: 10; 398.

Shoemaker et al Am J Surg 1983: 1; 43.

Shoemaker et al Chest 1988: 94; 1176.

Shoemaker in a series of
observational studies
demonstrated a group of patients
that he called “**High Risk**”
and who had a 28 day mortality of
30- 40 %.

Shoemaker Used Simple Clinical Criteria to Identify These Patients

- Previous severe cardio-respiratory illness
- Late stage vascular disease
- Age > 70 with limited physiological reserve
- Acute abdominal catastrophe
- Septicaemia
- Respiratory failure
- Acute renal failure
- Massive blood loss > 8 units
- Extensive surgery for carcinoma

Risk Indices for Cardiac Events

- Goldman (1977), Detsky (1986) and Lee (1999)

Lee Index

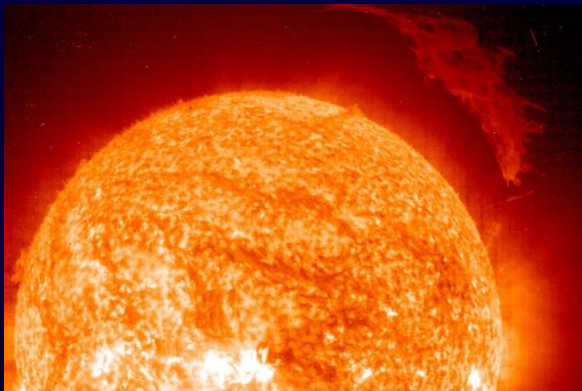
1.	IHD		
2.	Heart failure	Index	Risk
3.	Stroke or Transient ischaemic attack	> 3	11%
4.	Diabetes requiring insulin		
5.	Renal dysfunction		
6.	High Risk surgery		

Type and Timing of Surgery



Routine

Day



Urgent

Damage
Control surgery
CEPOD list



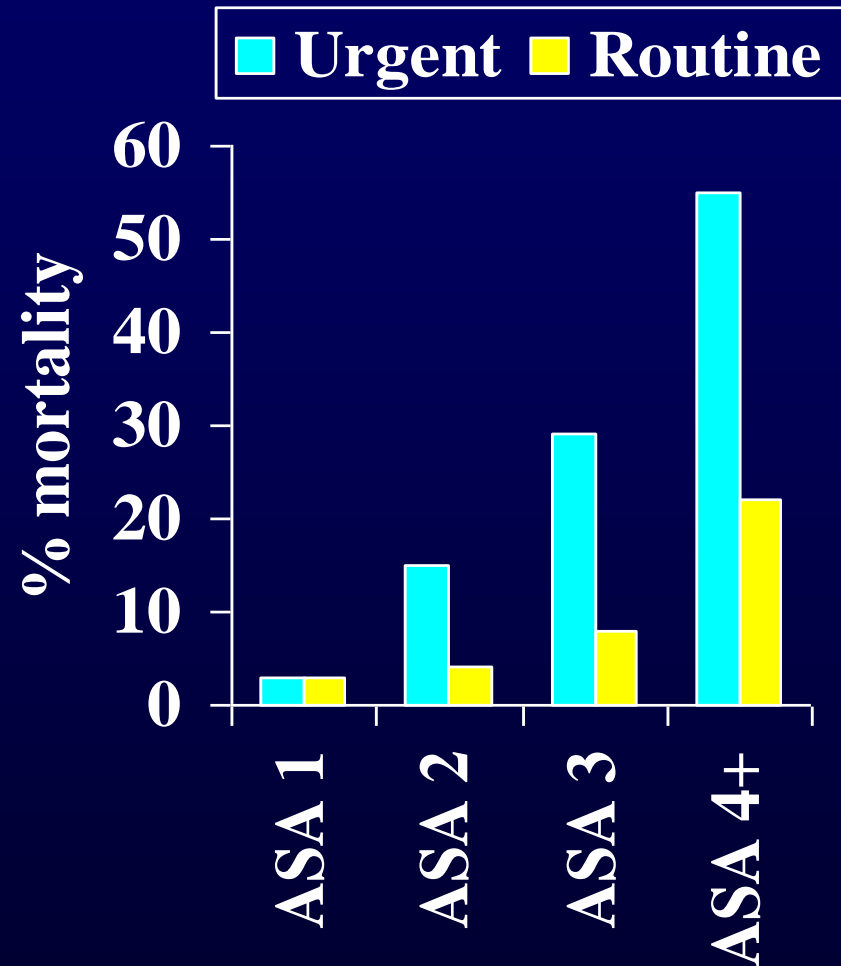
Emergency

Night



Surgical Mortality

- Mella BJS 98
- Colorectal surgery audit
- **Operations carried out urgently have a higher mortality rate**



Type of Operation

Table 4 Surgical risk^a estimate (modified from Boersma et al.⁵)

Low-risk <1%	Intermediate-risk 1–5%	High-risk >5%
<ul style="list-style-type: none">• Breast• Dental• Endocrine• Eye• Gynaecology• Reconstructive• Orthopaedic—minor (knee surgery)• Urologic—minor	<ul style="list-style-type: none">• Abdominal• Carotid• Peripheral arterial angioplasty• Endovascular aneurysm repair• Head and neck surgery• Neurological/orthopaedic—major (hip and spine surgery)• Pulmonary renal/liver transplant• Urologic—major	<ul style="list-style-type: none">• Aortic and major vascular surgery• Peripheral vascular surgery

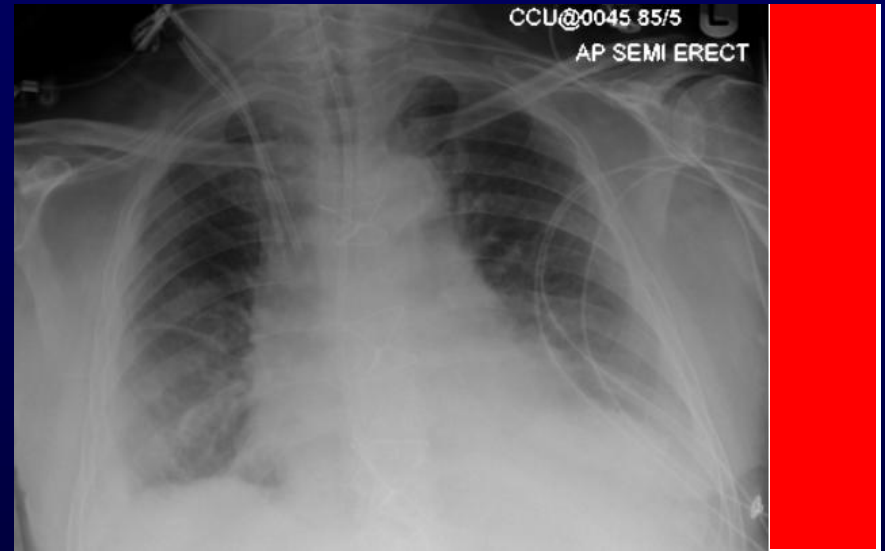
^aRisk of MI and cardiac death within 30 days after surgery.

Preoperative assessment

- High risk patient are clinical priority
- Good communication between surgical and anaesthetic teams required
- Limited time available
- Balance between optimising medical conditions and need for surgery

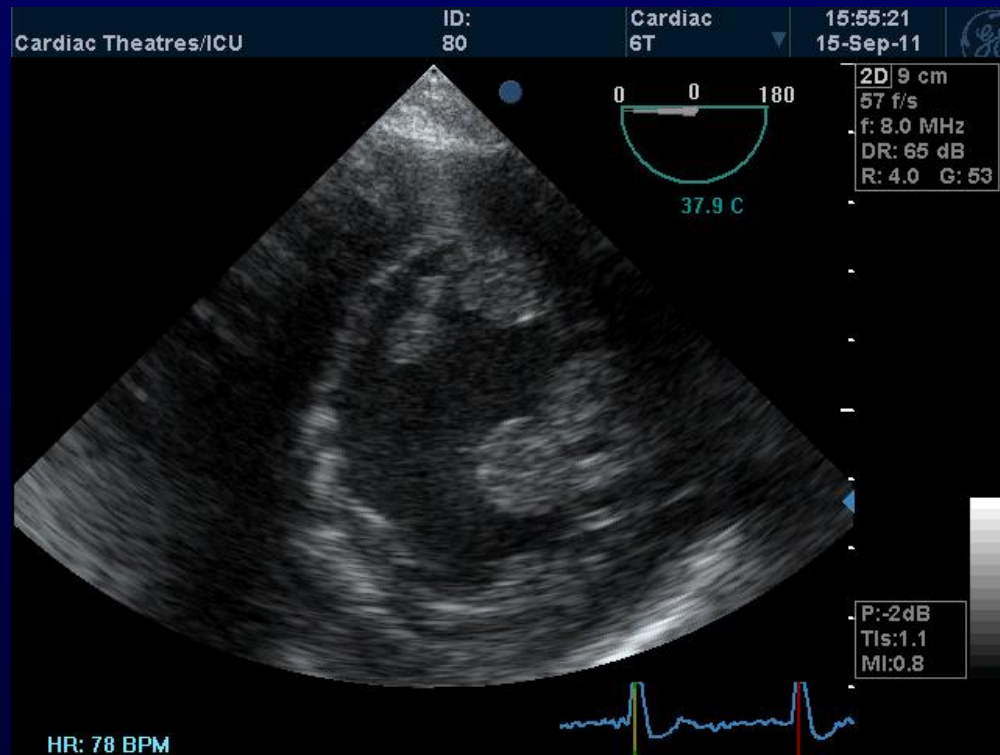
Base Line Investigations

- Full blood count
- Urea and Electrolytes
- Coagulation screen
- Blood Glucose
- ECG
- Chest X-ray



Other Investigations

- Echocardiography in patients with heart failure or murmur
- Significant valvular lesions and impaired LV consider invasive monitoring + HDU



Non-invasive testing IHD

- Is there time available?
- Exercise tolerance test (ETT)
- Myocardial Perfusion Imaging (MPI)
- Stress Echocardiography
- CT or MRI
- Angiography
- CPET

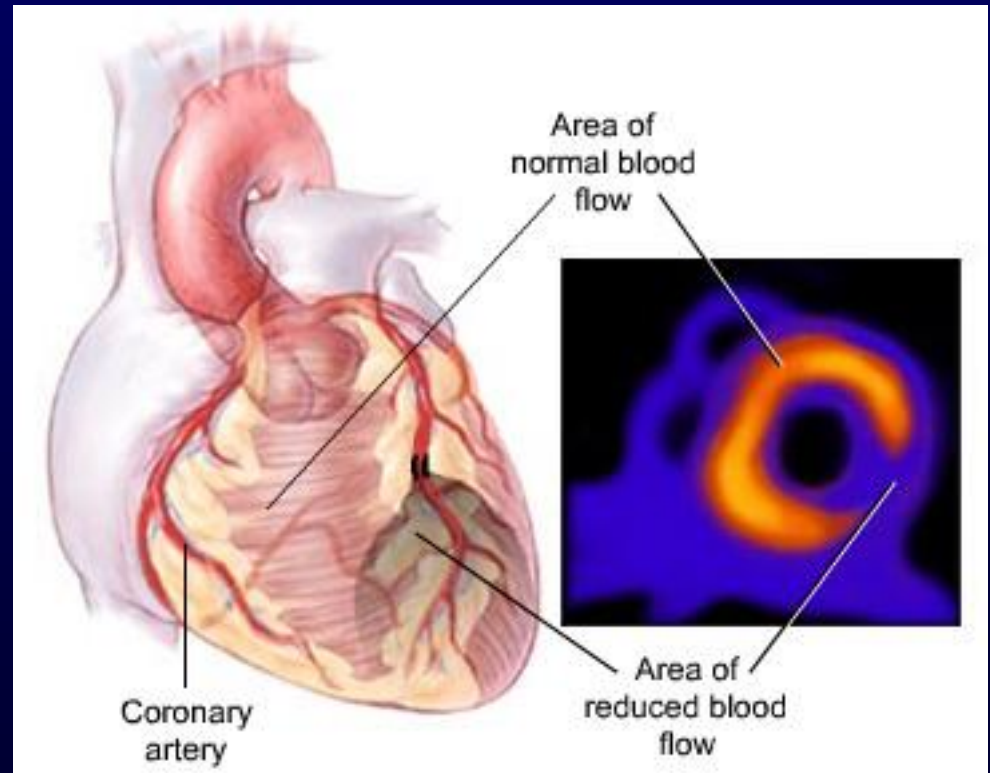
ETT

- Sensitivity 74%, Specificity 69%
- Not suitable for patients who cannot reach ischaemic threshold



Radioisotopes scan

- Dobutamine
- Dipyridamole, Adenosine
- Look for
 - Reversible defects
 - Fixed defects



Meta-analysis MPI (1)

9 studies vascular surgery, end points cardiac death or MI, n 1179, 7% event rate

% LV reversible ischaemia	Lightlihood ratio of ischaemic event
< 20%	No difference
20-29%	1.6
30-49%	2.9
>50%	11

Etchells J Vasc Surg 2002;**36**:534-540

Stress Echocardiography

- Sensitivity 85%, Specificity 70% for cardiac death and MI
- **Negative predictive value 90-100%** (-ve test means safe)
- Positive predictive value 25-45% (+ve test does not Predict post op cardiac event)

Angiography

- Rarely indicated to assess risk and may cause delay
- However is indicated in STEMI/NSTEMI and unstable angina if surgery can be delayed

Respiratory Assessment

- COPD increases risk x 3 of pulmonary complications
- Arterial Blood Gas
- Pulmonary Function Test
 - $FEV1 < 70\%$
 - $FEV1/FVC < 0.65$

Optimisation

- Identify factors that can be optimised in time frame available
- Specialist input
- Pharmacological optimisation
- Medical optimisation
- Physiological optimisation

Pharmacological optimisation

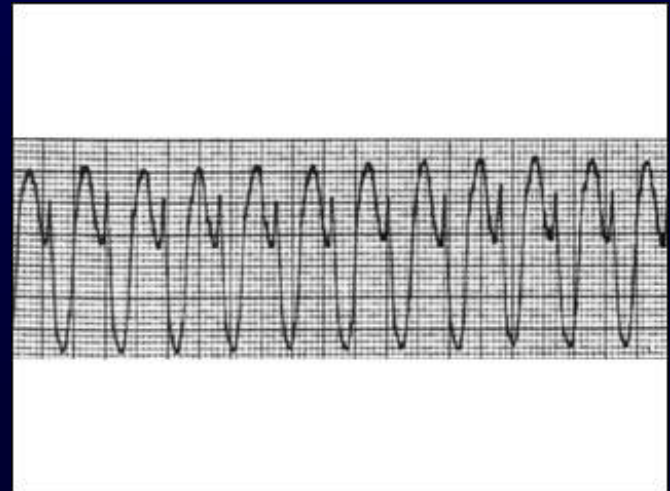
- **B-blockers** – continue established therapy, complex guidelines, POISE
- **Statins** – continue (7.5-fold increased risk of death if stopped)
- **Aspirin** – consider continuing
- **ACE inhibitors** – consider continuing
- **Diuretics** – for hypertension hold, for LVF continue

Recommendations on β -blockers^a

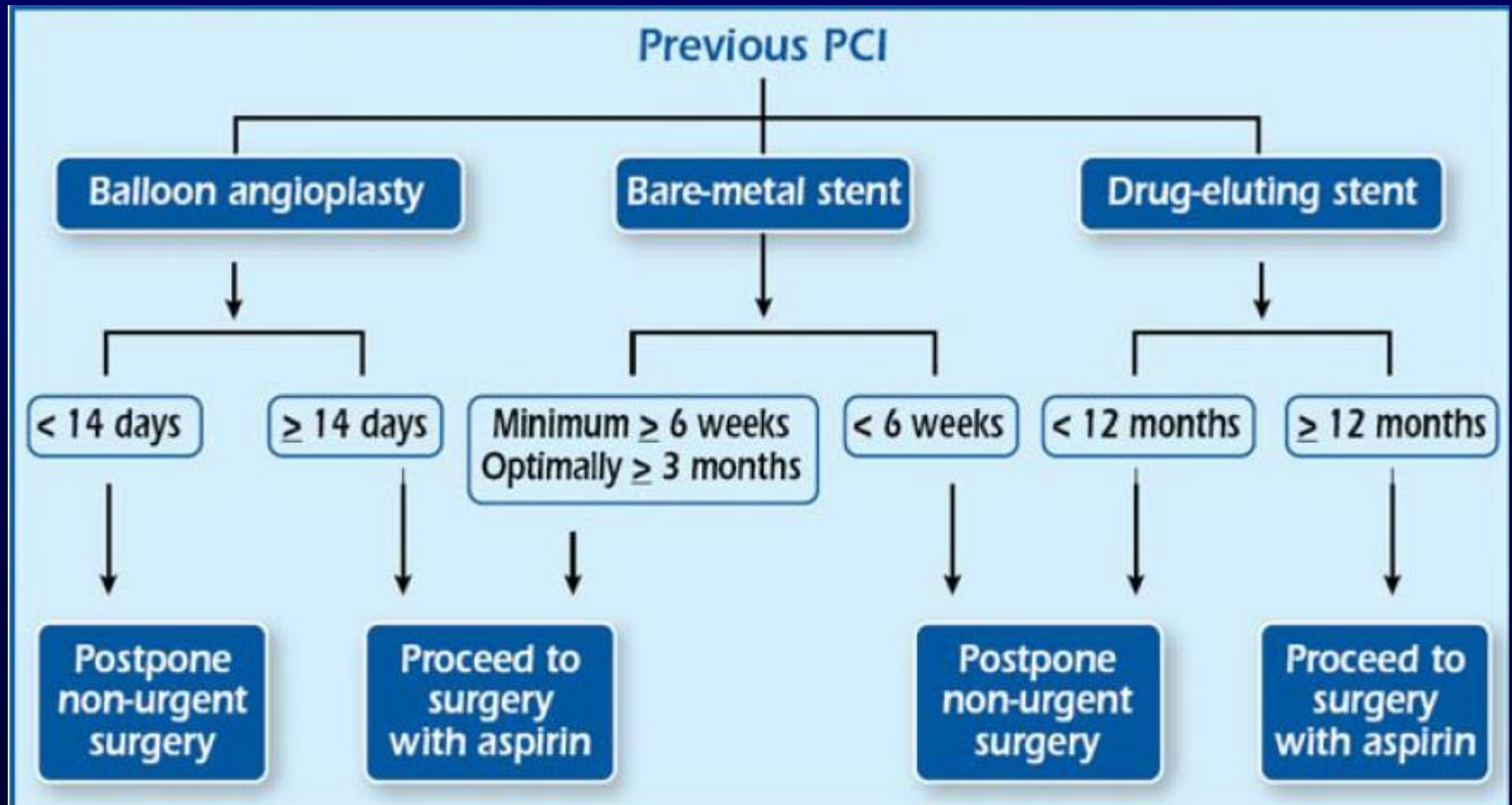
Recommendations	Class ^b	Level ^c
β -Blockers are recommended in patients who have known IHD or myocardial ischaemia according to pre-operative stress testing ^a	I	B
β -Blockers are recommended in patients scheduled for high-risk surgery ^a	I	B
Continuation of β -blockers is recommended in patients previously treated with β -blockers because of IHD, arrhythmias, or hypertension	I	C
β -Blockers should be considered for patients scheduled for intermediate-risk surgery ^a	IIa	B
Continuation in patients previously treated with β -blockers because of chronic heart failure with systolic dysfunction should be considered	IIa	C
β -Blockers may be considered in patients scheduled for low-risk surgery with risk factor(s)	IIb	B
Perioperative high-dose β -blockers without titration are not recommended	III	A
β -Blockers are not recommended in patients scheduled for low-risk surgery without risk factors	III	B

Active Cardiac Conditions

- Unstable coronary syndromes
 - MI within 30d
 - Angina class III or IV
- Decompensated heart failure
- Severe valve disease
- Significant arrhythmias

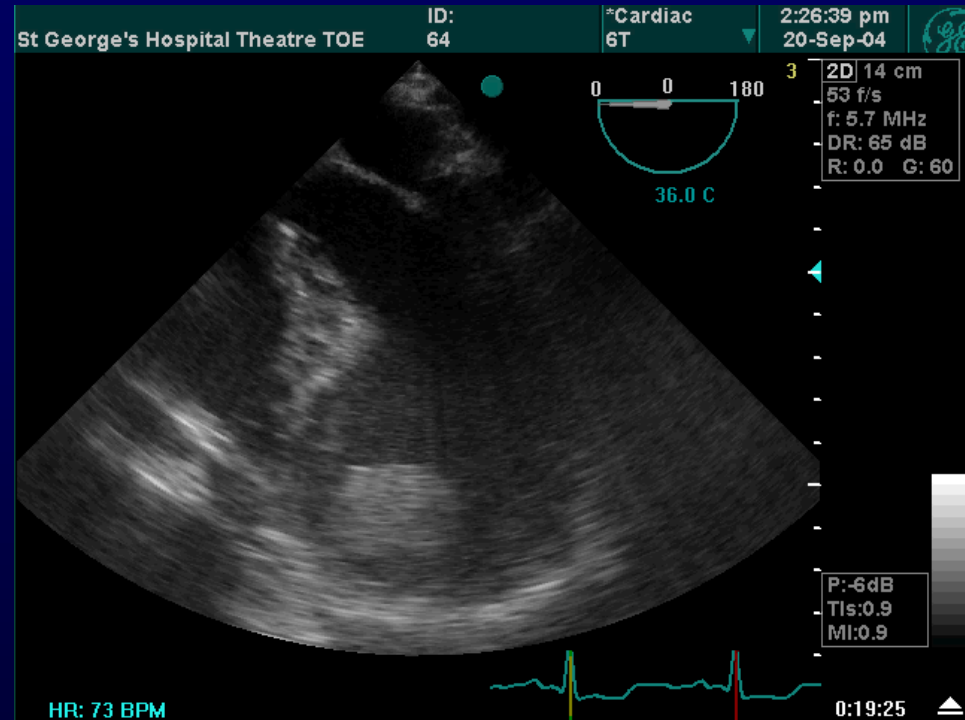
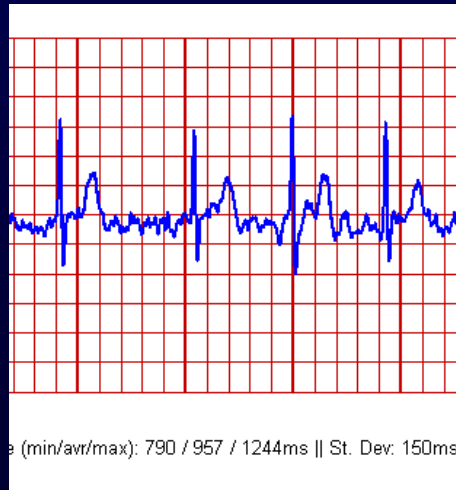


Surgery following PCI



Atrial Fibrillation

- Rate control 80-100
- Consider TOE to exclude thrombus and cardioversion if acute onset



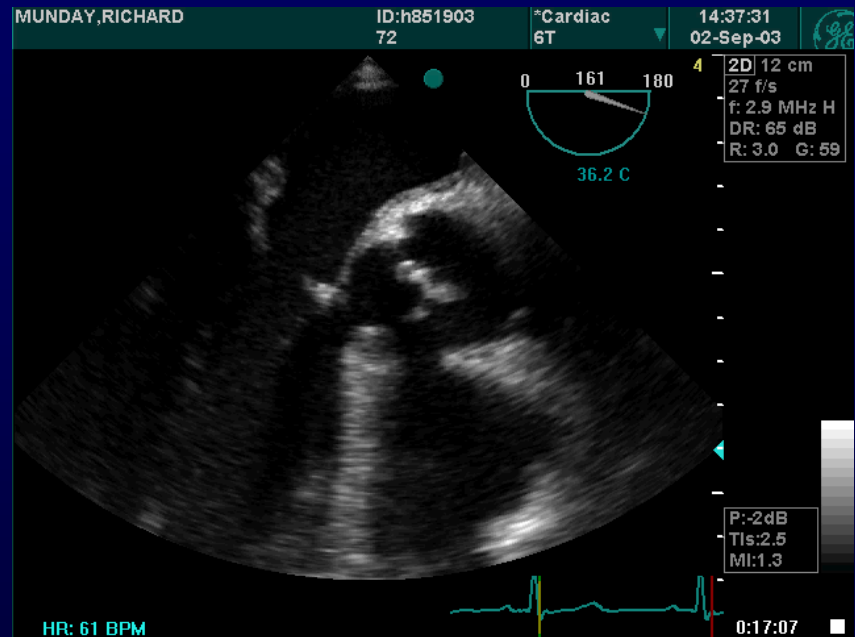
Other Arrhythmias

- SVT/AF
- VPB/non-sustained VT
- SMVT
- SPVT
- Torsades-de-Pointes



Aortic Stenosis

- Severe AS $< 1\text{cm}^2$ risk of MI and death
- Urgent surgery performed with invasive monitoring
- Non urgent surgery delay consider Tx AS



Kertai Am J Med 2004; 116:8-13

Other Valve Disease

- MS symptomatic patients with PHT > 50mmHg high risk
- AR/MR symptomatic patients with LV EF < 30% high risk
- Prosthetic valves antibiotics and anticoagulants

Renal Disease

- eGFR < 60mls/min at risk
- Oral intake
- IVI fluids 1ml/kg/hr
- Vasopressor
- Diuretics
- Dopamine
- N-acetylcysteine (contrast nephropathy)

Other issues

- Diabetes
- Pulmonary disease
- Metabolic derangement
- Pain
- Monitoring
- Anaesthetic

Preoperative Haemodynamic Optimisation or EGDT

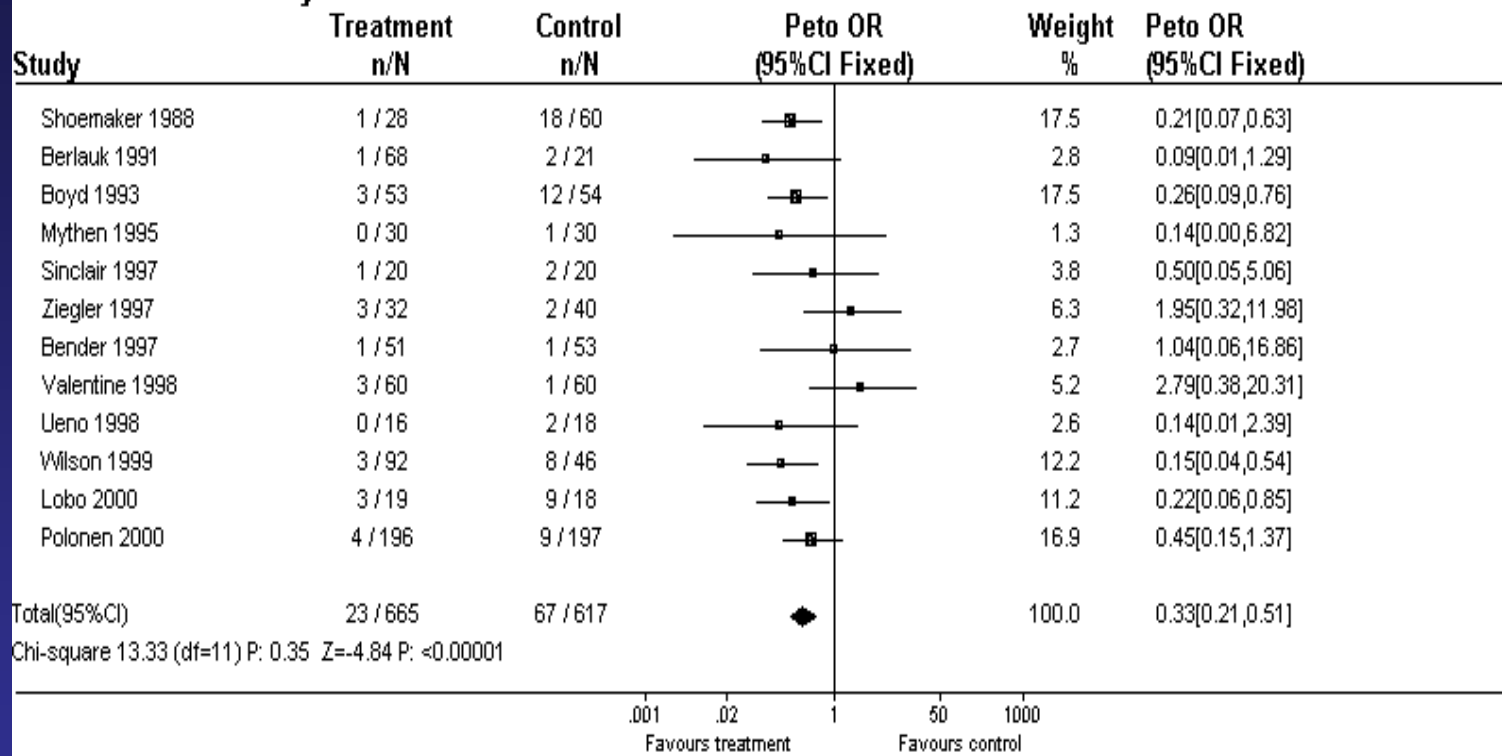
- Multiple studies of varying quality
- Seem to make a difference in outcome in sick patients undergoing high risk surgery if started early
- Use flow monitoring to direct fluids and inotropes

I will discuss this topic in more depth at workshop on friday

Meta-analysis

Comparison: 01 All Studies

Outcome: 01 Mortality



All studies Mortality	Treatment	Control	Peto OR	P
	23/665	67/617	0.33	<0.0001
	3.5%	10.9%		

Grocott M. et al.
2003

