Debata I: LEFT MAIN stenosis
PCI v.s. CABG – surgical side

Academician Mitrev Z

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Which procedure is the best?

Growing uncertainty over role and value of PCI in Multivessel and/or Left Main

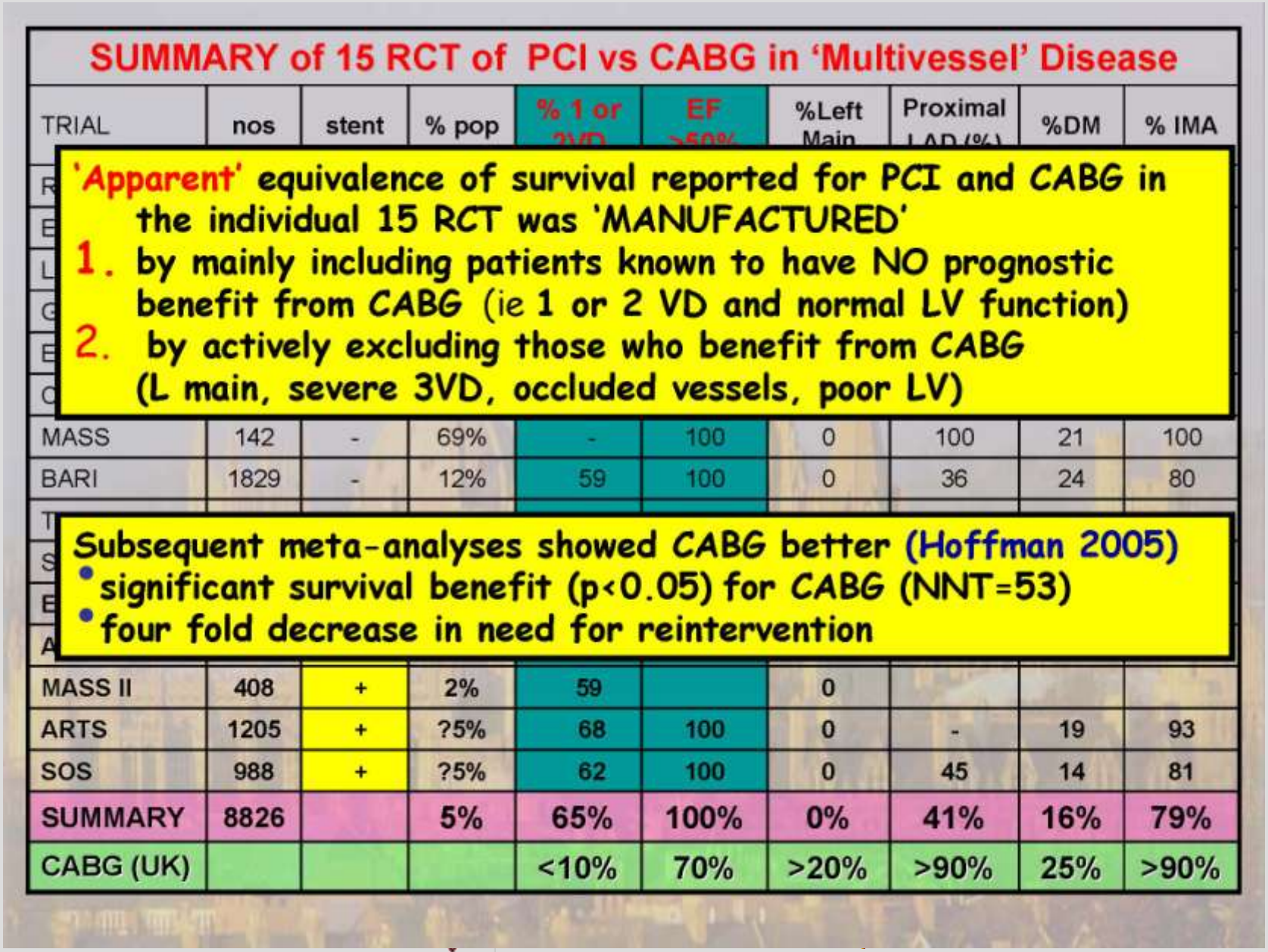
Outcomes (↑ mortality, ↑ reintervention, ↑ risks with DES) • Are patients adequately informed of the risks and limitations of PCI to allow informed consent?

Fergusson Lecture at STS 2006 ATS 2006; 82: 1966-76 •www.sts.org

- **Aim today is to update that lecture and focus on the key issues**
- **1. Evidence basis for LEFT MAIN stenosis- PCI v.s. CABG**
- **2. Evidence basis (absence of ?) for PCI with and without stents**
- **3. Cost effectiveness of CABG vs PCI**
- **4. Appropriateness of cardiology guidelines for PCI ?**
- **5. What information is given to patients and by whom**

Fergusson Lecture at STS 2006 ATS 2006; 82: 1966-76 •www.sts.org

EVIDENCE BASIS FOR CABG:STRONG SCIENTIFIC RATIONALE



TRIAL	nos	stent	% pop	% 1 or 2VD	EF >50%	%Left Main	Proximal LAD (%)	%DM	% IMA
MASS	142	-	69%	-	100	0	100	21	100
BARI	1829	-	12%	59	100	0	36	24	80
MASS II	408	+	2%	59		0			
ARTS	1205	+	?5%	68	100	0	-	19	93
SOS	988	+	?5%	62	100	0	45	14	81
SUMMARY	8826		5%	65%	100%	0%	41%	16%	79%
CABG (UK)				<10%	70%	>20%	>90%	25%	>90%

Five-Year Outcomes After Coronary Stenting Versus Bypass Surgery for the Treatment of Multivessel Disease

The Final Analysis of the Arterial Revascularization Therapies Study (ARTS) Randomized Trial

Patrick W. Serruys, MD, PhD, FACC,* Andrew T. L. Ong, MBBS, FRACP,*

ARTS trial (JACC 2005)		
enrolment	1012 (5-10% eligible)	
	Stent	CABG
% 1 or 2VD	70%	67%
Normal LV	100%	100%
1 yr Death (%)	2.6%	2.6%
5 yr Death (%)	8%	8%
Rpeat Revasc	30%	9%
Medication	++++	+

208 Diabetic Patients		
5 yr Death	13%	8%
Repeat Revasc	43%	10%

SoS (Pepper, WCC Sept 2006)	
988 (5% of eligible)	
Stent	CABG
62%	62%
100%	100%
2.0%	0.8%
10.9%	6.6%*
-	-

142 Diabetic Patients	
17.6%	5.4%
-	-

Question

WHY DOES CABG HAVE SUCH A SURVIVAL BENEFIT OVER PCI ?

- **CABG TREATS BOTH THE 'CULPRIT CULPRIT'LESION AND FUTURE CULPRIT LESION(S), OF ANY COMPLEXITY •**
- **Patients with CAD have diffusely unstable coronary endothelium**
- **CABG places grafts to mid vessel thereby protecting whole zones of vulnerable proximal myocardium against culprit and 'de novo' lesions**
- **PCI only deals with 'suitable' localised proximal culprit lesions and has no prophylactic benefit against new disease**
- **PCI is unlikely to ever match the results of CABG for LM/MVD**

“There is no survival difference between CABG and PCI”

The most widely perpetuated myth in cardiovascular medicine

“The great enemy of the truth is very often not the lie – deliberate, contrived and dishonest –but the myth – persistent, persuasive and unrealistic.”John F Kennedy.

Based on 15 RCT where results were stacked against CABG

Ignoring consistently strong data from numerous large databases which demonstrate survival benefit of CABG

What is the Scale of the Problem with Stent Thrombosis in Over Six million Implanted Drug Eluting Stents?

		label	pts	Follow-up	Stent Thrombosis	Death/MI with Stent Thrombosis
Moreno JACC 2005	Meta-analyses 10 RCT: DES vs BMS	ON	5030	12 mo	0.58 vs 0.54 (0-2%)	-
Jeremias Circ 2004	observational	OFF	652	3 mo	1.2%	75%
Iakovou JAMA 2005	observational	OFF	2229	9 mo	1.3	45%
Park AJC 2006	observational	OFF	1911	19 mo	0.8%	-
Pfisterer JACC 2006	RCT (Basket Late)	OFF	746	7-18 mo	-	4.9% DES vs 1.3% BMS
Spertus Circ 2006	Premier Registry (post MI)	OFF	500	11 mo	-	7.5% if medication stopped vs 0.7%
Eisenstein JAMA 2007	observational	OFF	1501	24 mo	-	7.2% if clopidogrel stopped vs 3.1%

What is the Scale of the Problem with Stent Thrombosis in Over Six million Implanted Drug Eluting Stents?

Universally agreed there is a problem but scale uncertain because of

limited duration and completeness of follow-up

FDA (Dec 2006) accept ↑ risk of thrombosis with 'off-label' use

Thrombosis can occur even on two antiplatelets but highest risk if

- **one or both antiplatelets stopped**
- **'Off Label' Lesions (long/multiple/overlapping/ bifurcation)=80%**

Patients (elderly, diabetes, ACS, low EF, renal failure)

AHA/ACC recommend aspirin + clopidogrel for > one year (JACC 2007)

Bleeding risks

Cost of clopidogrel ($ 1400/year)

'Debating the risks of drug eluting stents' Shuchman NEJM 24 Jan 2007

Summary for CABG vs PCI in stable multivessel CAD

- **For CABG there is consistently strong evidence from databases of >80,000 patients of a significant survival benefit and a marked decrease in the need for reintervention**

- **FOR PCI**
- **There is no evidence from RCT to support its use in multivessel disease (as these patients were excluded from RCT)**
- **All available evidence from large databases show that PCI impairs survival vs CABG and ↑ reintervention by X7**
- **Meta-analyses of PCI vs medical therapy show**
    - **No improvement in survival**
    - **No reduction in myocardial infarction**
    - **No reduction in repeat intervention (? ↑)**

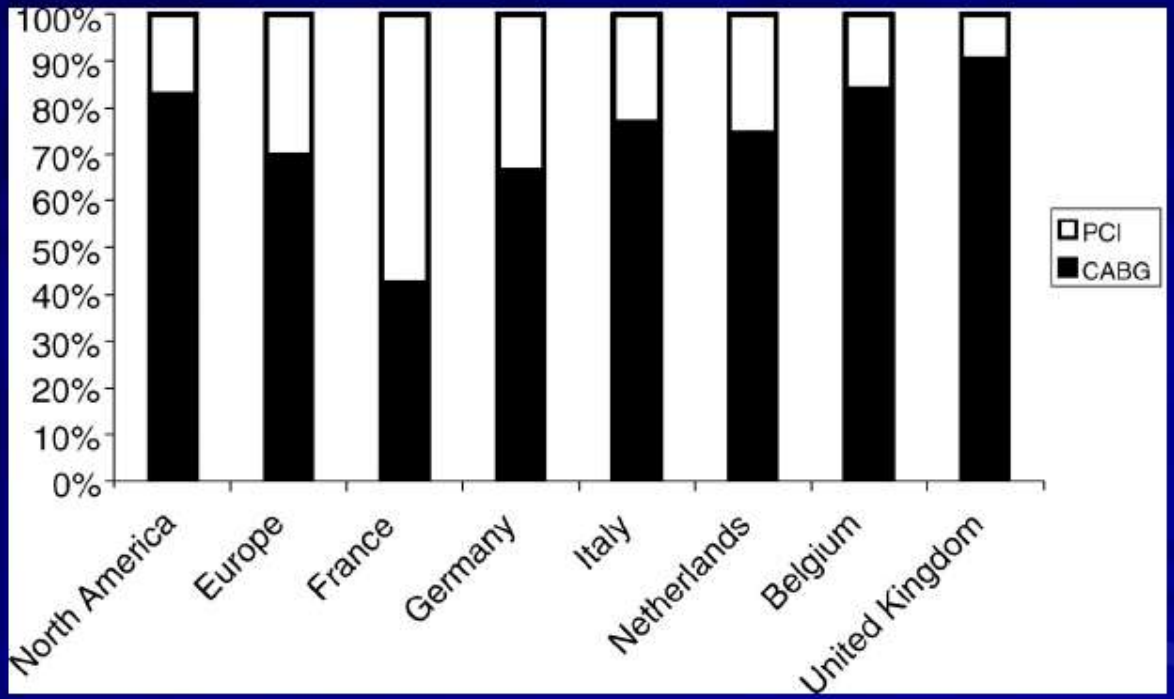
ACC/AHA Guidelines for ACBP 2004

Class I:
-LMN 50%
-LMN equivalent with 70% LAD and LCx proximal stenosis
-Multivessel dissease low ejection fraction
-Proximal LAD stenosis with low ejection fraction

Cost-benefit from stenting

1. Myocardial infarction?
2. Unstabile coronary syndrom
3. Shock cardiogenes
4. Stenting and multivessel dissease ????

Procedure by region or country for left main disease



Kappetein A. P. et al.; Eur J Cardiothorac Surg 2006;29:486-491

EUROPEAN JOURNAL OF CARDIO-THORACIC SURGERY

PCI + Drug Eluting Stents in 'LM

	nos	% elig	Follow	Angio	Stenosis	Death	Revasc
Colombo (Circ 2004)	107	?	12	85%	20%	3%	20%
Park (Am J Card 2006)	116	?	18	82%	13%	0%	5%
Serruys (Circ 2005)	95	?	12	NO	-	14%	6%
Lee (JACC 2006)	50	?	6	42%	-	4%	10%
Price (JACC 2006)	50	?	9	100%	44%	2%	38%

- Baim (JACC 2005) 'with 2% stent thrombosis and 20%-44% angiographic restenosis.. necessary to perform routine angiography perhaps at both 3 and 9 months. Without that safety net, one would expect an up-tick in late mortality .. from unrecognized restenosis in this critical location.
'Because the merit of surgery for LM lesions is based mostly on mortality reduction .. equivalent mortality reduction should be demonstrated by PCI. This may be difficult (despite CABG surgery's higher initial mortality) because over the longer term it protects against events related to entire zones of proximal vulnerability, thereby reducing the incidence or lethality of subsequent myocardial infarctions'.

- Serruys (Circ 2005): 'CABG should remain the preferred revascularization treatment in good surgical candidates with LMCA disease '

- With very strong evidence that CABG is superior to PCI for LM (ie lack of equipoise), are RCT of DES vs CABG justifiable or ethical ? (Taggart NEJM 2006)

Why is PCI replacing CABG against all the available evidence?

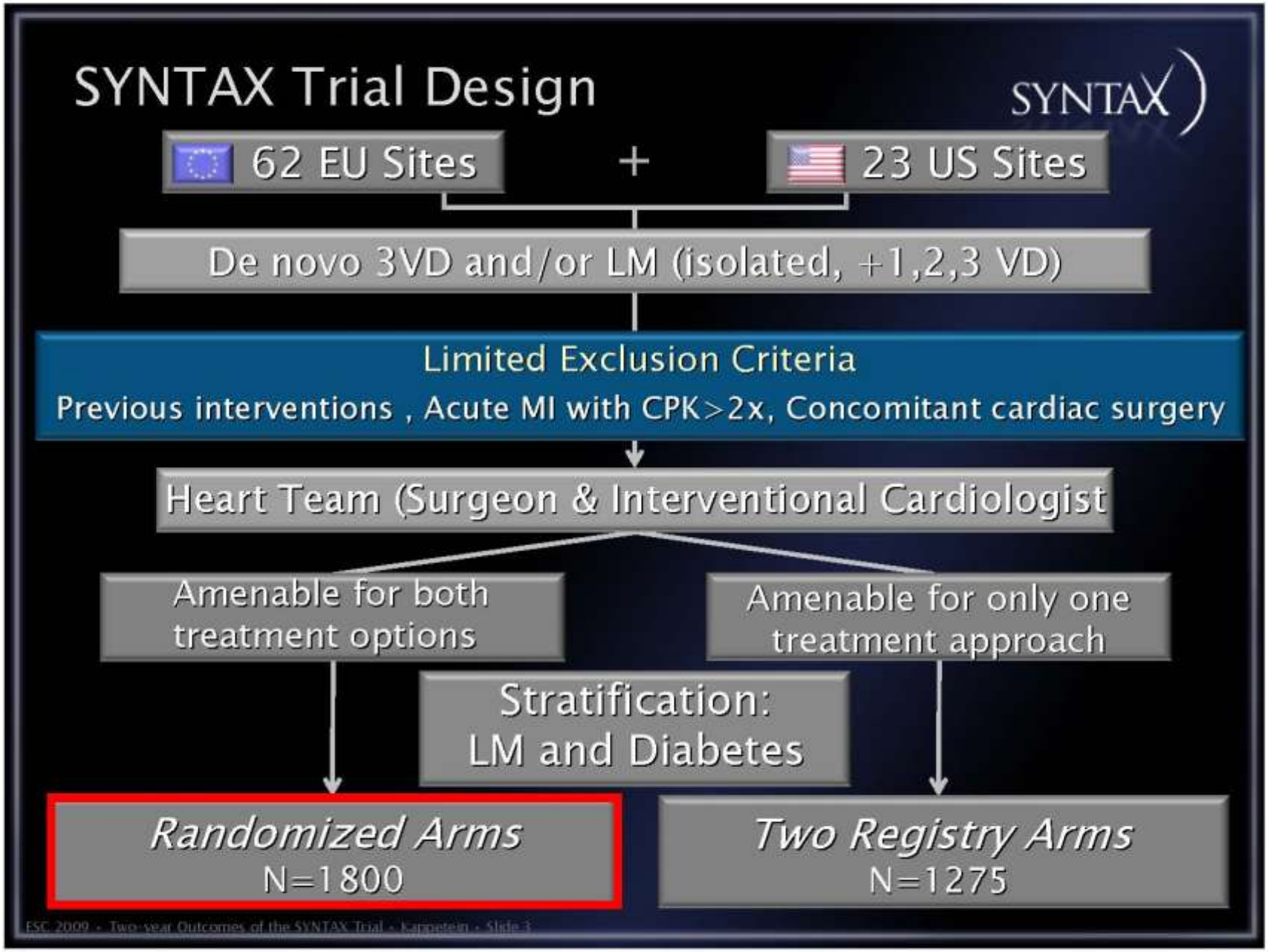
- ***Califf RM. Stenting or Surgery JACC 2005; 46: 589 589-91 :***
- **"It is likely that most people undergoing coronary angiography are not told the entire story when a decision is made about undergoing PCI … self-referral.. financial incentives ..without surgical opinion the patient is in no position to have rational input into the decision"**

Decision depends from patients information

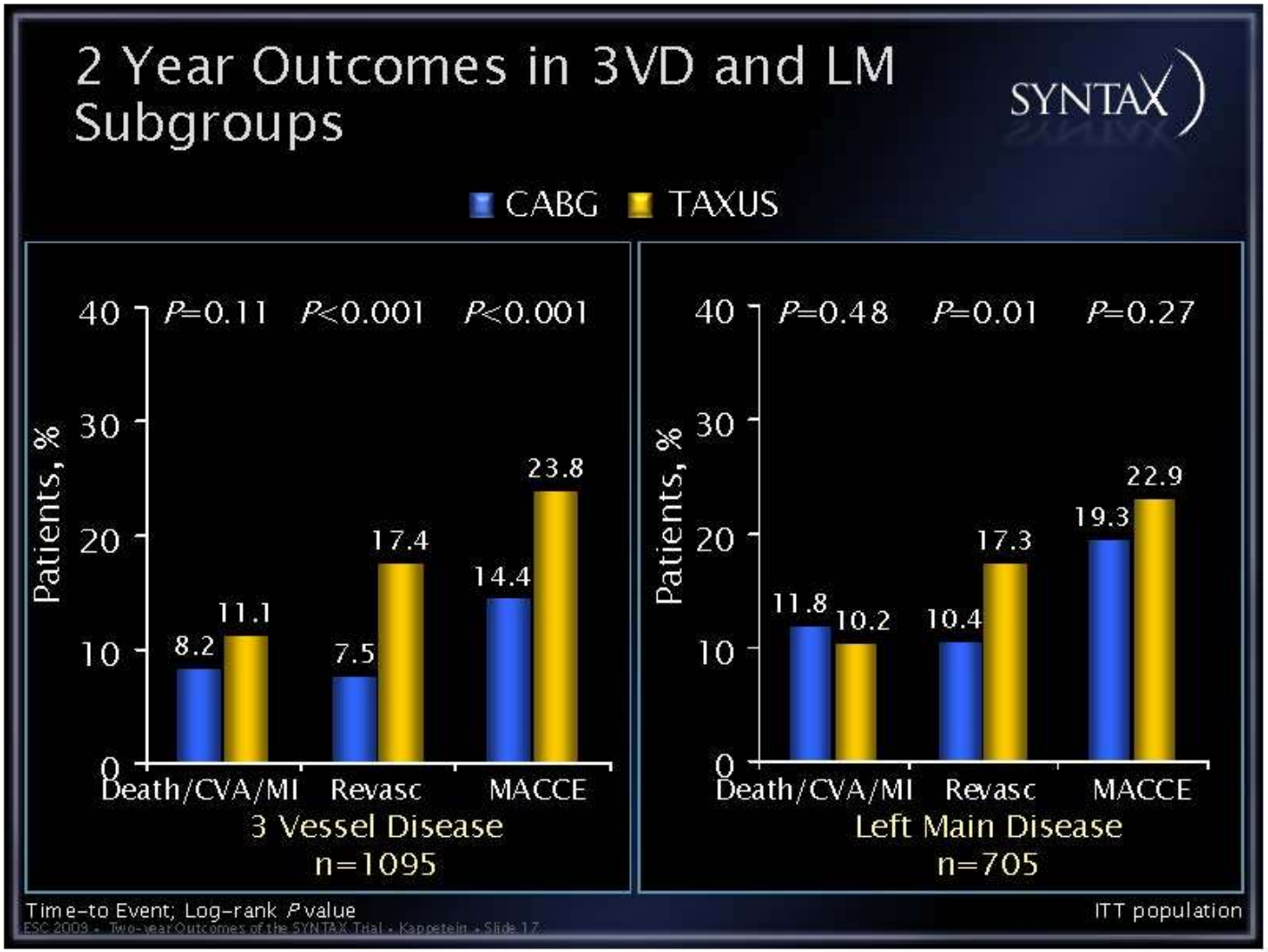
"PATIENTS DO NOT WANT OPERATIONS"

- No one wants any operation
- Patient's decision on CABG depends who presents information and its balanceno patient wants 'cracking the chest' **if the same effect can be achieved with PCI**

- But most patients want the **best treatment and many will accept an operation if it increases survival by 5% (or reduces risk of mortality by 1/3) within 3-5 years**
and allows them to get on with life without repeat interventions and the worry of 'failed stents'


SYNTAX Trial Design
SYNTAX
62 EU Sites
+
23 US Sites
De novo 3VD and/or LM (isolated, +1,2,3 VD)
Limited Exclusion Criteria
Previous interventions , Acute MI with CPK>2x, Concomitant cardiac surgery
Heart Team (Surgeon & Interventional Cardiologist
Amenable for both treatment options
Amenable for only one treatment approach
Stratification: LM and Diabetes
Randomized Arms
N=1800
Two Registry Arms
N=1275
ESC 2009 • Two-year Outcomes of the SYNTAX Trial • Kappetein • Slide 3


Dominance
Number & location of lesions
Left Main
3 Vessel
Total Occlusion
Tortuosity
Bifurcation
Thrombus
Calcification
SYNTAX score
EuroInterv 2005


2 Year Outcomes in 3VD and LM Subgroups
SYNTAX
CABG
TAXUS
Patients, %
40
30
20
10
0
P=0.11
P<0.001
P<0.001
8.2
11.1
7.5
17.4
14.4
23.8
Death/CVA/MI
Revasc
MACCE
3 Vessel Disease
n=1095
P=0.48
P=0.01
P=0.27
11.8
10.2
10.4
17.3
19.3
22.9
Death/CVA/MI
Revasc
MACCE
Left Main Disease
n=705
Time-to Event; Log-rank P value
ITT population
ESC 2009 • Two-year Outcomes of the SYNTAX Trial • Kappetein • Slide 17

Questions

Do you agree with the authors of the SYNTAX trial that CABG should be the standard of care?

- Yes *57%*
- No *43%*

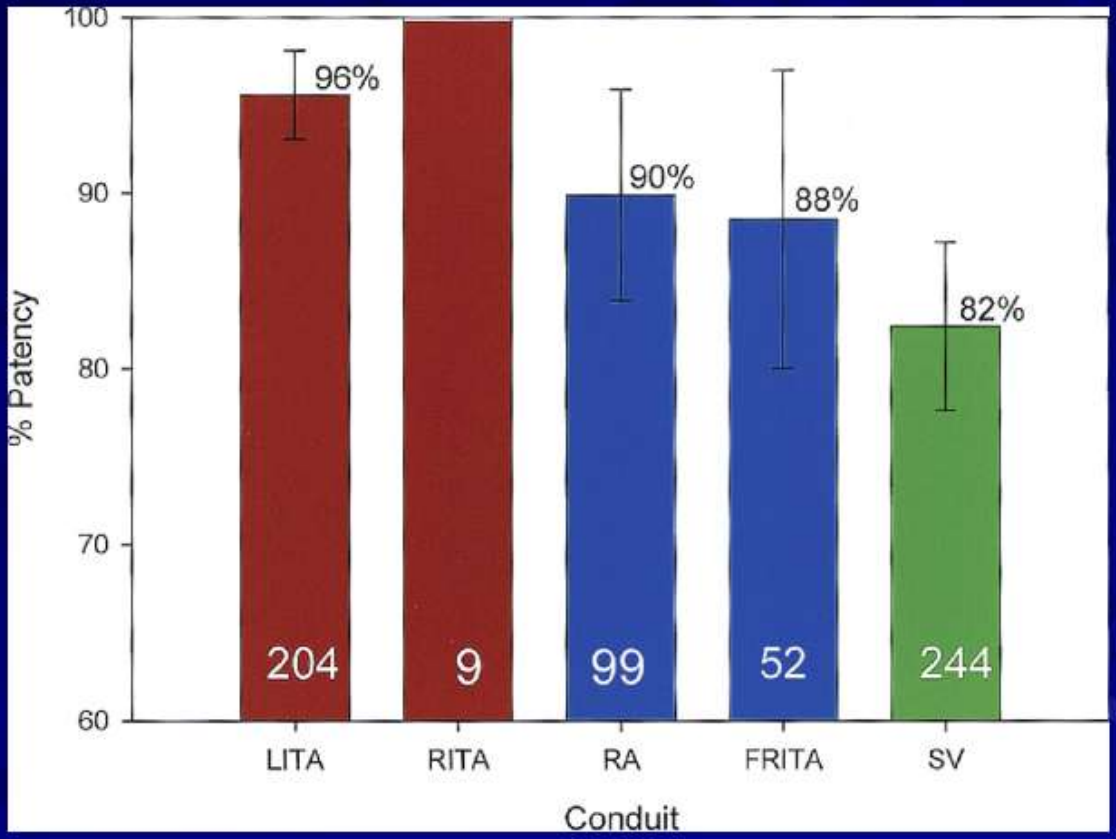
Will the SYNTAX results change the advice you give your patients about the choice of treatments?

- Yes *54%*
- No *46%*

Poll Closed Mar. 4, 2009
(total responses 28 543)

What every surgeon should be able to tell their cardiologists about CABG v.s. Stents for CAD !!!!!

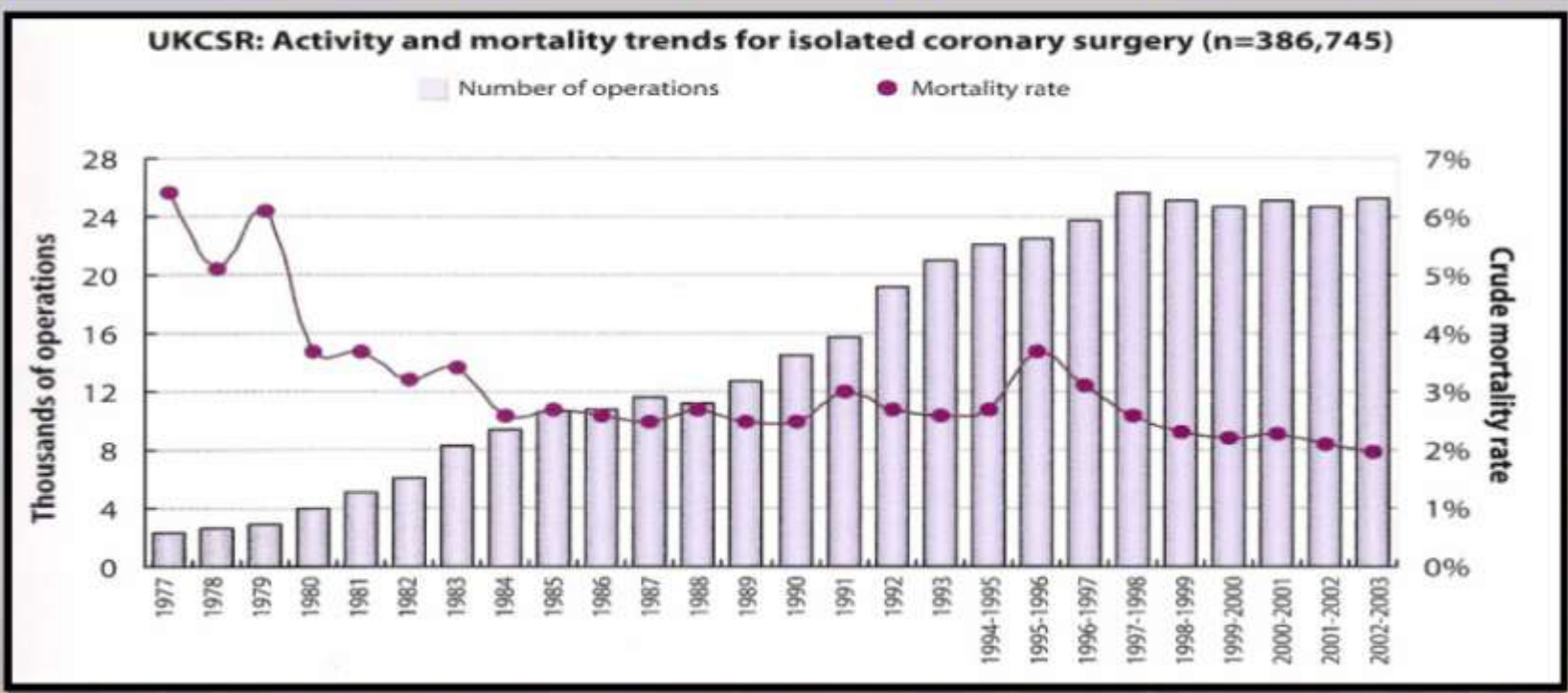
Comparative patencies of different in situ and free arterial conduits at 5 years



Hayward P. A.R. et al.; Ann Thorac Surg 2007;84:795-799

THE ANNALS OF THORACIC SURGERY

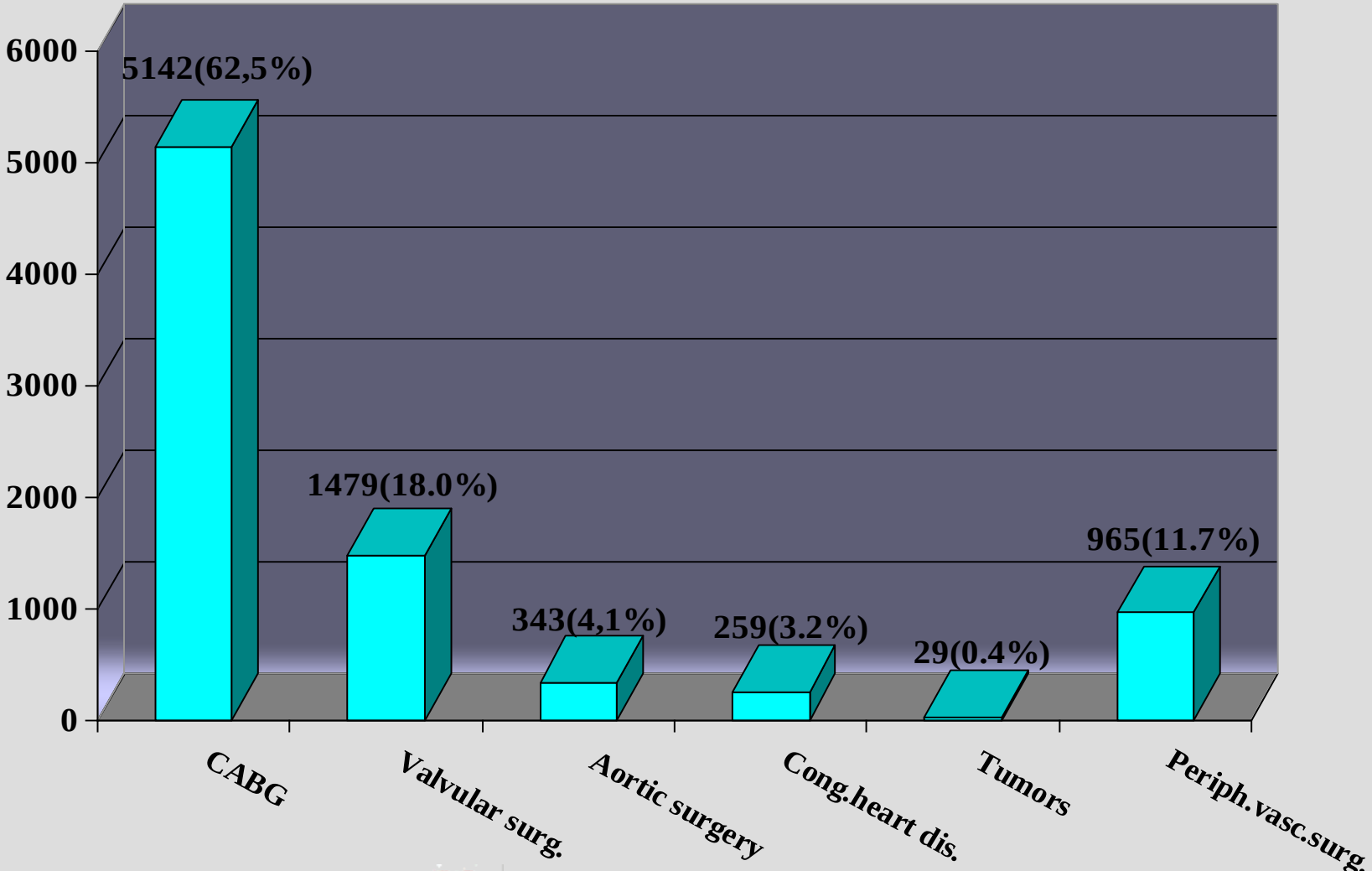
CABG: a very safe,effective procedure (with >40 yr follow-up data)



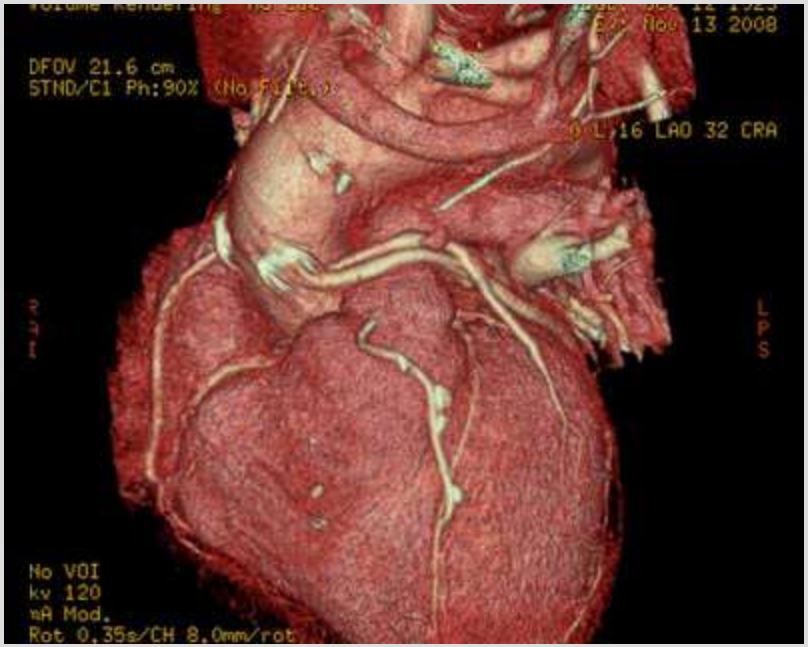
- Current results for ALL FIRST TIME CABG
  - mortality <2% (despite marked increases in age and comorbidity)
  - Includes > 30% who are high risk (urgent, elderly, poor LV)

- 1 yr mortality for 504 CABG patients in SoS RCT was 0.8%
- **MRC/BHF ART trial of 2 vs 1 IMA: 30 day mortality 1.0% in >2000 pts**

Type of surgery (01.06.2010) N = 8217pts



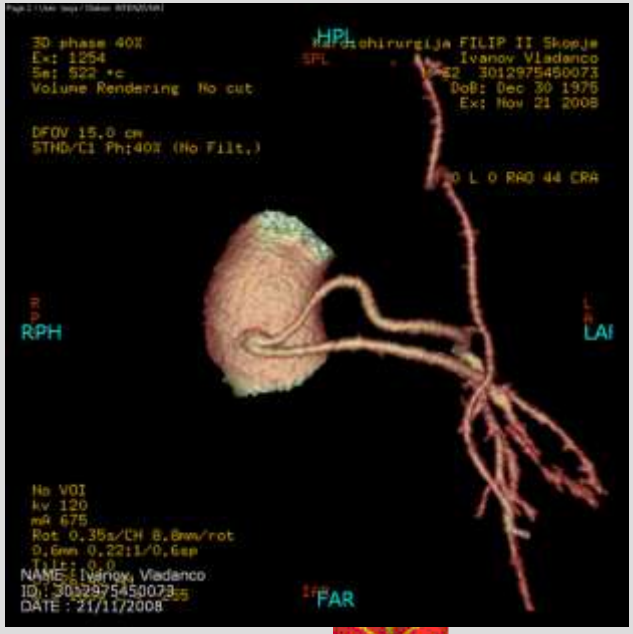
Surgical techniques



- **- CABG with EKC**
- **- CABG with EKC without cardioplegy**
- **- CABG in off-pump conditions**
- **- CABG for ischemic heart failure**

Type of grafts

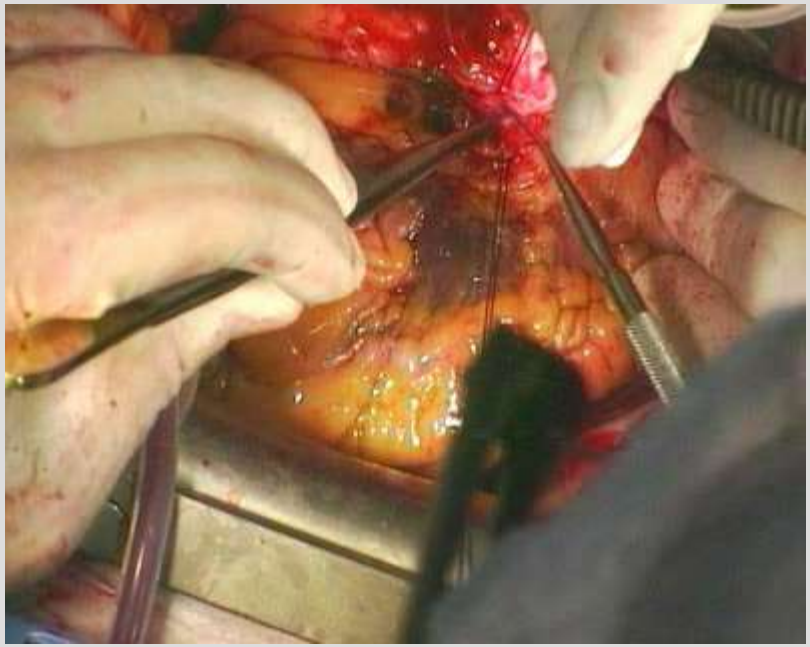
- **LIMA; RIMA**
- **Vena saphena magna**
- **Radial artery**



Aorto-coronary by-pass n = 5142 pts

-

CABG	**5142**	**62,5%**
OPCAB	*745*	14,5%
Total arerial revasc.	*2894*	56.3%
CABG+aneurysmetoy	*740*	14.4%
CABG + valv surgery	*763*	15.3%



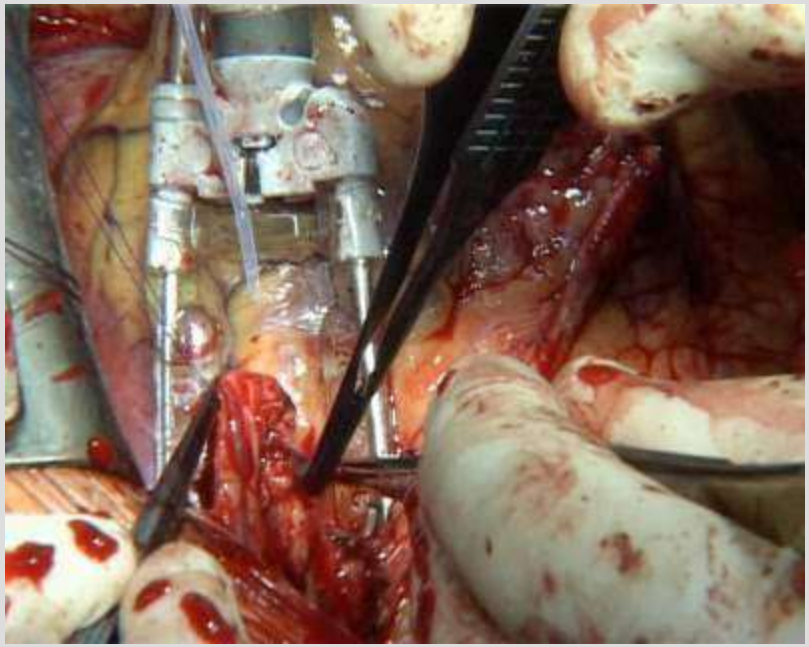
CABG + IABP pre -op. 252pts
CABG + IABP intra-op. 82pts
CABG + IABP post-op. 45pts

120 pts with haemodynamis instability- acute coronary syndrom

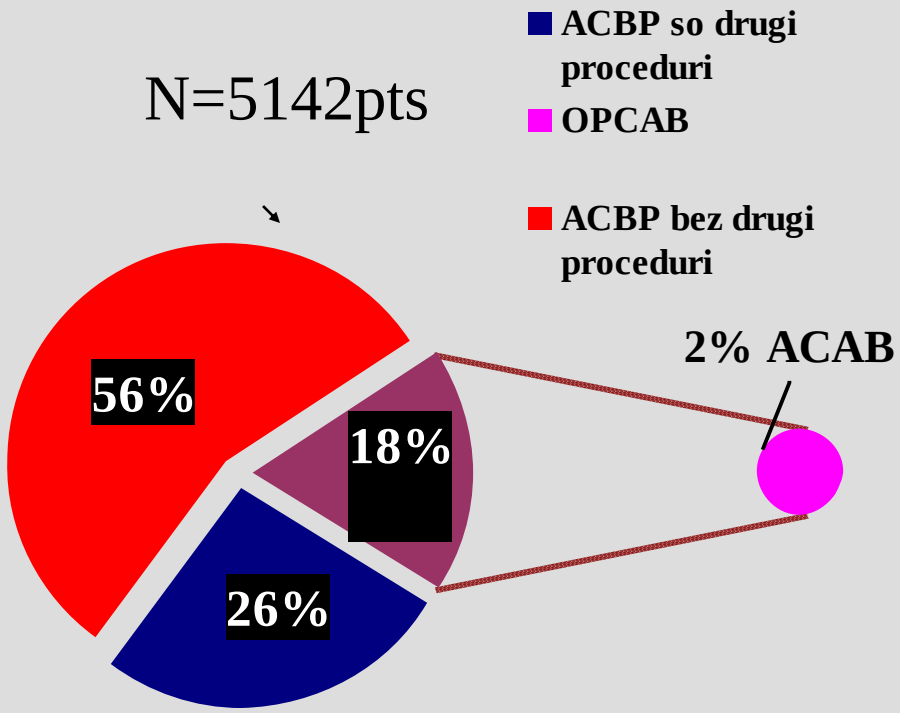
Mortality rate 1,2% - 61 pts.

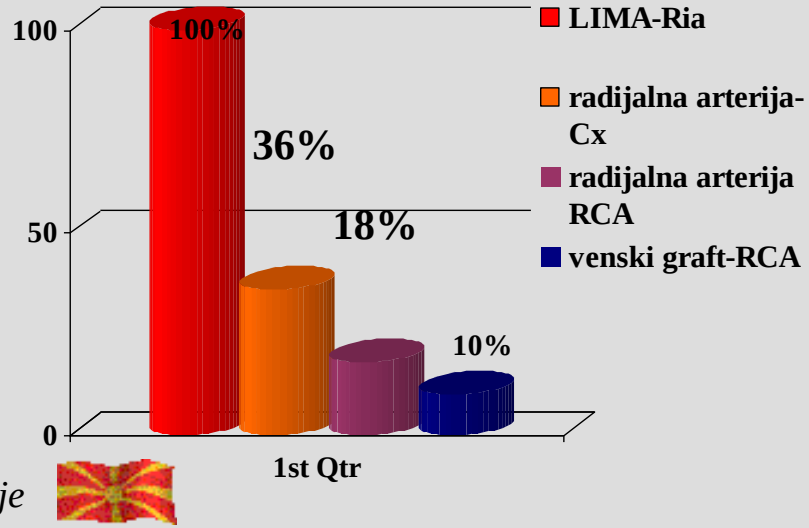
Follow – up > 10 y.

Off pump bypass – OPCAB n = 745 pts



N=5142pts





Mortality rate 0 – follow up > 10y.

Surgery for patients with terminal ishemic heart- ventriculoplasty &by-pass surgery N-740 (14,4%)

Direct circular repair for anterior left ventricle aneurysm N=433pts

Haemodinamic parameters:

EDV=345 ± 33.4ml EF=27 ± 6.2%

ESV= 259 ± 26.5ml Mortality rate -5,6 (21 pts)

Surgery- ventriculoplasty with posterior cuneate or separate posterior linear reconstruction N=96 pts

Haemodinamic parameters:

EDV=367 ± 23.5ml EF=25 ± 5.6%

ESV= 299 ± 22.4ml Mortality rate 4 (5,6) % pts

Transventricular mitral valve reconstruction for pts with LV aneurysm and mitral valve insuff N=56pts

EDV=367 ± 23.5ml EF=25 ± 5.6%

ESV= 299 ± 22.4ml Mortality rate 4 (8,6 %) pts

Cardiosurgery -

Surgery for patients in cardiogenic shock and postinfarction VSD

Haemodinamic stabilisation

Pre-operative IABP 5

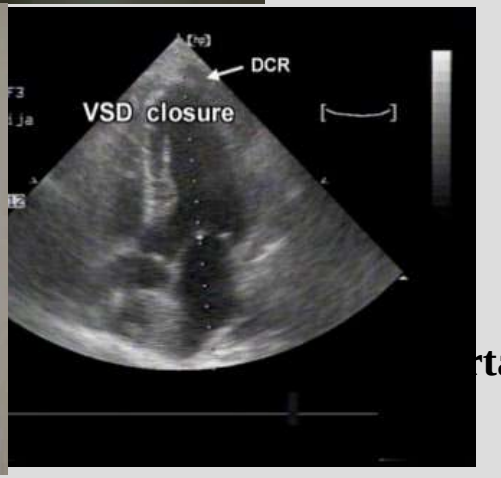
Cathecholemines if necessery

Postinfarction VSD - 5 (6%)

Strategy - IABP,

- haemodynamic stabilisation

- operation



Haemodynamic parameters:

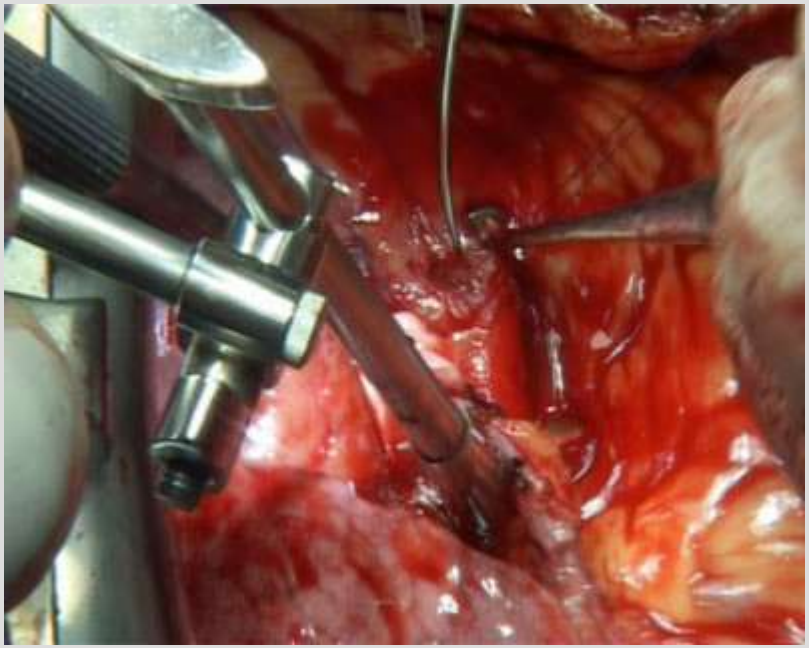
EDV=232 ± 30.4ml EF=25 ± 4.2%

ESV= 189 ± 28.5ml

Early mortality rate 0

rtality rate 1 pts

Surgery – OPCAB left ventricle plication (n=37pts)



52 ± 6.4y Sex f/m 20/17

Heamodinamic instability 2 (6%) pts

Pre-operative IABP 4(12%) pts

Post-operative IABP 0

Haemodinamic parameters:

EDV=250 ± 13.7ml EF=30 ± 4.8%

ESV= 169 ± 19.4ml

Prezented on X Jubillee congress

CTT/ Mayami 03/2004 year

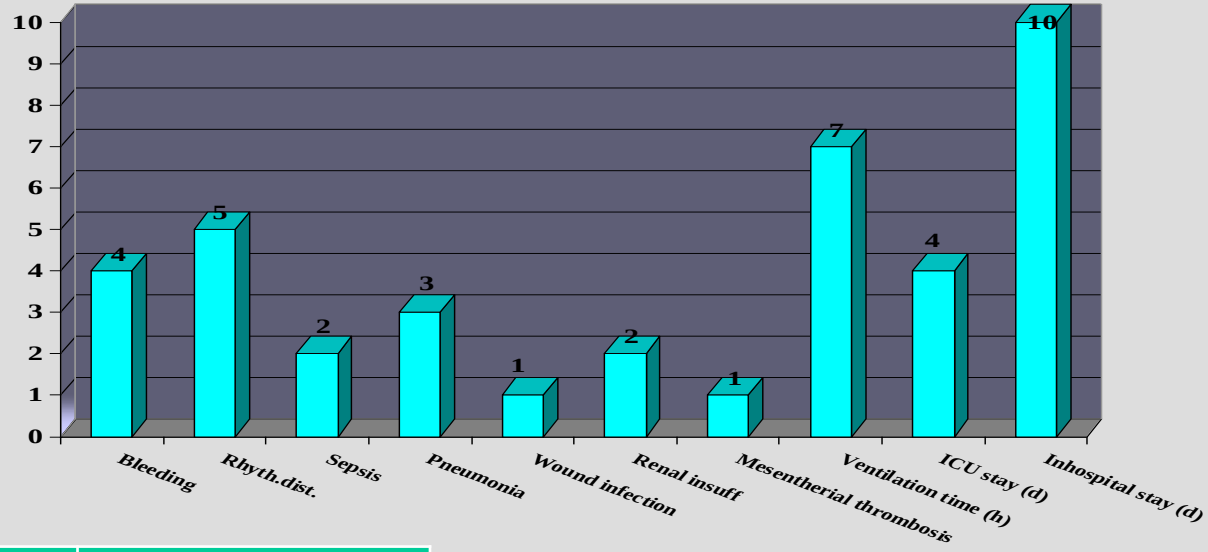
Coronary Artery Bypass Grafting in Awake Settings

Awarded on the 6th annual meeting of ISMICS in San Francisco (06/2003) as the best oral abstract and the best use of audio and video aims

Cardiosurgery - Skopje

Complications rate N= 5142

Early survival (30 days) 98.8%



End – point	Our experiences (%)
MACCE	8,9
Death/MI/stroke	4,5
Revascularisation	0,19
Stroke	1,6
MI	2,4
All-cause death	1,2

Syntax

Endpoint	CABG (%)	DES (%)	*p*
MACCE	12.1	17.8	0.0015
Death/MI/stroke	7.7	7.6	0.98
Revascularization	5.9	13.7	<0.0001
Stroke	2.2	0.6	0.003
MI	3.2	4.8	0.11
All-cause death	3.5	4.3	0.37

Mortality rate

N = 8217