



INSTITUT  
CARDIOVASCULAIRE  
PARIS  
SUD

# L'Approche Radiale : « Le Gold Standard »

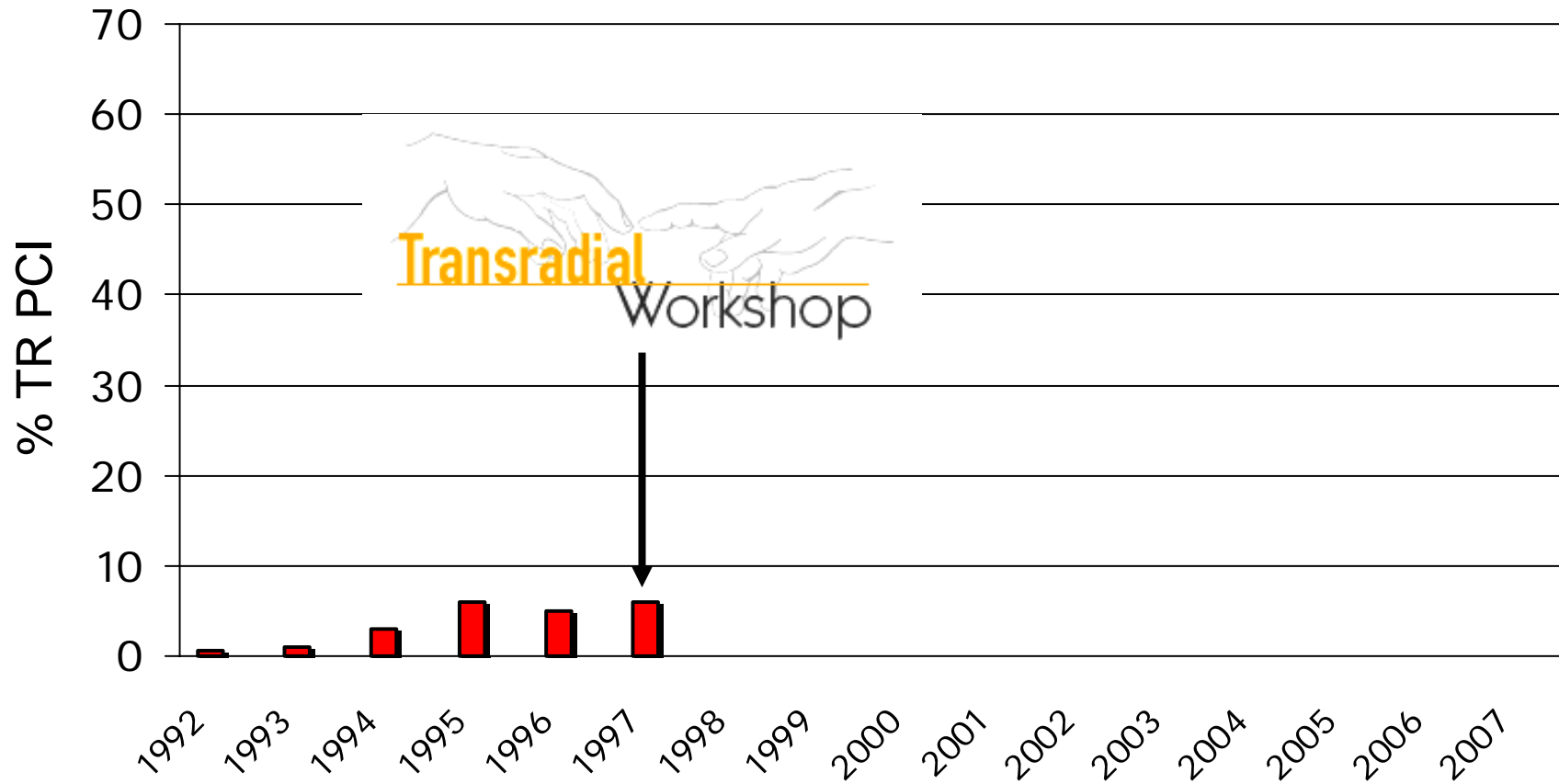
Thierry Lefèvre

11ème Rencontre des Anciens de l'CM, 2008

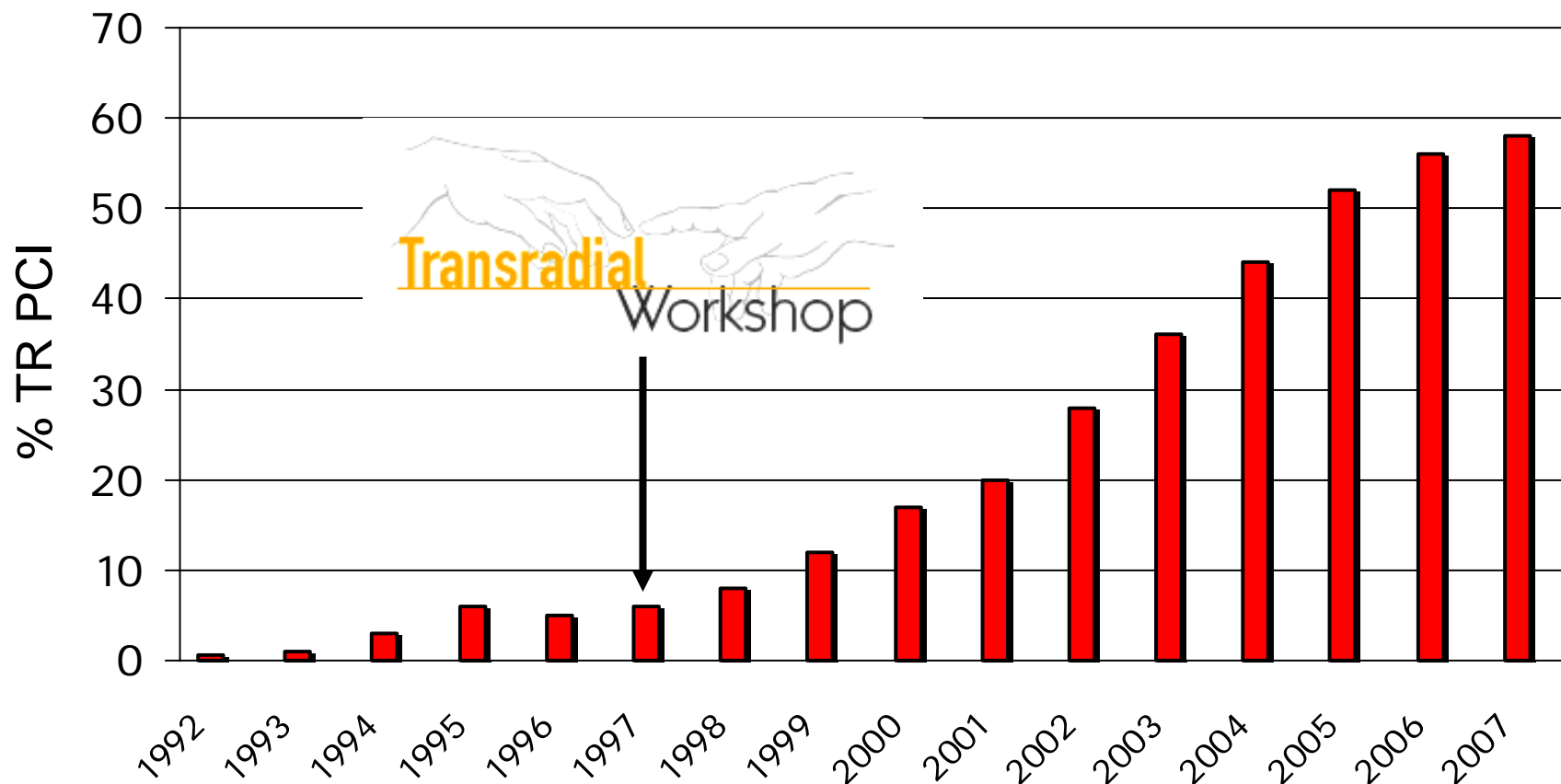
# Historique de l'Approche Transradiale

- ✓ Radner S. Thoracal aortography by catheterization from the radial artery. *Acta Radial* 1948;29: 178-180.
- ✓ Campeau L. proximal radial artery cut-off for selective coronary angiography (with radial artery suture). *Montreal* 1964
- ✓ Campeau L. Percutaneous radial artery approach for coronary angiography. *Cathet Cardiovasc Diagn* 1989;16:3-7
- ✓ Kiemenedj F. First transradial approach for PTCA. 1992, *Amsterdam*
- ✓ Kiemenedj F. First transradial coronary stenting. 1993, *Amsterdam*
- ✓ Kiemenedj. F. First outpatient coronary stenting. 1994, *Amsterdam*
- ✓ Fajadet. J. First transradial live demonstration. 1994, *Toulouse*
- ✓ Kiemenedj F. Percutaneous transradial artery approach for coronary stent implantation. *Am Heart J* 1995;128:167-174

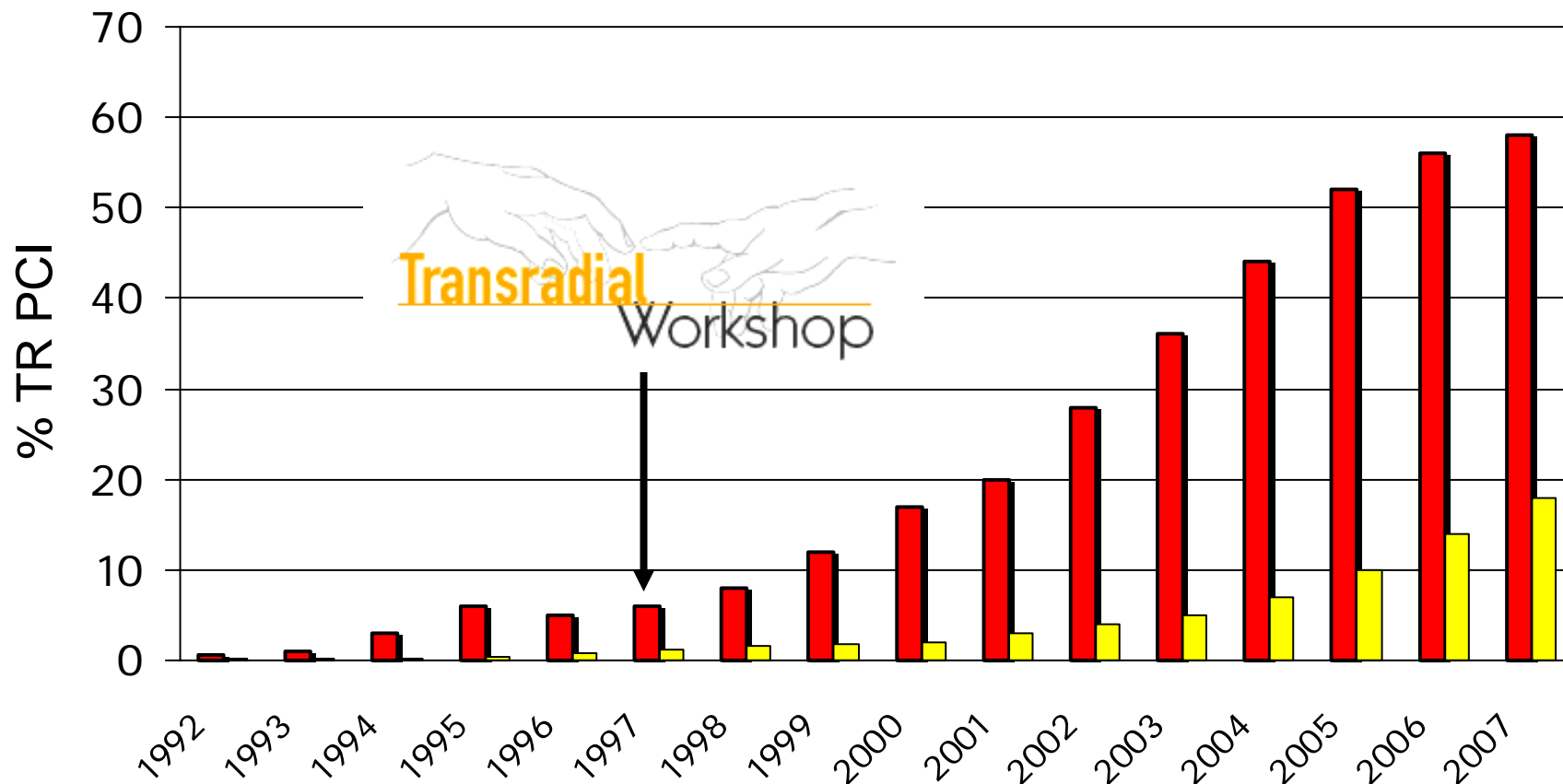
# TRA for PCI in France



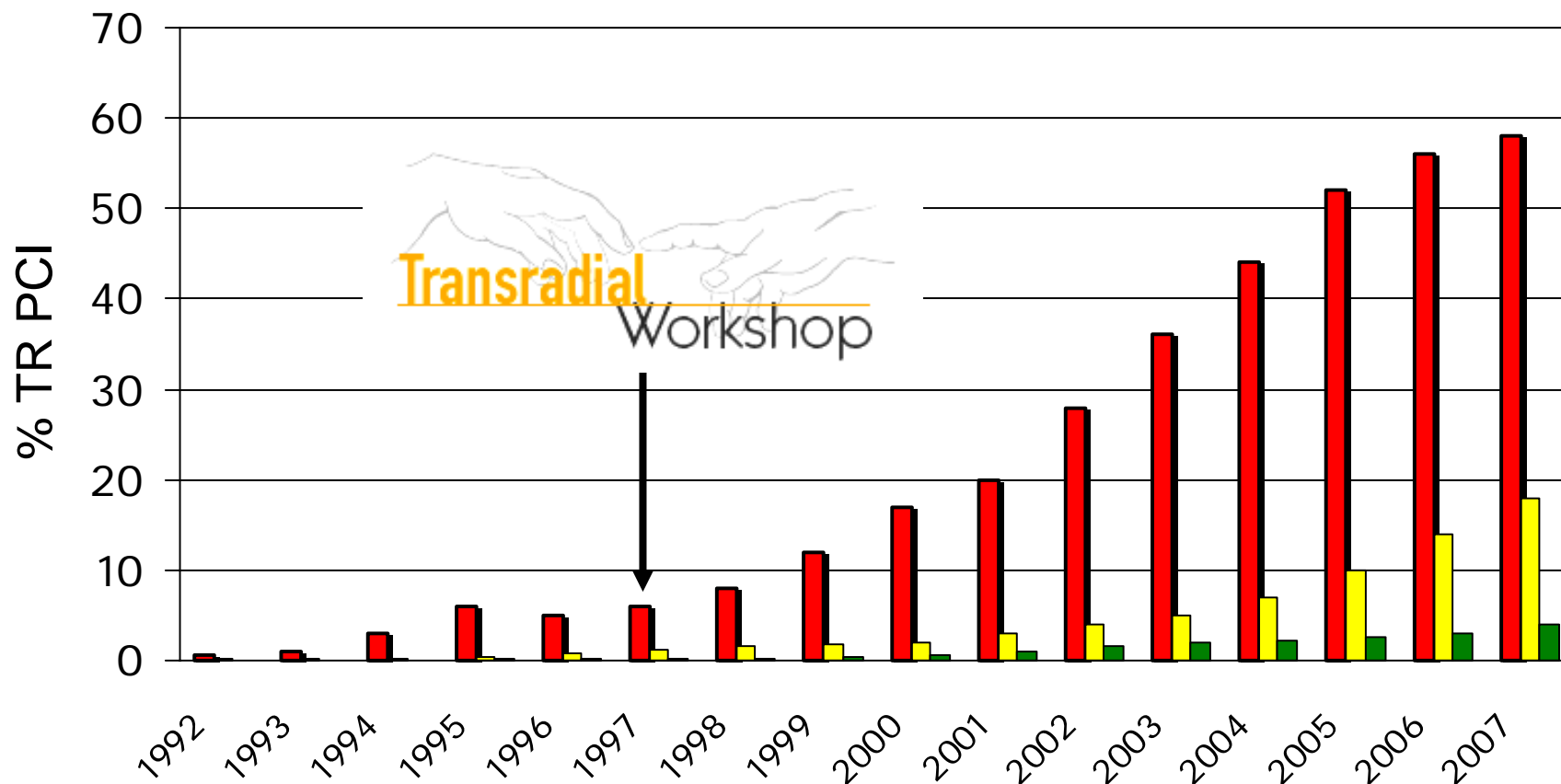
# TRA for PCI in France



# TRA for PCI in France/Europe

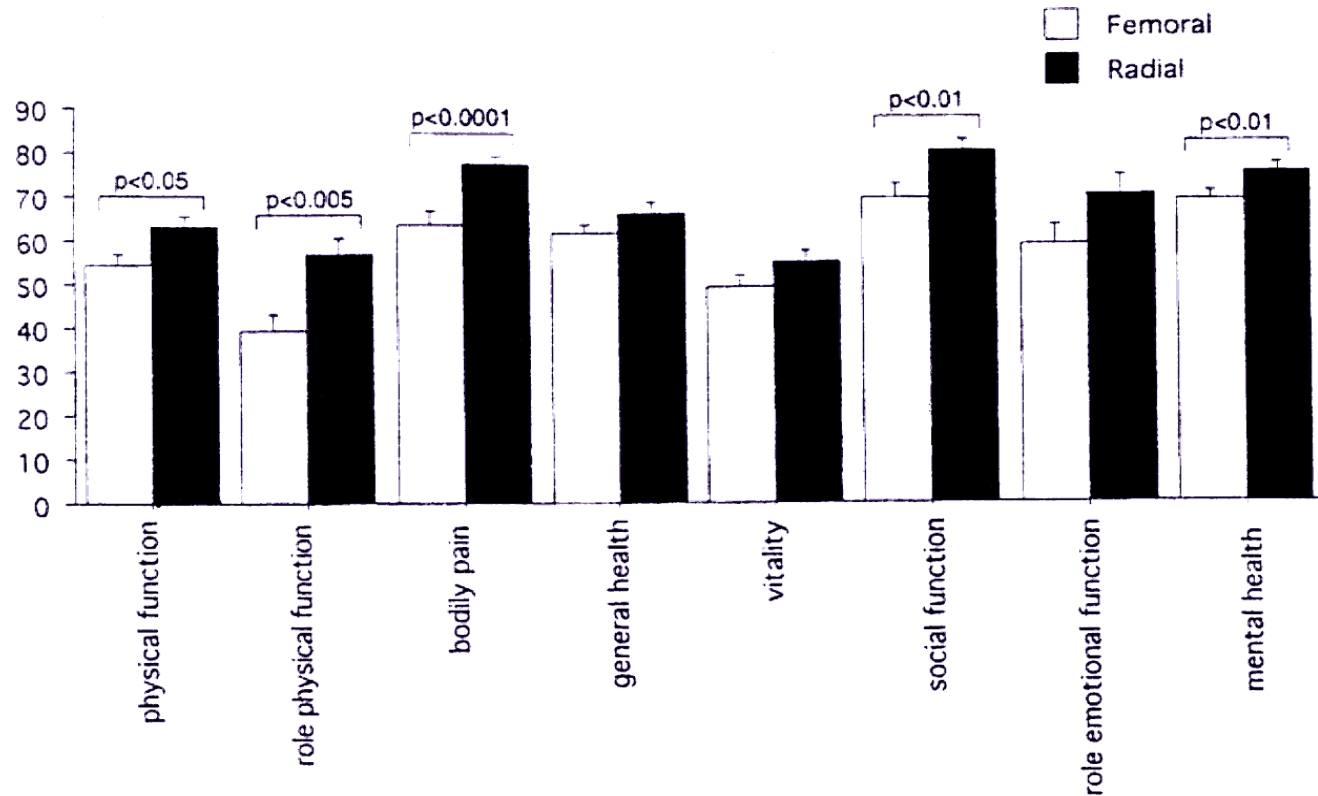


# TRA for PCI in France/Europe/US



# Avantages de l'Approche Transradiale

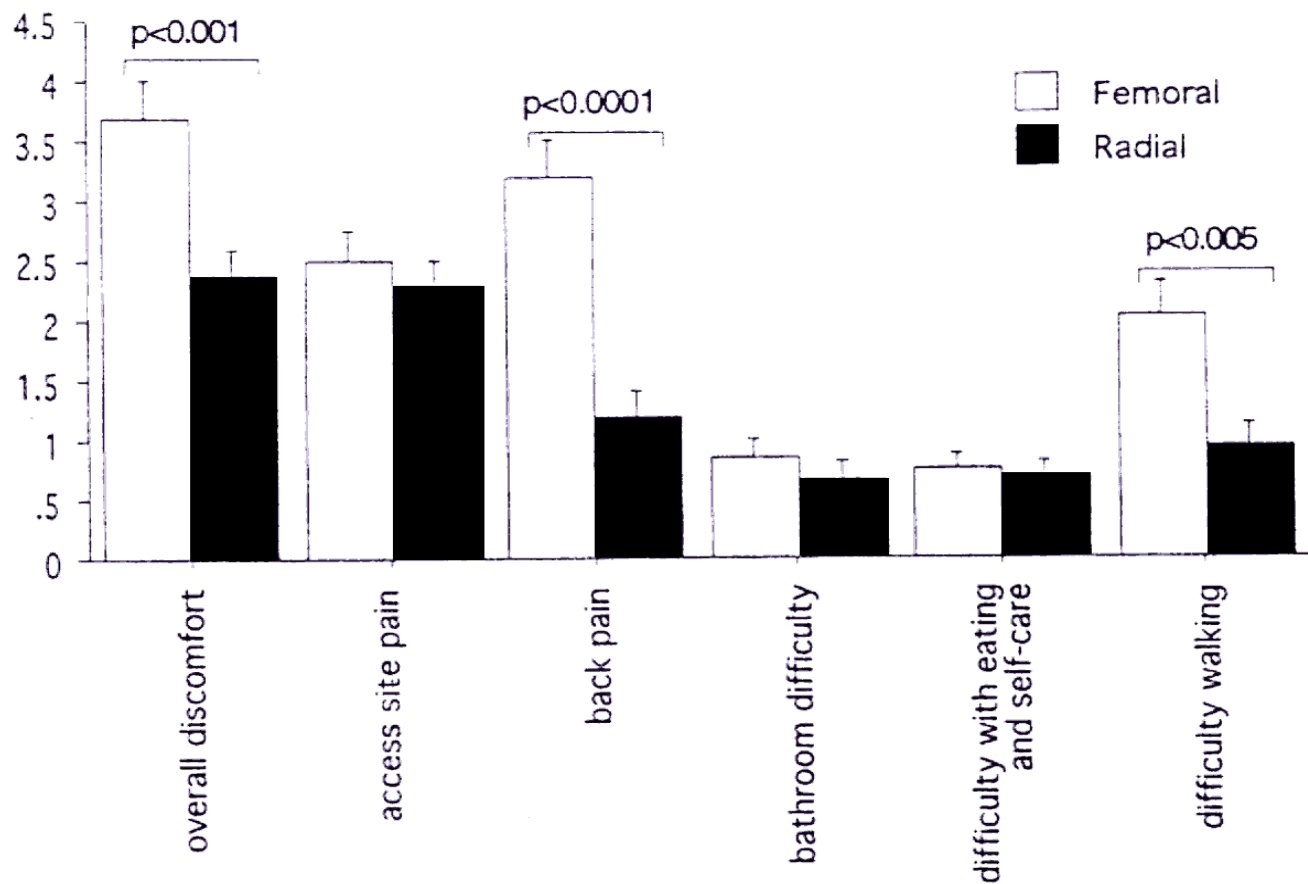
# Quality of Life after Radial or Femoral Approach for Coronary Angiography



Bar graph of generic measures of quality of life measured with acute version of SF-36 at 1 week after catheterization. Higher values indicate better postprocedural quality of life (n = 200).

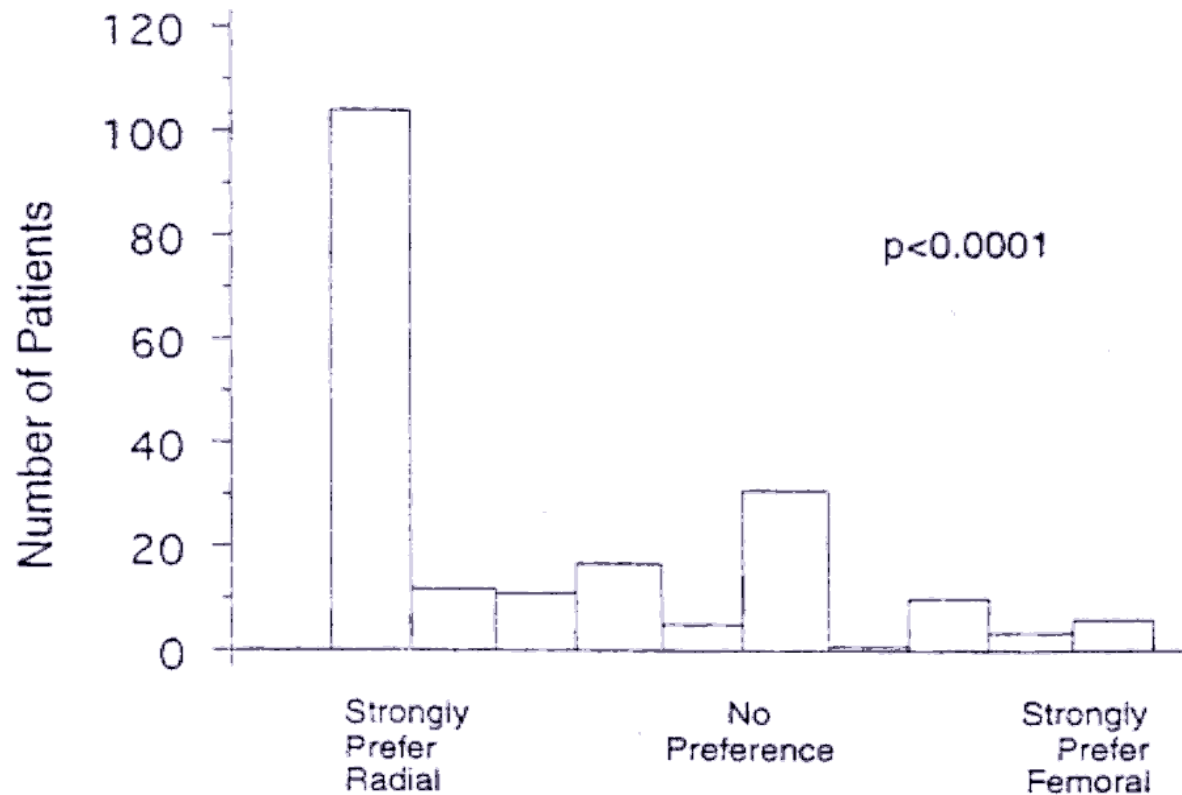
*Cooper AHJ 1999; 138: 430-6*

# Quality of Life after Radial or Femoral Approach for Coronary Angiography



Cooper AHJ 1999; 138: 430-6

# Radial vs Femoral Approach for Coronary Angiography: Patient Preference



Histogram of patient preference for catheterization method rated on visual analog scale (n = 200).

*Cooper AHJ 1999; 138: 430-6*

## CARAFE (Coronary Angio. through RAdial or FEmoral approach)

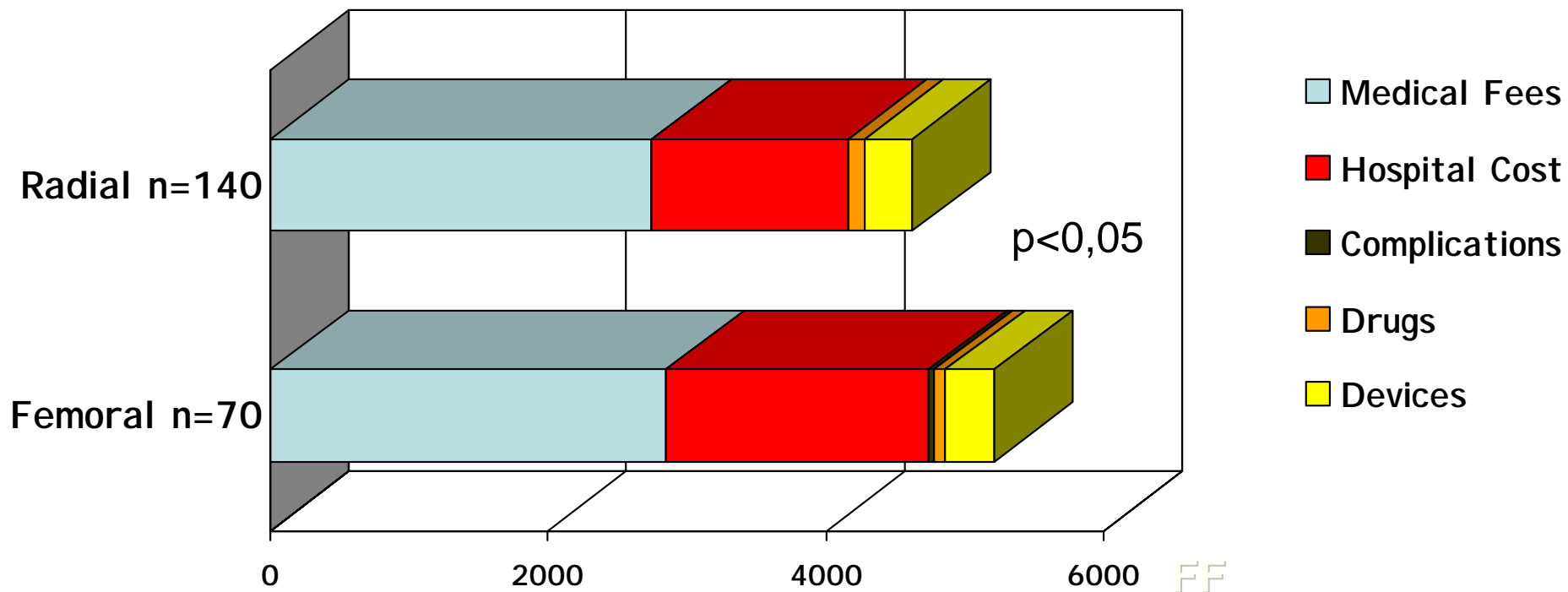
### Earlier Discharge

	<b>Femoral</b>	<b>Right Radial</b>	<b>Left Radial</b>
	70	70	70
Cross over (%)	0	1.4	0
Procedure (min.)	11.2 $\pm$ 3.3	12.4 $\pm$ 5.8*	14.2 $\pm$ 3.3*
RX (min.)	3.1 $\pm$ 1.7*	3.8 $\pm$ 2.2	4.2 $\pm$ 1.7*
Compression (min.)	8.1 $\pm$ 2.7	NA	NA
Bed rest (hour)	9.9 $\pm$ 11.1*	5.0 $\pm$ 4.0	
Discharge (hours)	42.0 $\pm$ 44.8*	31.4 $\pm$ 22.3	

\* p<0.05

*Y. Louvard CCVI 2001; 52: 181-187*

## CARAFE: Costs



Y. Louvard CCVI 2001; 52: 181-187

## Clinical and procedural predictors of nurse workload during/after invasive coronary procedures

	Femoral	Radial	P value
Patient (n)	52	208	
Cath Lab nurse workload (min.)	174 (134-218)	86 (58-126)	<0.001
Patients (n)	46	118	
Ward nurse workload (min.)	386 (226-652)	720 (314-1375)	<0.001

### Predictors of Cathlab workload:

Femoral access, failed radial access, interventional procedures, procedural time, urgent procedures.

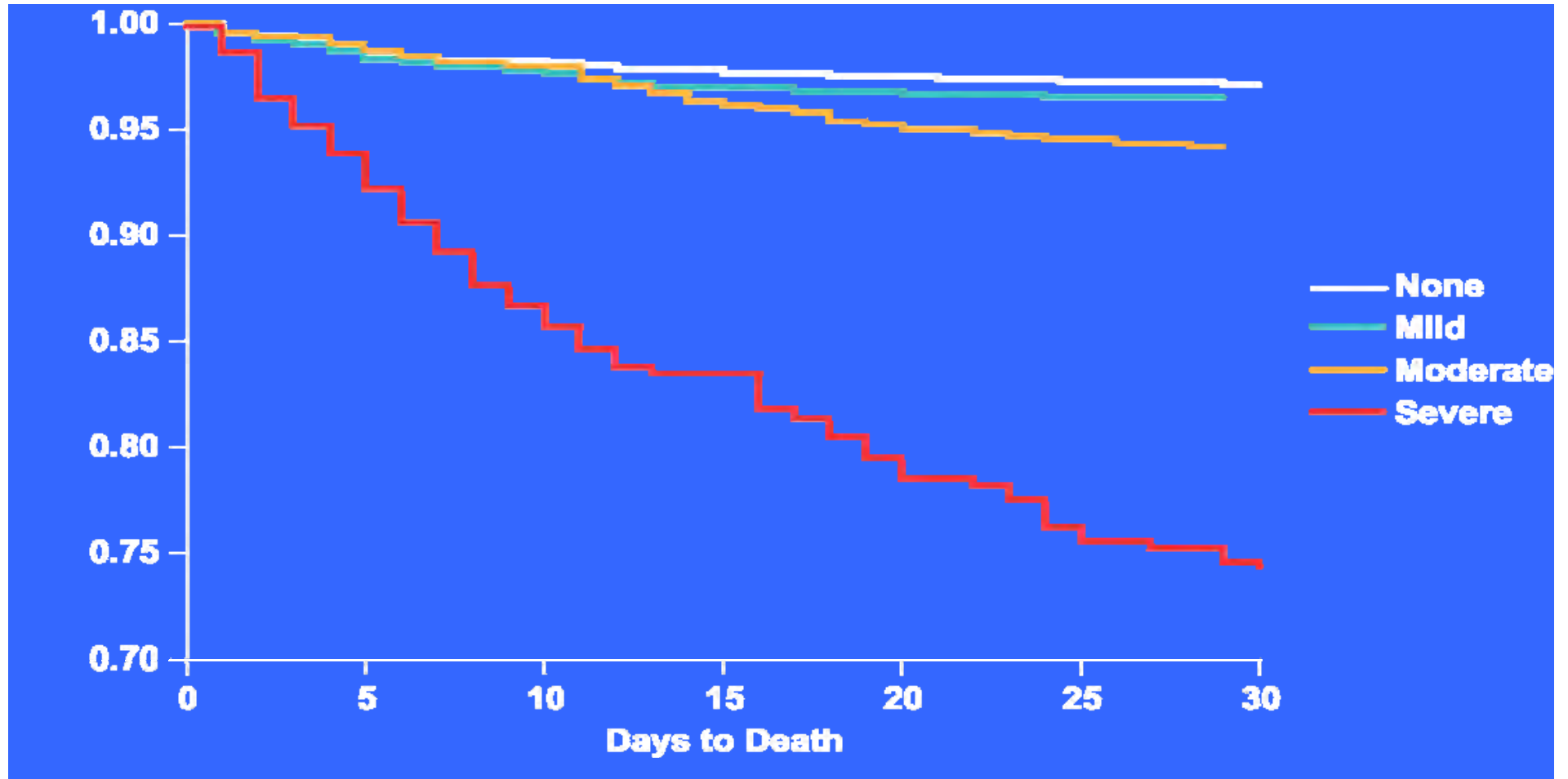
### Predictors of Ward workload:

Access-site complication, length of in-hospital stay, admission to CCU, interventional procedures

# Access Site Complications: A new Risk Factor

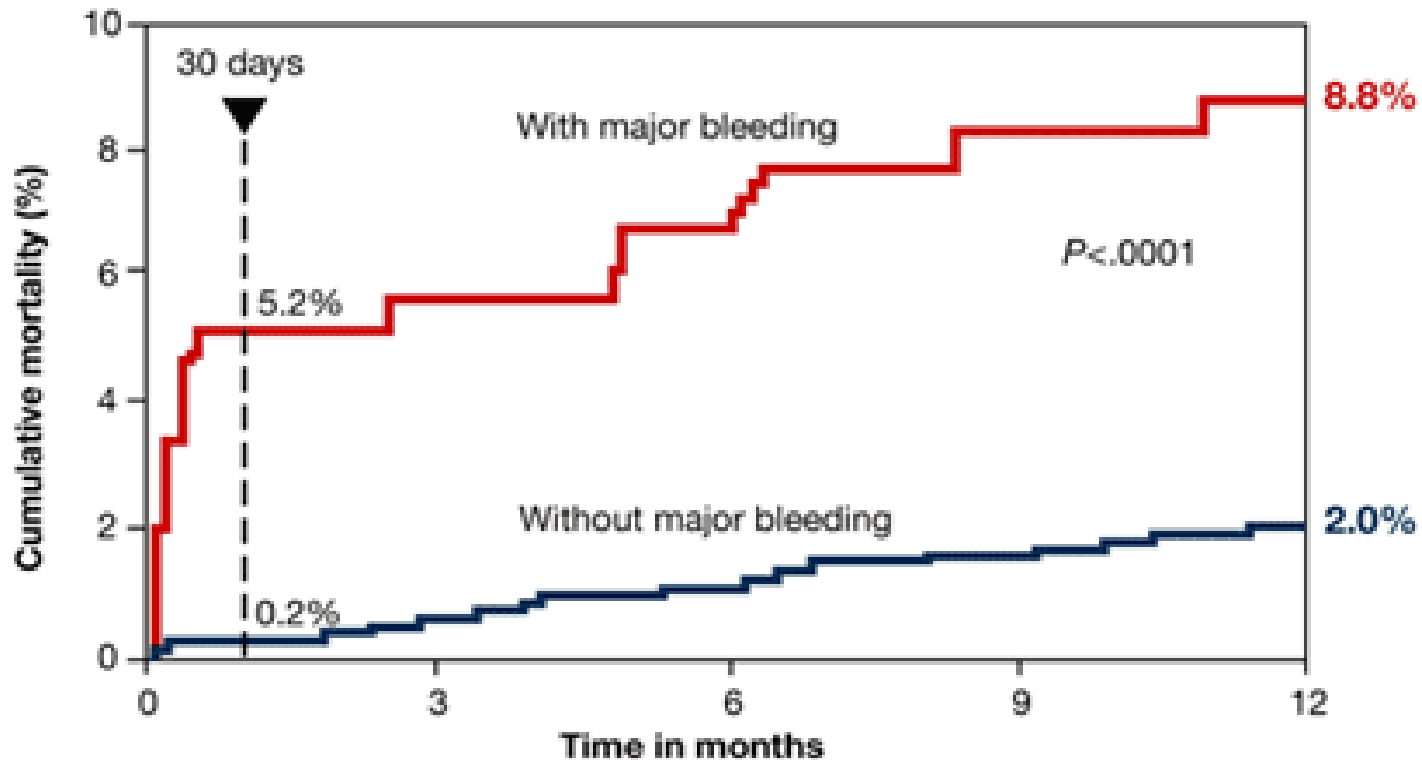
# Severity of Bleeding and Mortality in ACS

Kaplan Meier Curves for 30-Day Death, Stratified by Bleed Severity



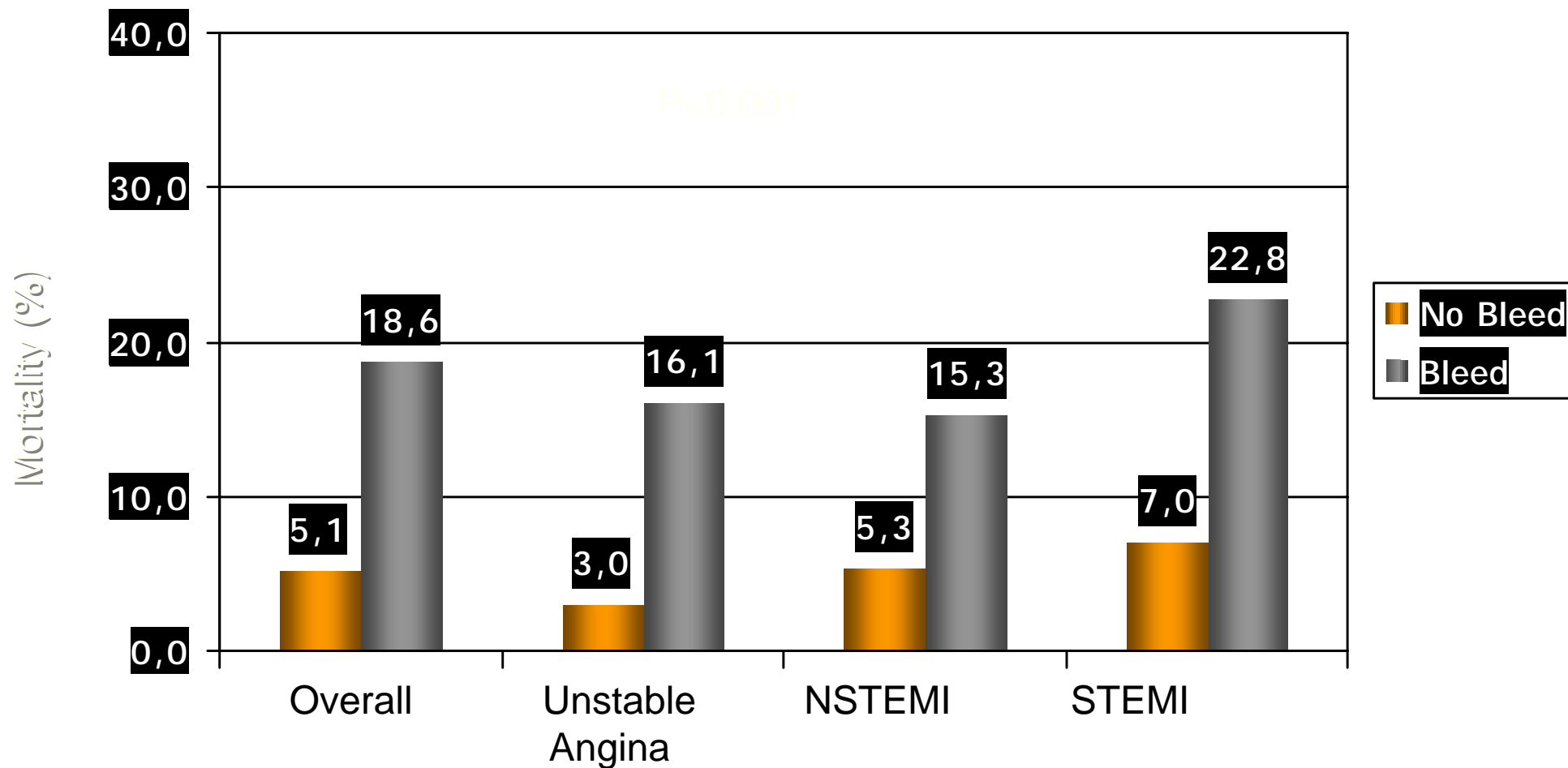
Rao SV, et al. Am J Cardiol. 2005; 96(9):1200-6

# Impact of In-Hospital Major Bleeding on Early and Late Mortality in REPLACE-2



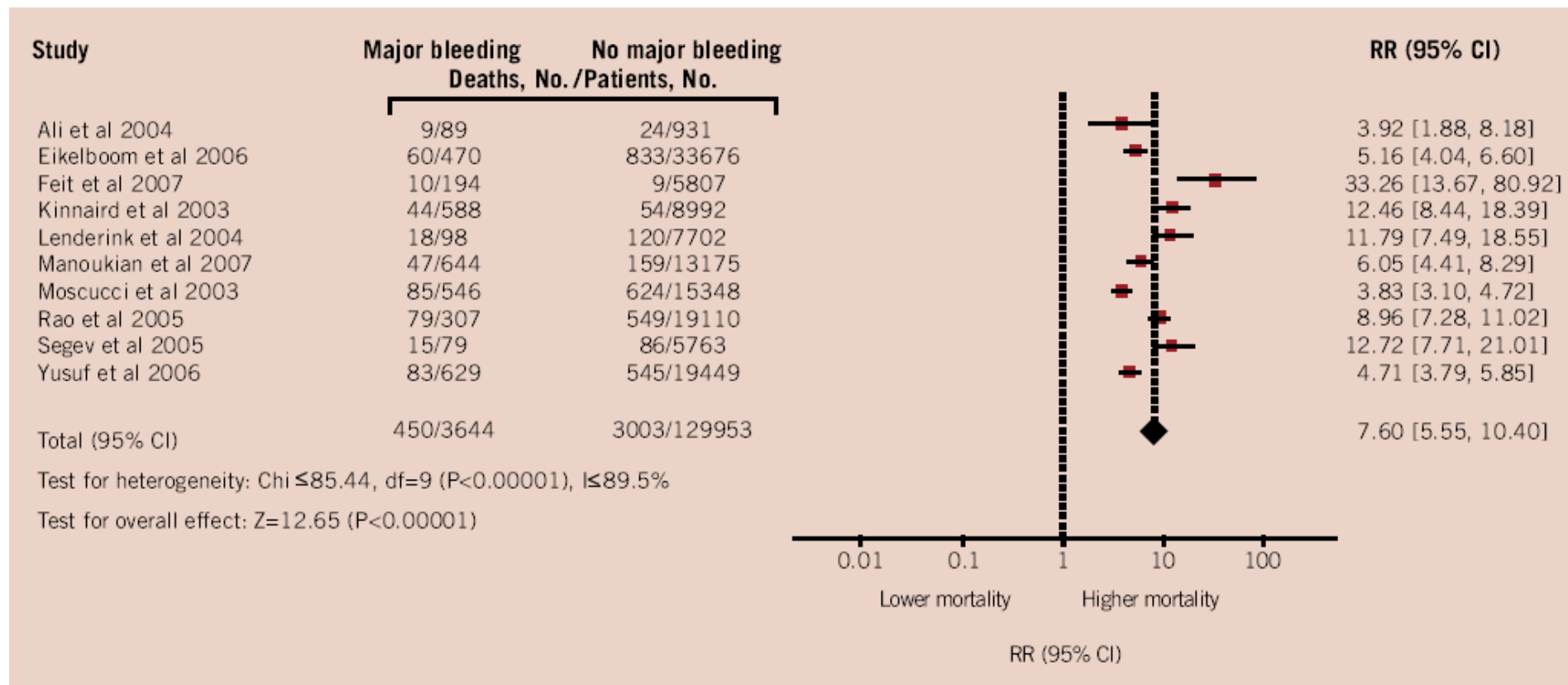
Stone GW J Invas Cardiol 2004, 16(suppl G): 12G-17G

## Major Bleeding and Mortality in ACS The GRACE Registry (N=24,045)



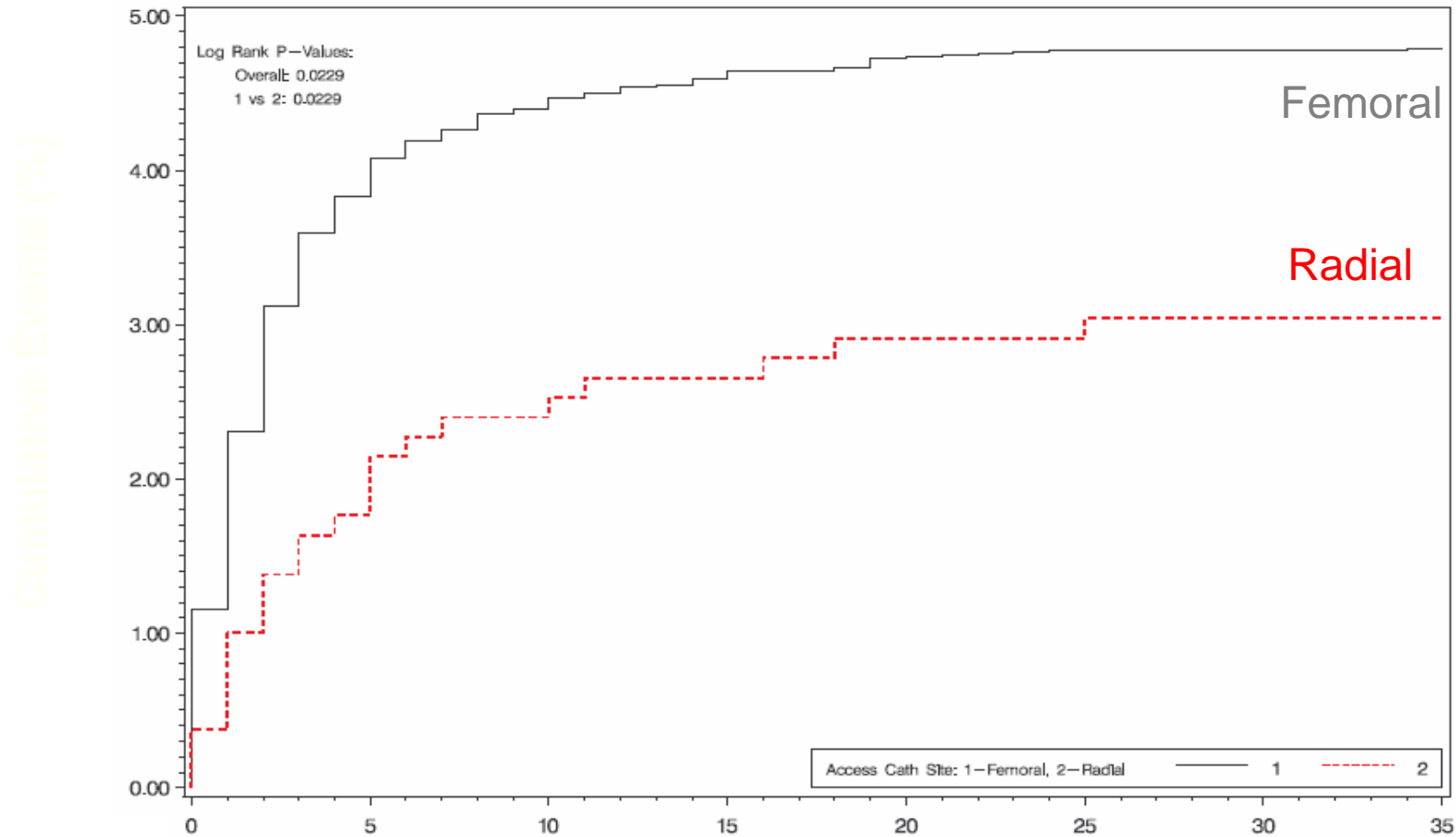
Moscucci M et al. Eur Heart J 2003;24:1815-23

# Pooled relative risk of mortality increase in patients with ACS and major bleeding



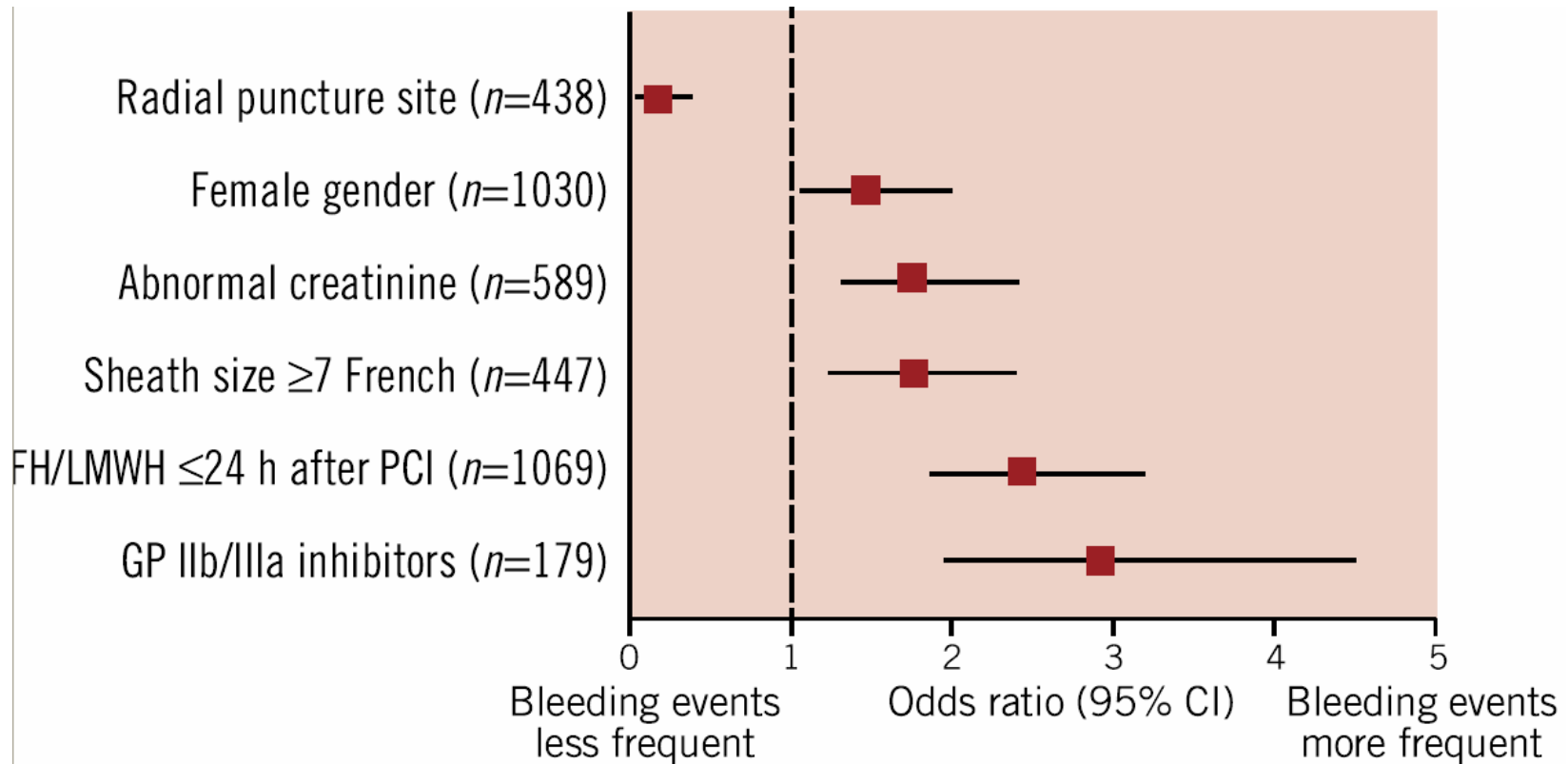
# Access Site Complications: Role of TRA

# Major Bleeding Endpoint in Acuity



Stone GW et al. *N Engl J Med* 2006;355:2203-16.

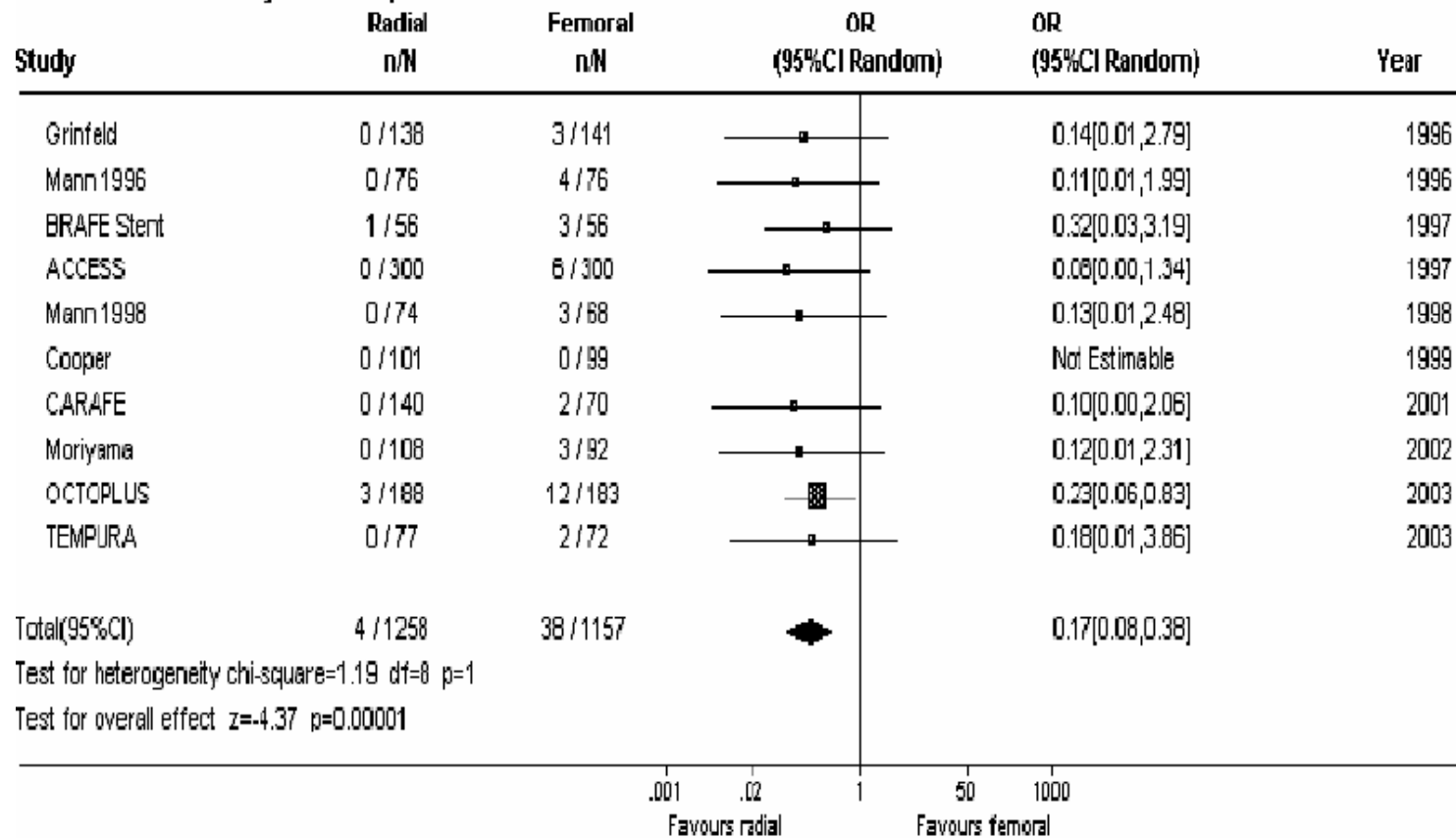
# Ischemic events and Bleeding in Pts Undergoing PCI with Concomitant Bivalirudin Treatment



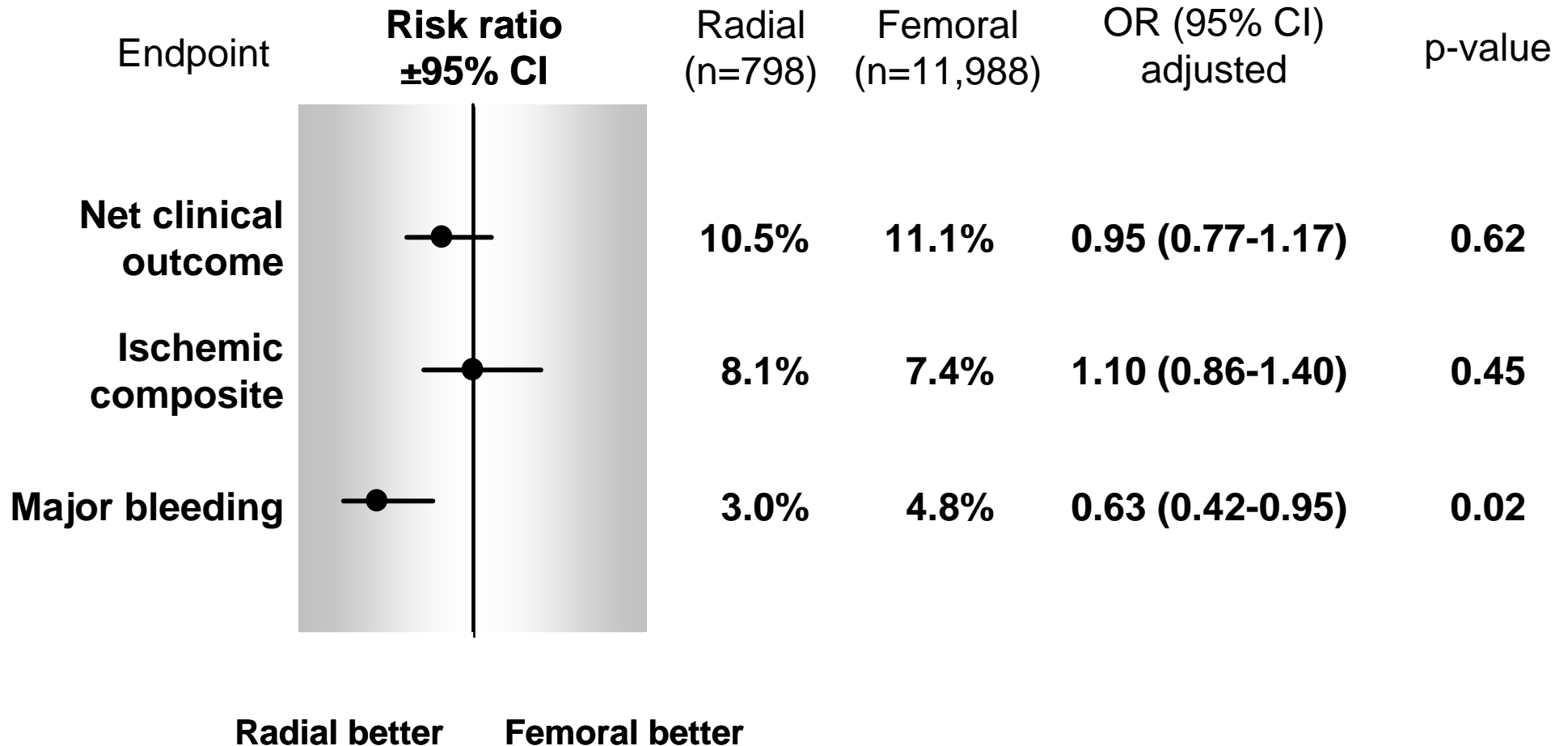
Madsen et al. *EuroIntervention* 2008;3;610-16

# Radial / Femoral Approach Meta-analysis: Entry Site Complications

Comparison: Radial vs Femoral approach  
 Outcome: Entry site complications

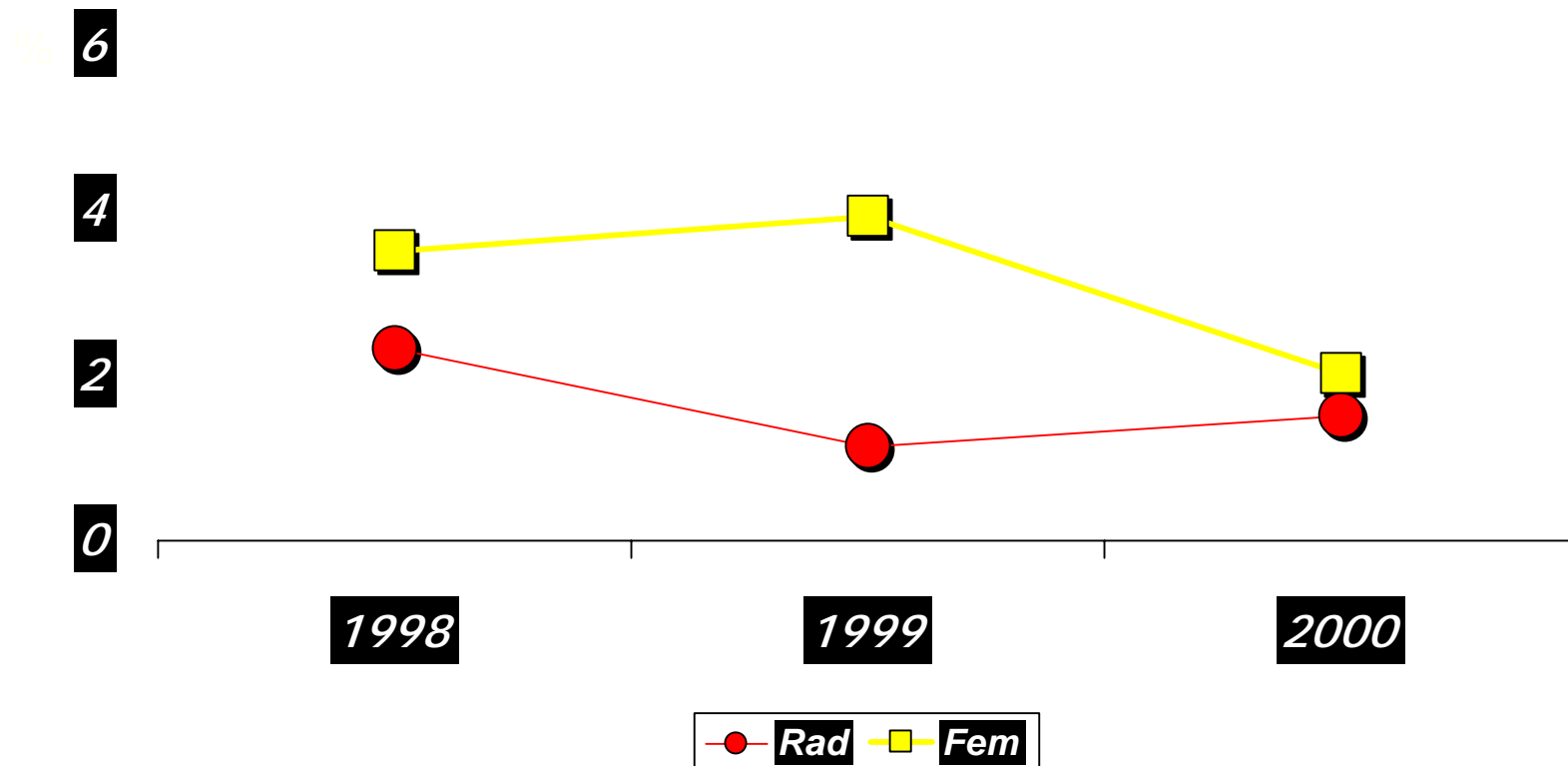


# Endpoint Measures in Acuity



## Impact of Increased Rate of Radial Angioplasty on the Occurrence of Vascular Complications

<b>Patient Number</b>	<b>1,013</b>	<b>1,014</b>	<b>1,171</b>
<b>% Radial</b>	<b>29.7 %</b>	<b>52.5 %</b>	<b>62.0 %</b>



*Hilton Am J Cardiol 2000; 86(supp1 8A): 36i*

*M.O.R.T.A.L STUDY*  
(**M**ortality benefit **O**f **R**educed  
**T**ransfusion after PCI via the  
**A**rm or **L**eg)

Alex Chase & W Peter Klinke



## Methods: data linkage

- The *British Columbia Cardiac Registry* PCI patients in BC 1999-2005 demographics & procedure details
- The *Central Transfusion Registry* (CTR) will cross reference packed red cells transfusion by medical records number (PHN) within a window of 9 days after PCI excluding CABG
- The BC *Vital Statistics* status; alive or dead at 30 days, 1 year post PCI.

# TRA in High Risk Patients

## Coronary angiography in the fully anticoagulated patient: transradial route is successful and safe

600 radial coronary angiograms

66 on Coumadin, INR > 2

Age  $67 \pm 11$  years

Sheath size: 4 Fr in 6%, 5 Fr in 20%, 6 Fr in 74%

Seven operators

Success rate: 97%

Complications: 1 minor postprocedural hemorrhage

## TRA Reduces Bleeding Complications and Length of Stay in Pts Treated With Gp2b3a Inhibitors

	FA	RA	p value
Patients (n)	2432	164	
Gp2b3a inhibitors (%)	61	90	<0.05
Major bleeding (n)	164	0	<0.05
Major complication (n)	21	0	<0.05
Minor complication (n)	59	6	<0.05
Thrombocytopenia (n)	17	3	<0.05
Length of stay (hrs)	70.6	36.6	<0.05

\*p <0.05, major bleeding (TIMI criteria), major (requiring surgical repair), and minor (pseudoaneurysm or chartered hematoma) access site complications

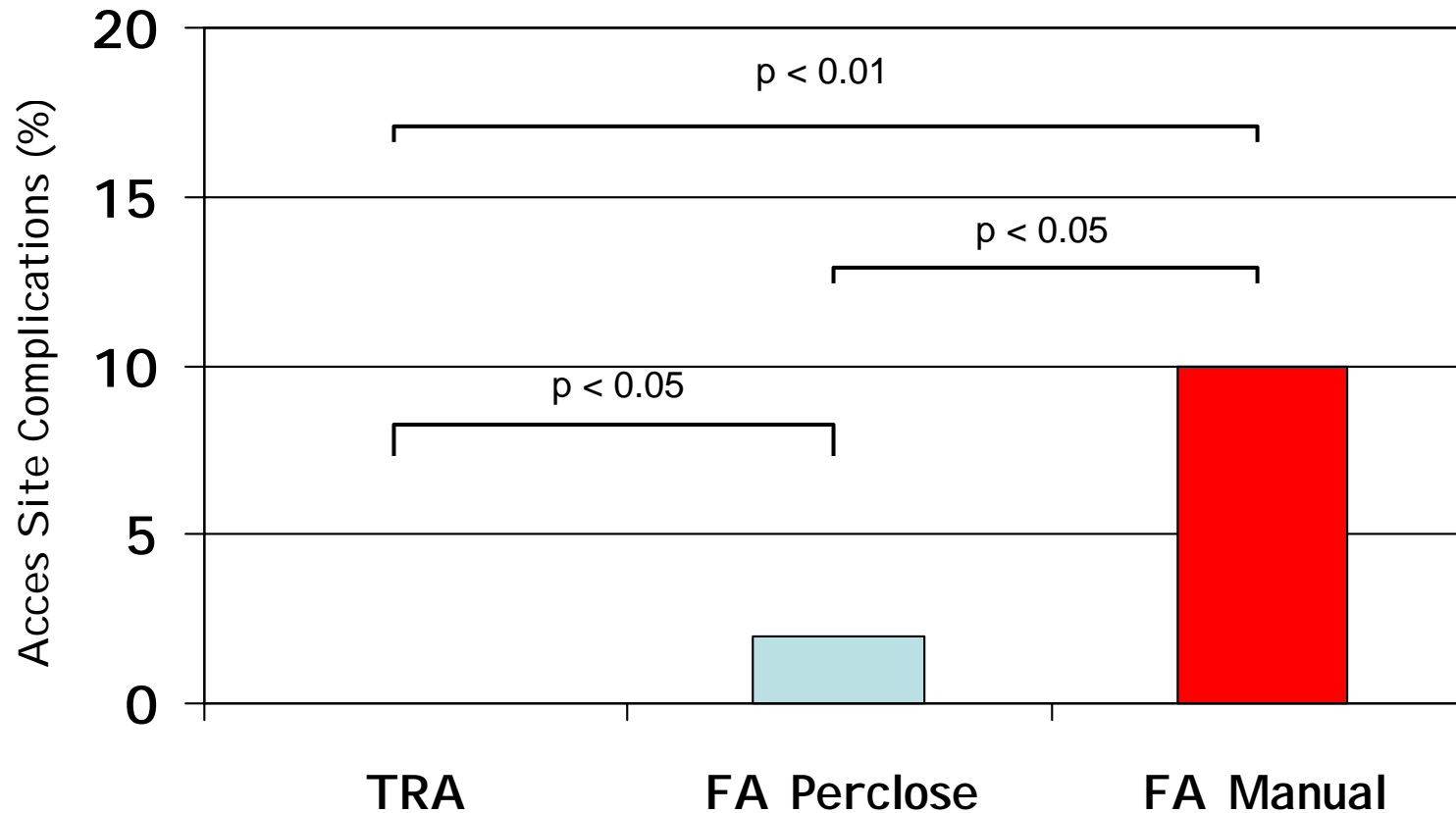
## Fewer Bleeding Complications With Comparable Efficacy With the TRA in Coronary Artery Stenting

	Femoral (n=1886)	Radial (n=144)	p
Centers (n)	92	20	
Eptifibatide(%)	50	48	
Death/MI (%)	8.0	10.4	NS
Urgent TVR (%)	1.4	0.7	NS
Thrombotic Bailout (%)	1.6	0	0.09
Any Bleed (%)	17.9	11.8	0.05
Access Site Bleed (%)	14.2	6.3	0.003
Access Site Complication (%)	6.6	0.7	0.14

Multivariate analysis, Access Site Bleeding: Radial / Femoral, OR 0.41, p=0.009

*ESPRIT Trial, O'Shea et al. ACC 2001*

# Access Site Strategies in Acute MI



Y. Louvard, J.Ludwig CCVI 2002; 55: 206-211

## Coronary angiography in the presence of peripheral vascular disease: femoral or brachial/radial approach?

297 patients, age  $67.1 \pm 8.4$  years, clinical/radiographic evidence of aortofemoral arterial disease, diagnostic coronary angiography

	Femoral	Radial/Brachial	p value
Patients (n)	154	143	
Approach success (%)	79	91	< 0.01
Controlateral success (%)	40		
Radial/brachial success (%)	100		
Procedural time (min)	$51 \pm 19$	$42 \pm 22$	< 0.01
Major vascular complications (%)	5.8	0	< 0.01

*Hildick-Smith et al. CCVI 2000; 49: 32-7*

# A Randomized Comparison of TRA and TFA for Coronary Angiography and PTCA in Octogenarians: OCTOPLUS

	Femoral	Radial	p value
Patients (n)	185	192	
Vasc. Surgery (%)	0	0.5	ns
Transfusion (%)	1.6	1.0	ns
Hb drop > 3g/DL (%)	2.8	0.5	0.063
False aneurysm (%)	1.1	0.5	ns
Arm or leg ischemia (%)	0	0	ns
Forearm compartment syndrome (%)	0	0	ns
Large hematoma (%)	6.5	1.6	0.031
<b>COMPOSITE END-POINT* (%)</b>	<b>6.5</b>	<b>1.6</b>	<b>0.029</b>
Hematoma (%)	11.4	3.5	0.003
CVA (%)	0.6	0	ns

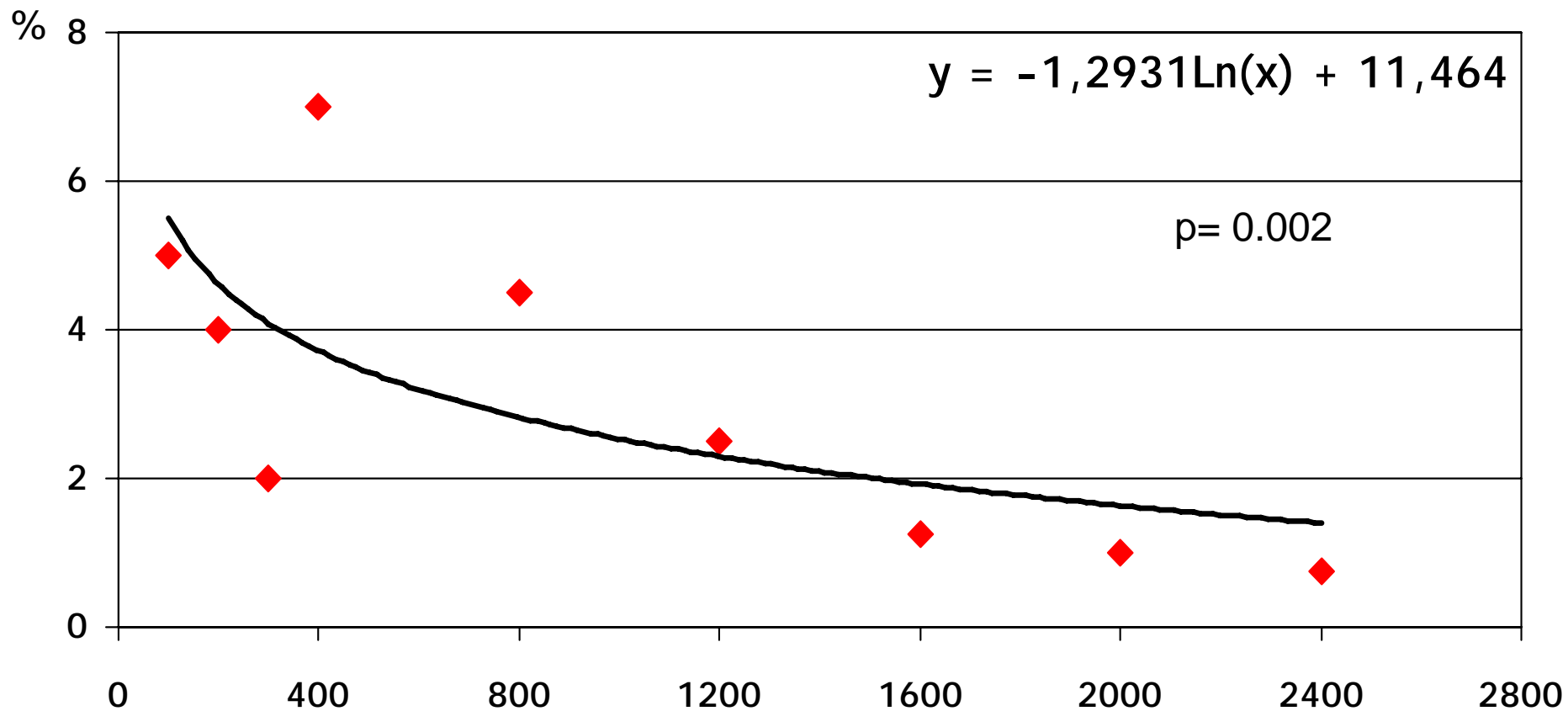
**Intention to Treat**

\* surgery, transfusion, Hb loss>3g/100ml, Ht loss>10%, ischemia, vasc. Complic. leading to discharge delay

# Why TRI is Not the « Gold Standard » In 2008 ?

# Deep Learning Curve

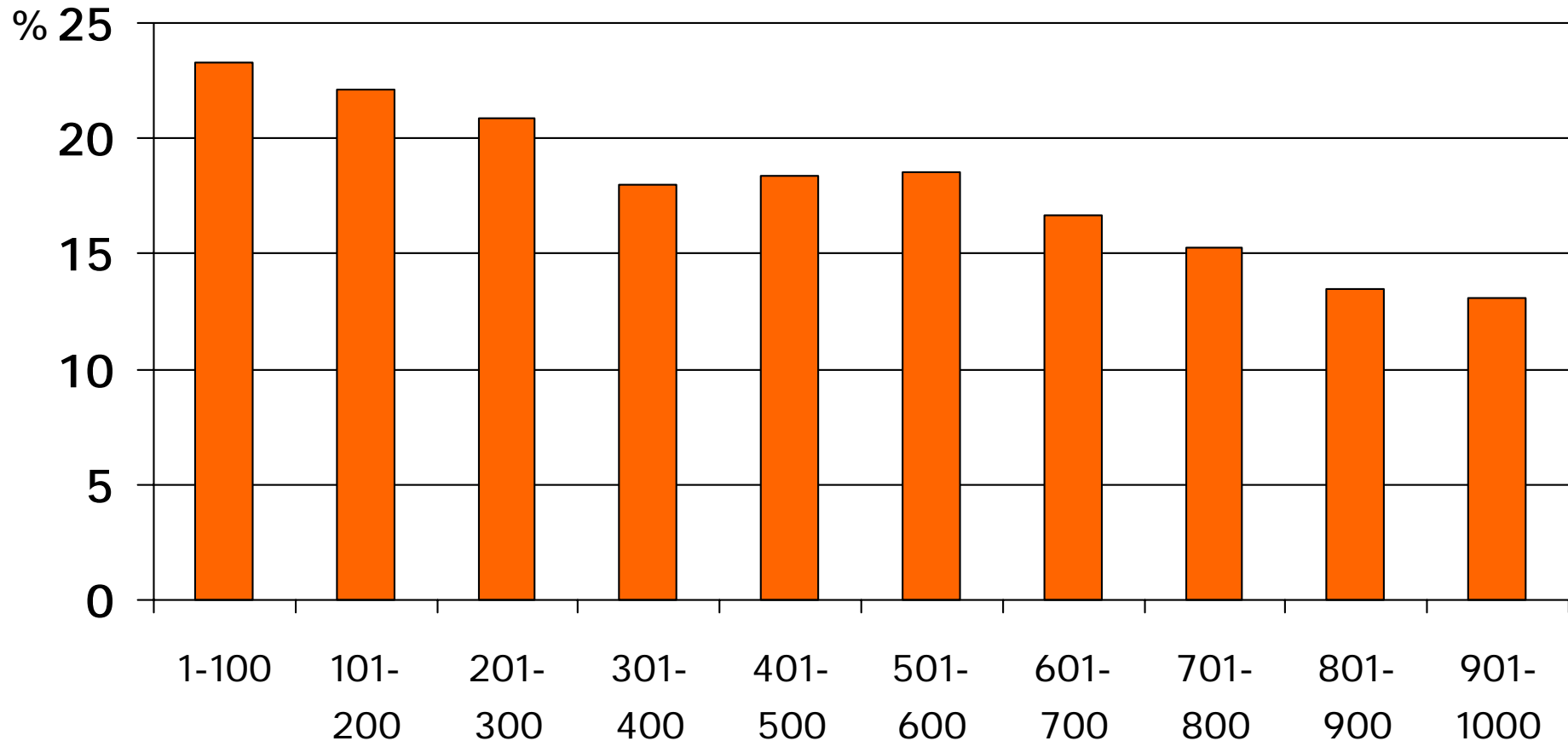
# Transradial Approach Failure in Relation to Volume



\*Failure to enter ascending aorta

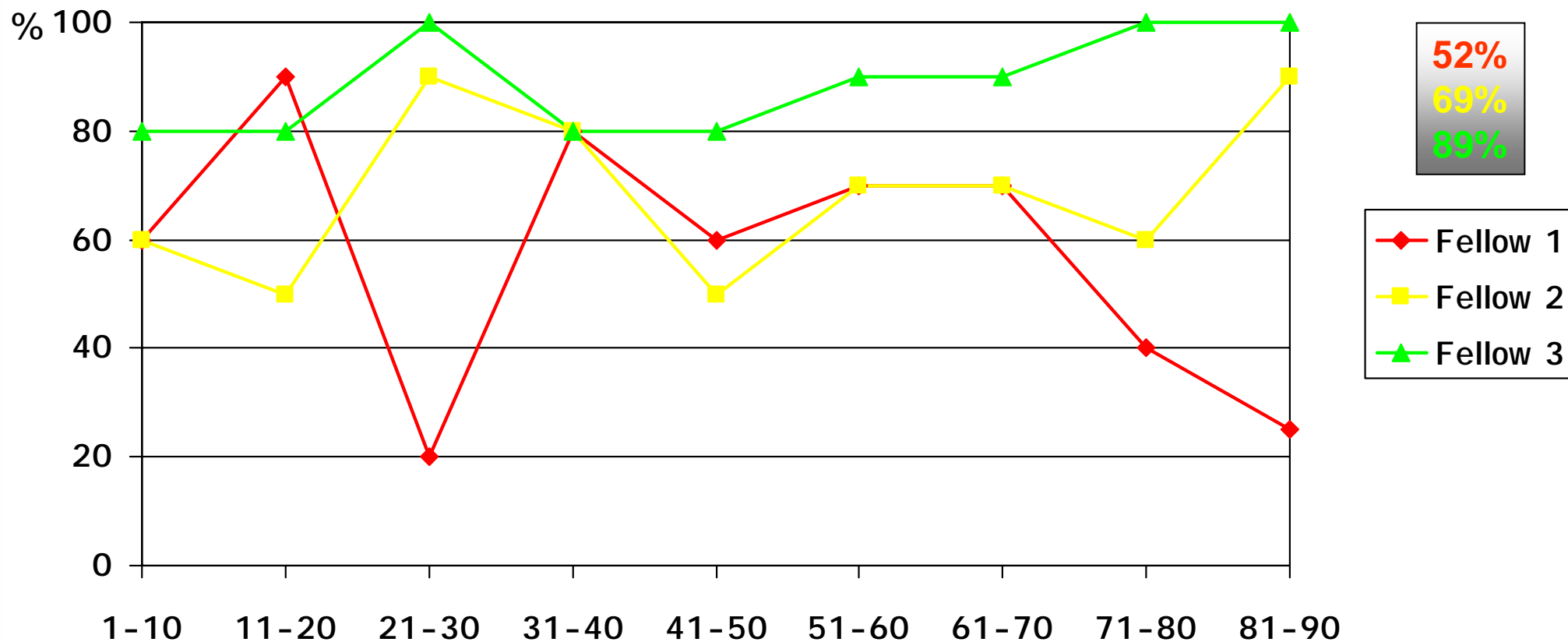
*Y. Louvard, unpublished*

# Right Transradial Coronary Angiography Procedural Time



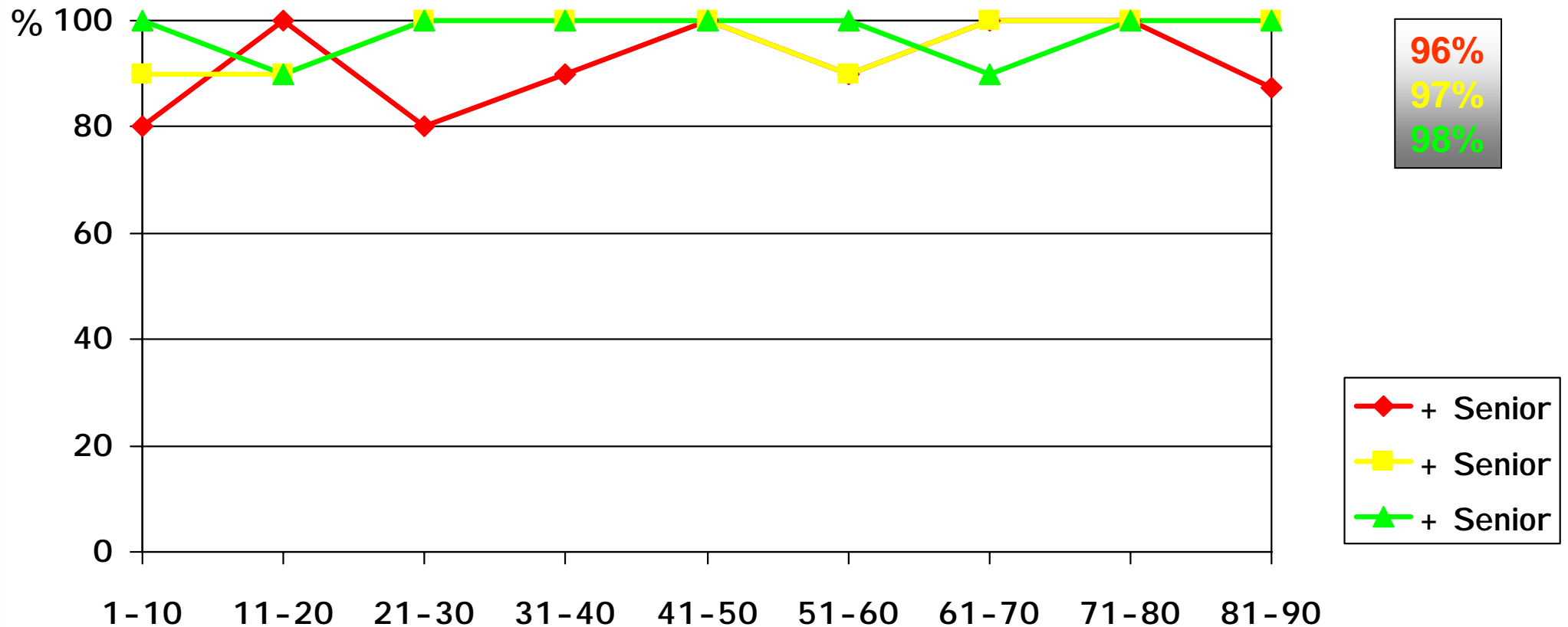
Y. Louvard *J Invas Cardiol.* 1999;11(9):543-548

# Radial Approach Success for beginners



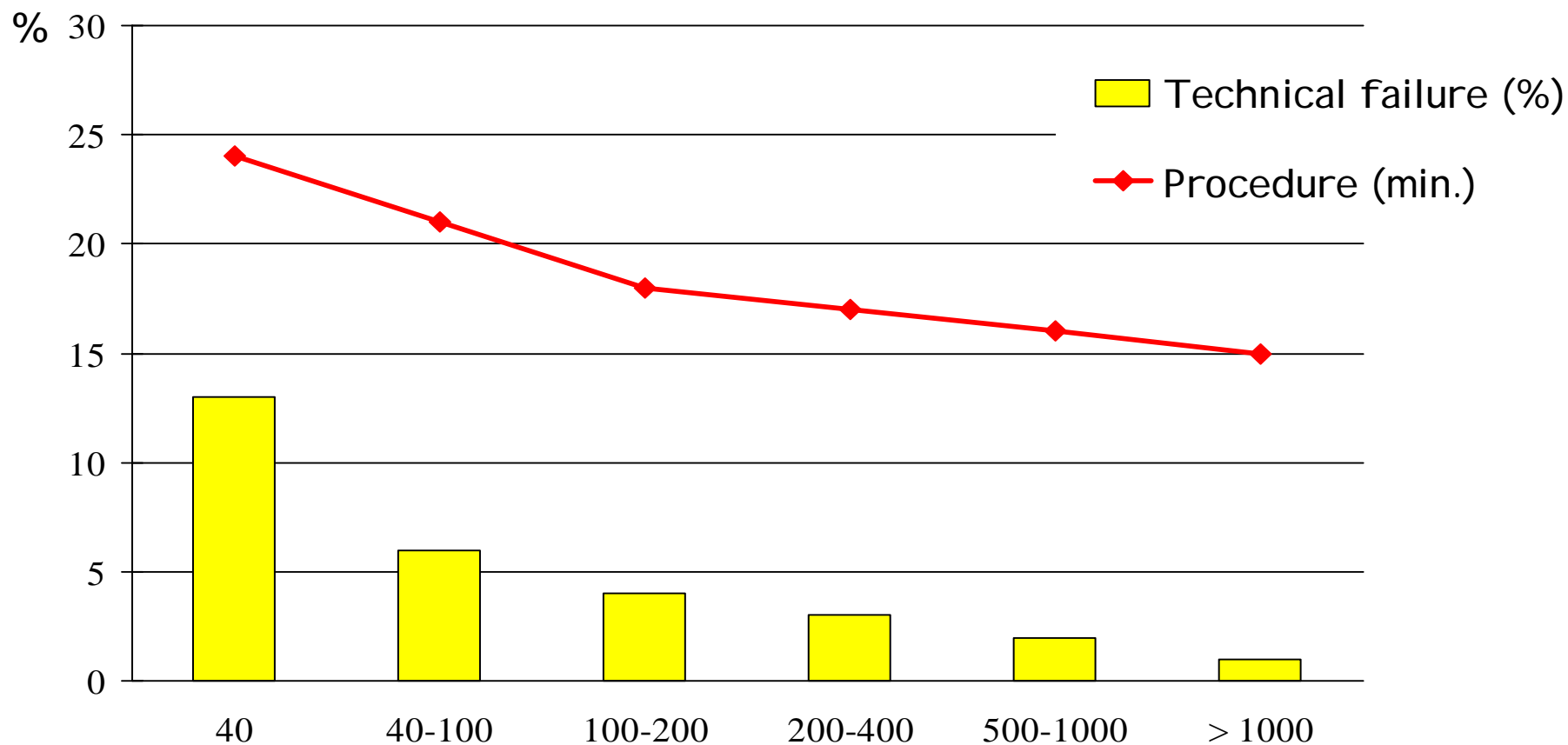
Y. Louvard and T. Iefèvre, 2004, unpublished

# Radial Approach in the Real Life



Y. Louvard and T. Iefèvre, 2004, unpublished

# Learning Curve (Left Radial)



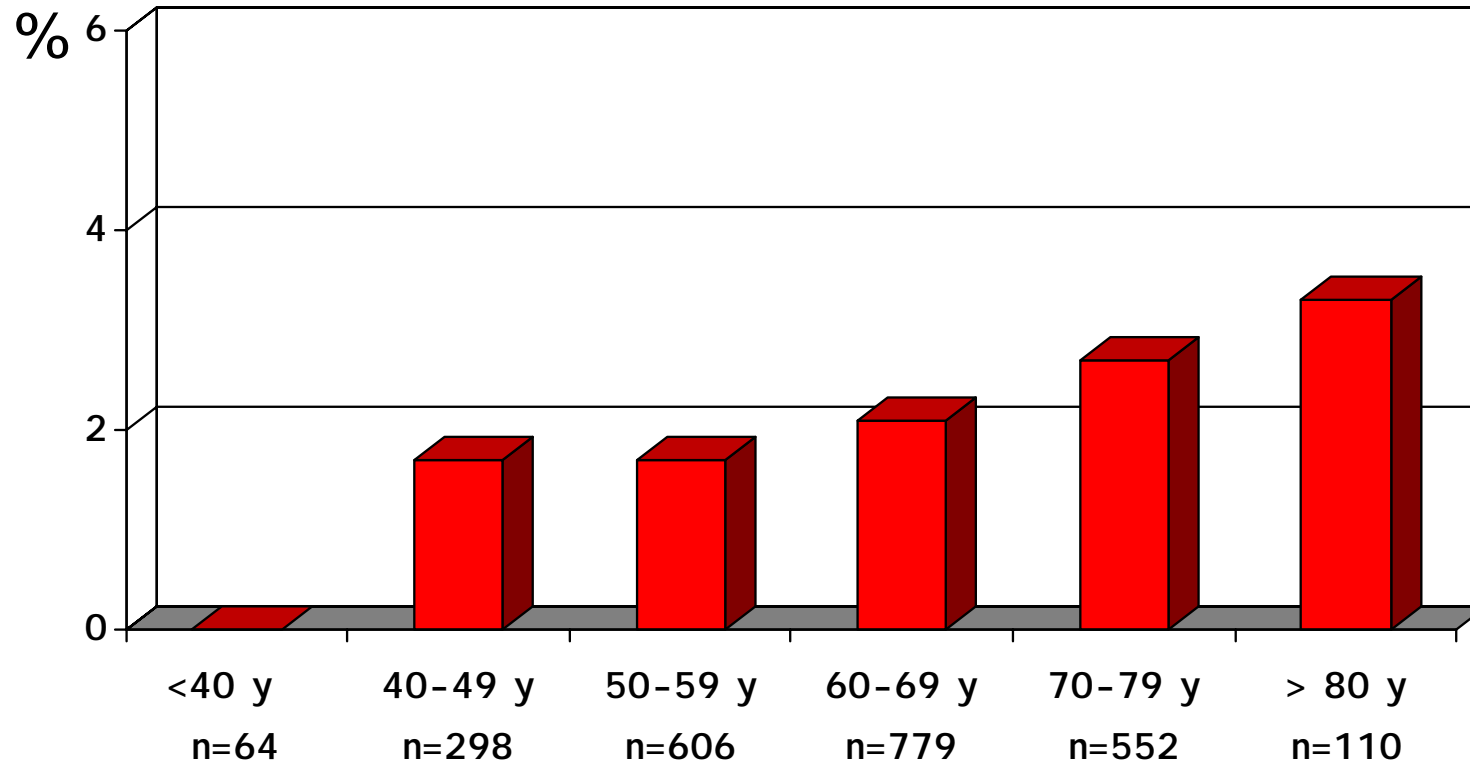
*T. Lefevre, 1998 unpublished*

# Predictive Factors of Radial Approach Failure

	Success	Failure	p
Patients (n)	2347	53	
Age (years)	61.6 $\pm$ 11.3	65 $\pm$ 11.2	0.030
Weight (kg)	76.9 $\pm$ 13.5	72.8 $\pm$ 13.8	0.029
Height (cm)	169.3 $\pm$ 8.3	166.4 $\pm$ 10.3	0.030

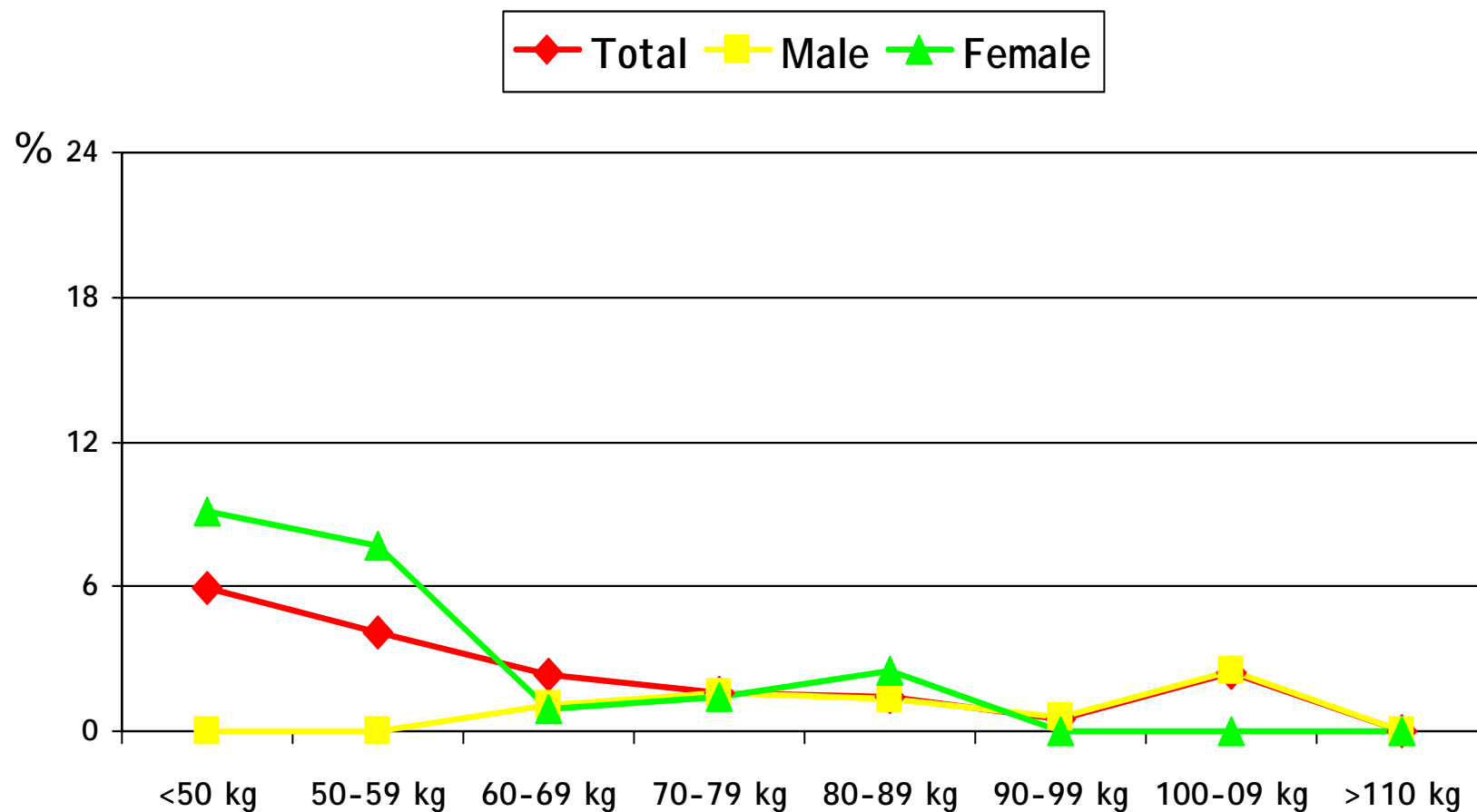
*Y. Louvard, unpublished*

# Radial Approach Failure in Relation to Age



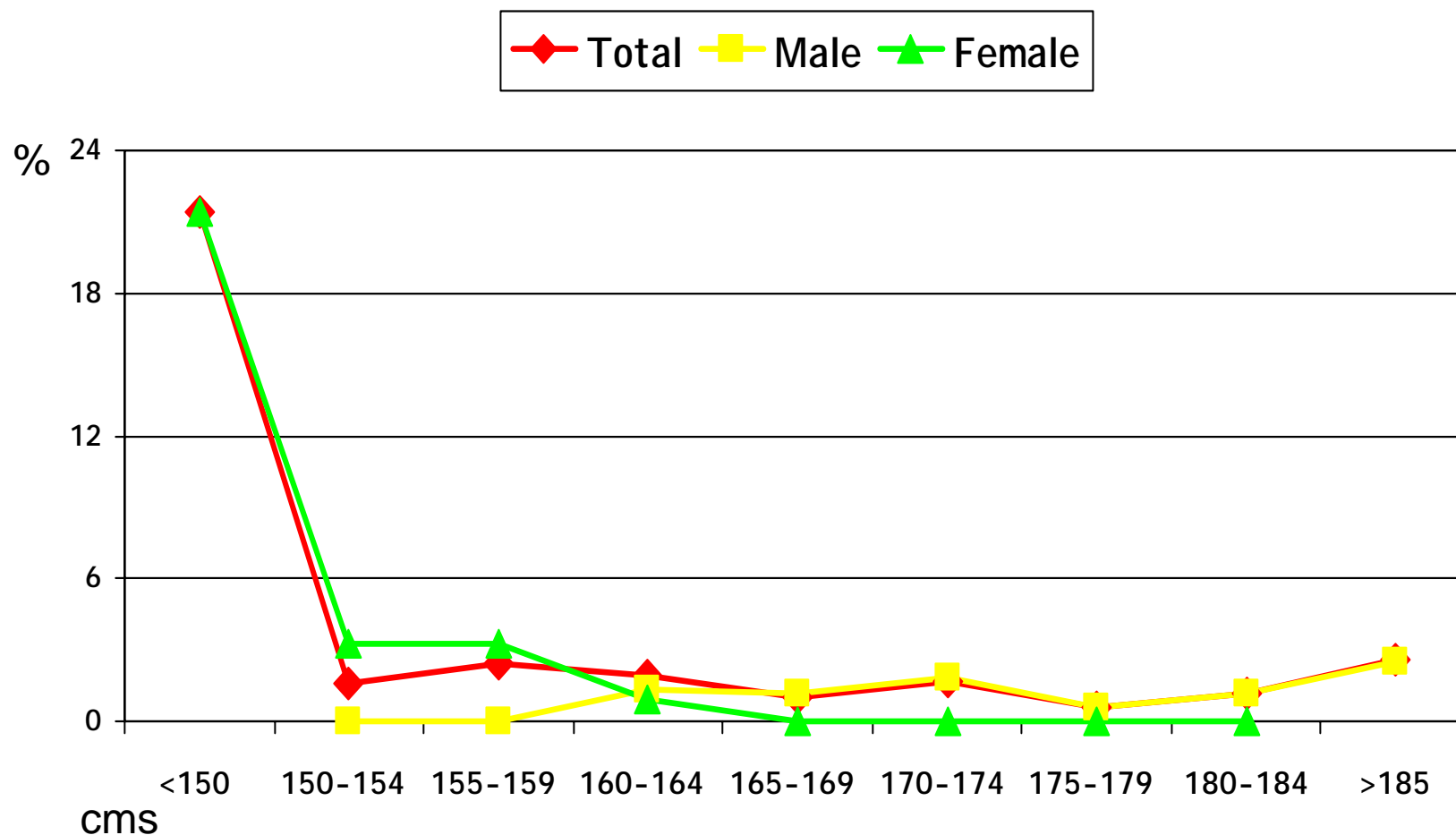
*Y. Louvard, unpublished*

# Radial Approach Failure in Relation to Weight



*Y. Louvard, unpublished*

# Radial Approach Failure in Relation to Height



*Y. Louvard, unpublished*