Cardiac surgery and acute kidney injury: retrospective study

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Acute Kidney Injury (AKI) in the setting of cardiac surgery

INTRODUCTION:

- ✓ Severe postoperative complication
- ✓ Increase rate of mortality, morbidity and length of stay in intensive care unit (ICU)
- ✓ Occurrence: 5% to 42 %

Rosner M, et al. Cardiac surgery as a cause of acute kidney injury: Pathogenesis and potential therapies. J Intensive Care Med 2008;23:3-18.

Hobson CE, et al. Acute kidney injury is associated with increased long-term mortality after cardiothoracic surgery. Circulation 2009;119:2444-2453.

Arora P, et al. Preventable Risk Factors for Acute Kidney Injury in Patients Undergoing Cardiac Surgery. J Cardiothorac Vasc Anesth. 2012 Aug;26(4):687-97.

AIM OF THE STUDY:

… Occurrence by type of cardiac surgery ?

… Length of stay in ICU and in Hospital ?

… Mortality ?

MATERIAL AND METHODS:

Retrospective study: 1 year adult surgery

Inclusion criteria

- Off-pump coronary artery bypass surgery (Off-PUMP CABG)
- On-pump coronary artery bypass surgery (On-PUMP CABG)
- Aortic valve replacement (AVR)
- Aortic valve replacement combined with CABG (AVR+CABG)
- Mitral valve repair or replacement (MVR)

MATERIAL AND METHODS:

Retrospective study: 1 year adult surgery

Exclusion criteria

- Mitral valve + CABG
- Aorta surgery
- Redo procedure
- Other combined surgery (eg: + TEA carotid)
- Double valve surgery
- Heart transplant
- Preoperative renal replacement therapy (RRT)

RIFLE classification

Category	Blood criteria	Urine criteria
Risk	× 1.5 serum creatinin or GFR ↘ 25%	< 0.5 mL/kg × 6h00
Injury	× 2 serum creatinin or GFR ↘ 50%	< 0.5 mL/kg × 12h00
Failure	× 3 serum creatinin or GFR ↘ 75%	< 0.3 mL/kg × 24h00
	OR ≥ 4 mg/dL with ↑0.5mg/dL	OR anuria × 12h00
Loss	Complete loss of kidney function > 4 weeks	
End-stage kidney disease	ESKD > 3 months	

GFR= Glomerular Filtration Rate

Bellomo R, et al. Acute renal failure. Critical Care 2004, 8:R204-R212.

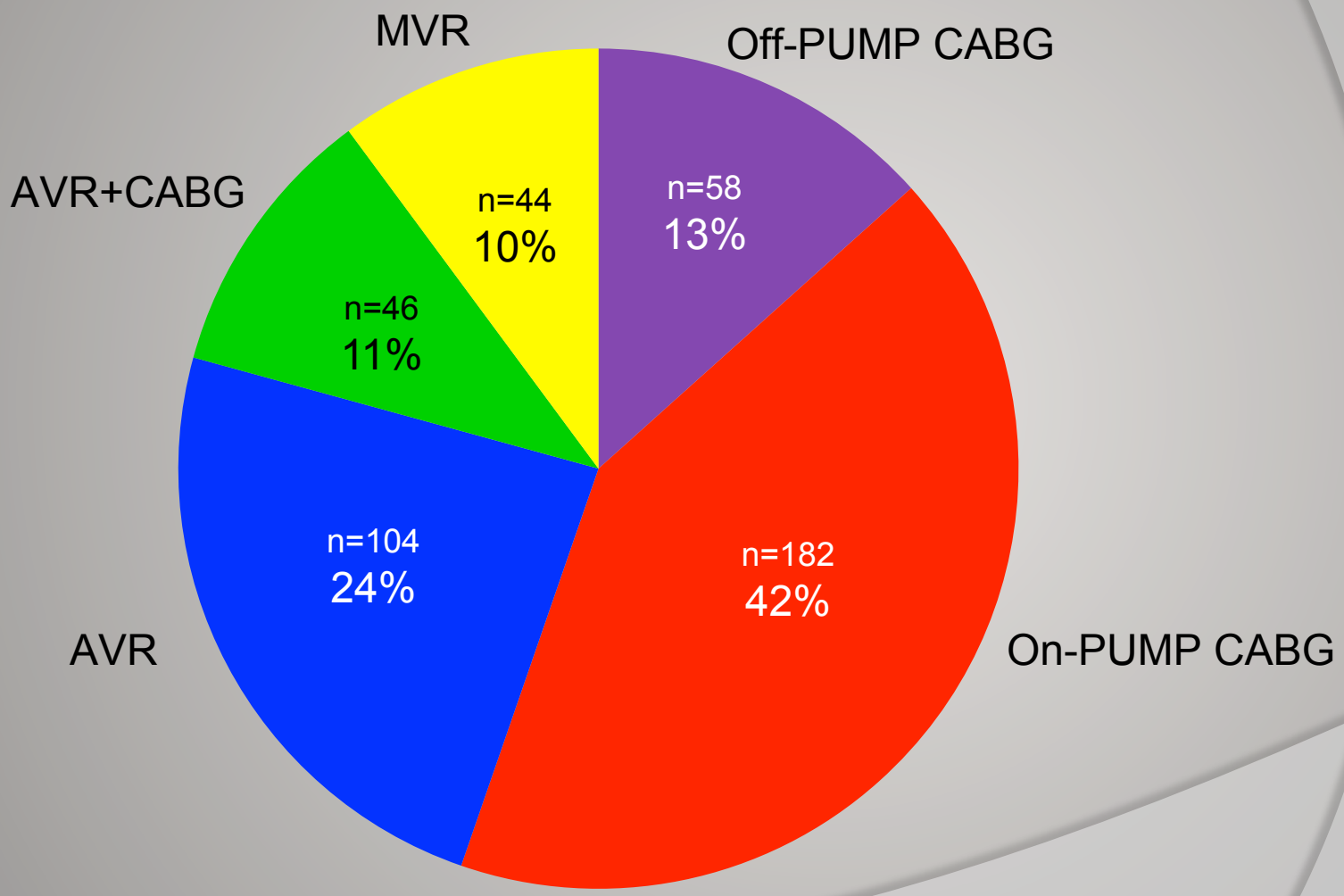
RESULTS :

N= 598 cases
(100.0%)

Excluded cases
n= 164 (27.4%)

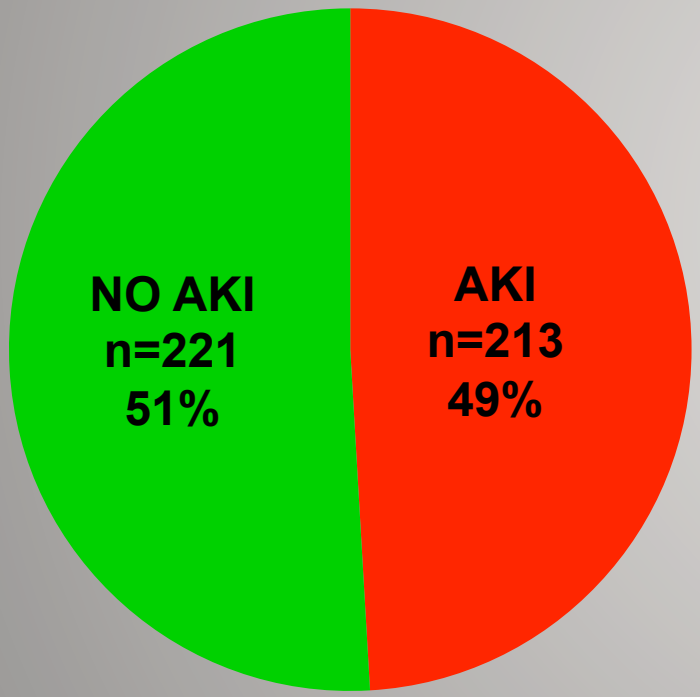
Included cases
n= 434 (72.6%)

Type of surgery n= 434 (100%)

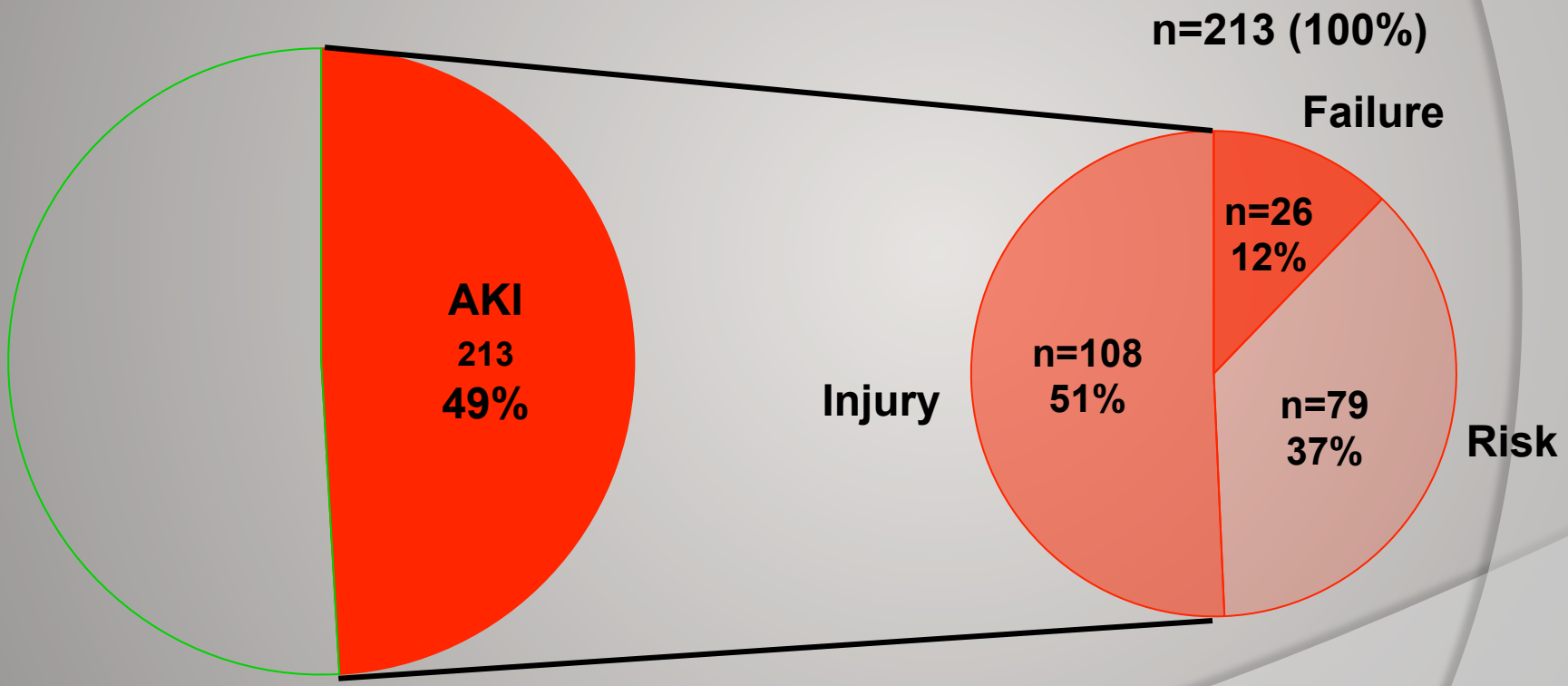


Postoperative renal status

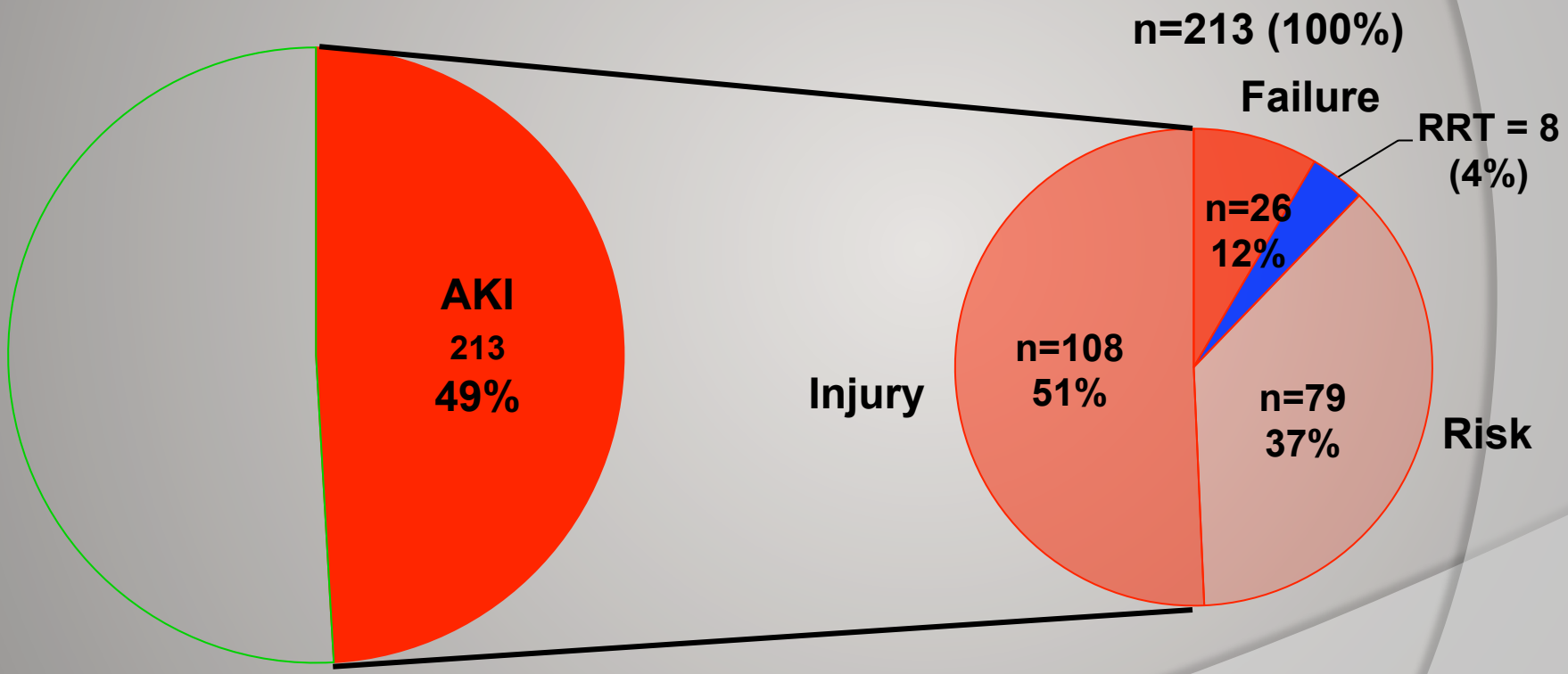
n= 434 (100%)



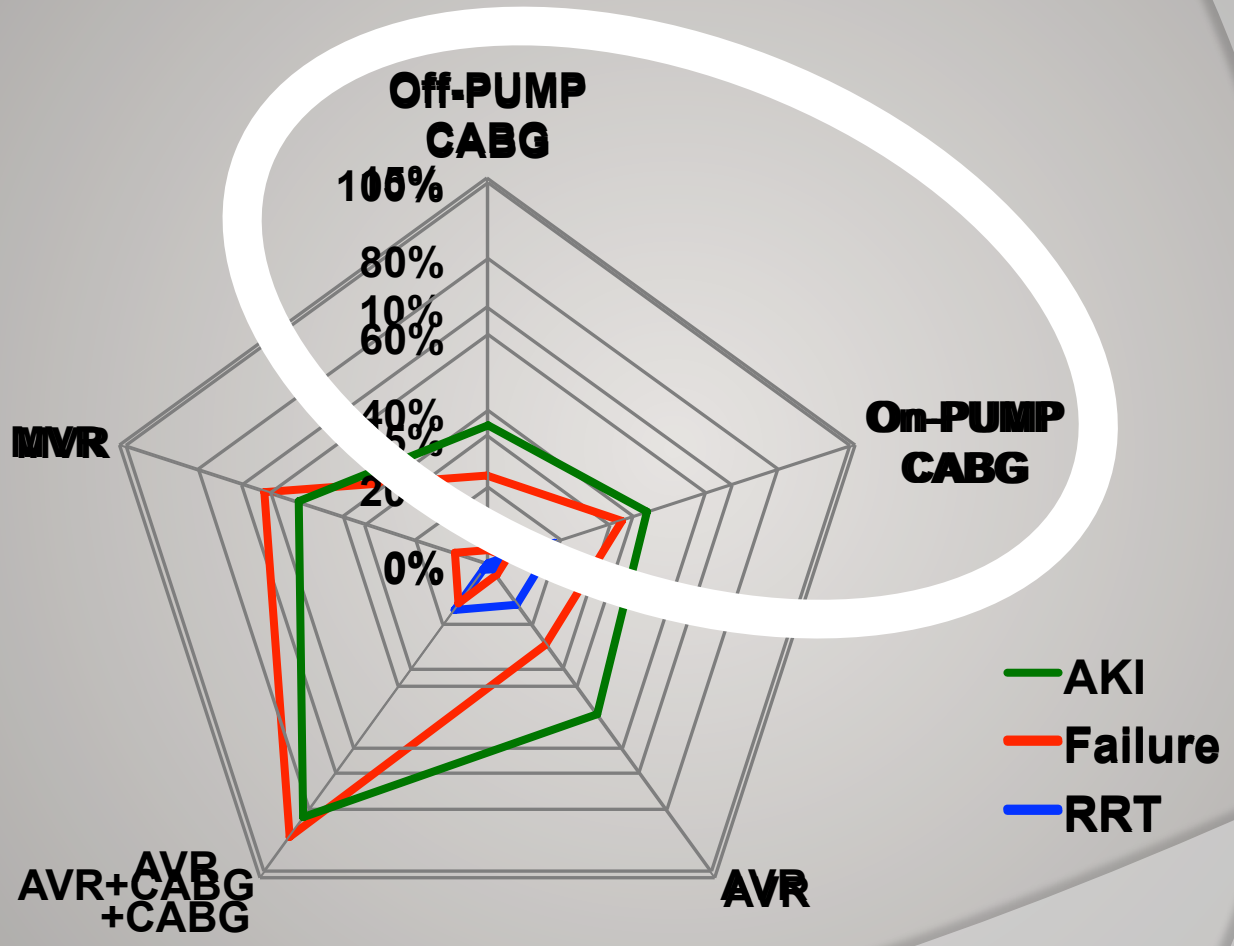
Postoperative renal status



Postoperative renal status



Postoperative AKI: Failure



p<0.0001

Risk of AKI

Off-PUMP CABG vs On-PUMP CABG

	Off-PUMP CABG n=58	On-PUMP CABG n=182	*p* value
AKI, n (%)	21 (36.0)	80 (44.0)	0.29
Failure, n (%)	2 (3.00)	10 (5.00)	0.70
EuroSCORE 1 Log	2.72 (1.5 - 5.1)	3.05 (1.9 - 6.7)	0.083
MI preop (<3 months), n (%)	4 (6.90)	39 (21.4)	**0.032**
CABG (>2 vs ≤ 2), n (%)	21 (36.2)	134 (73.6)	**<0.0001**
ICU stay (days)	2.0 (2.0 - 3.0)	2.0 (2 – 4)	**0.012**
Hospital stay (days)	11.5 (10 – 15)	12.0 (10 – 18)	0.14
Hospital mortality, n (%)	0 (0.00)	4 (2.20)	0.25

Data are expressed as M (IQR)

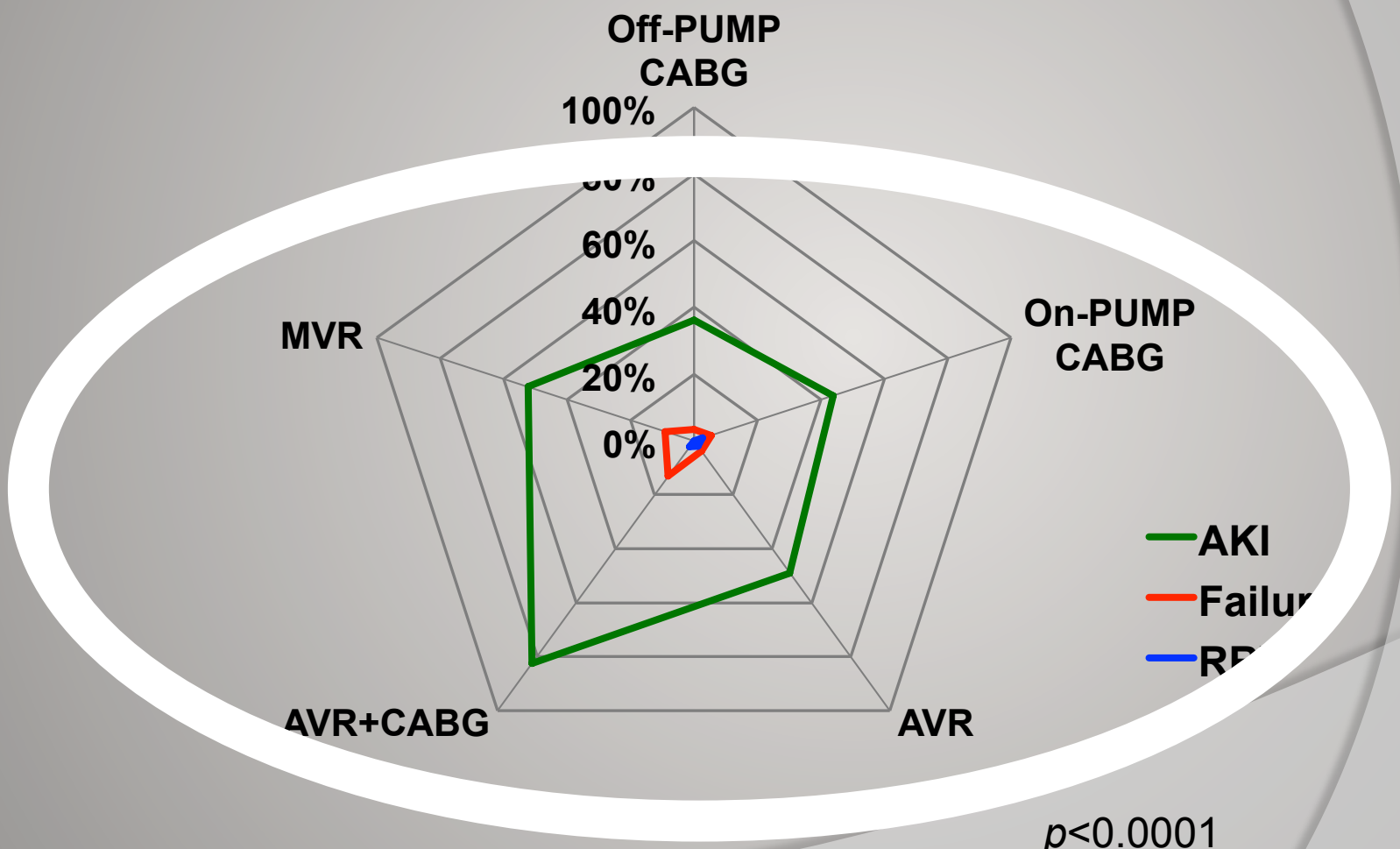
AKI:
Length of stay
Mortality

Off-PUMP CABG vs On-PUMP CABG

	Off-PUMP CABG n=21	On-PUMP CABG n=80	p value
ICU stay (days)	2.0 (2 – 3)	2.0 (2 – 4)	0.26
Hospital stay (days)	11.0 (9 – 13)	12 (10 – 18)	0.17
Hospital mortality, n (%)	0 (0.00)	1 (1.25)	0.61

Data are expressed as M (IQR)

Postoperative AKI



p<0.0001

Risk of AKI

CPB procedures

Preoperative data

	Non AKI n=184	AKI n=192	*p* value
Age (years)	66.0 (59 - 74)	72.0 (63 - 77)	**<0.001**
BMI (UI)	25.7 (23 - 28)	26.9 (24 - 30)	**<0.001**
GFR (mL/min)	82.0 (72 - 96)	70.5 (55 - 88)	**<0.001**
Parsonnet Log	5.76 (3 - 12)	8.41 (4 - 17)	**<0.001**
EuroSCORE I Log	3.60 (2 - 6)	4.98 (2 - 9)	**0.008**
CIN score	4.27 (2 - 8)	6.44 (4 - 9)	**0.002**
ARF score	1.00 (0 - 2)	2.00 (1 - 3)	**<0.001**

Data are expressed as M (IQR)
CIN score: Contrast Induced Nephropathy (Mehran and all, JACC Vol.44 No.7, 2004 October 6,2004:1393-9)
ARF score: Acute Renal Failure Score (Charuhas and all, J Am Soc Nephrol 16: 162-168,2005)

Risk of AKI

CPB procedures

Peroperative data

	Non AKI n=184	AKI n=192	*p* value
CPB time (min)	85.0 (70 - 100)	89.0 (75 - 106)	**0.048**
Clamping time (min)	52.0 (39 - 64)	58.0 (43 - 74)	**0.009**
Nadir Hct ≤ 21%, n (%)	102 (55.4)	127 (66.5)	**0.028**
RBC transfusion, n (%)	30 (16.3)	50 (26.5)	**0.017**
UF, n (%)	21 (20.6)	11 (13.8)	0.22
UF, mL	1000 (1000-1600)	1300 (1000-2000)	**0.013**

Data are expressed as M (IQR)

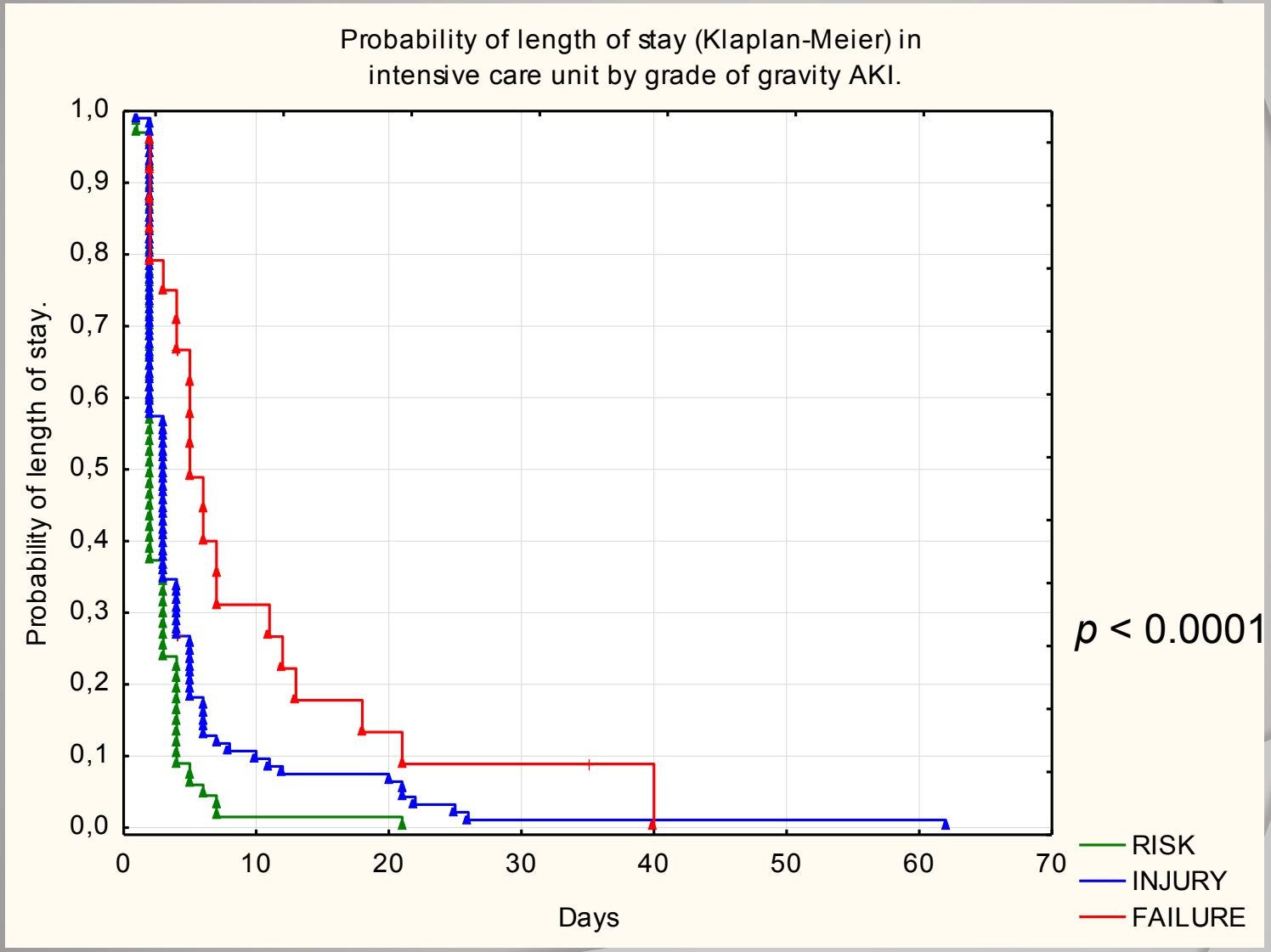
POSTOPERATIVE DATA

CPB procedures

	Non AKI n=184	AKI n=192	*p* value
Mean Blood Pressure (mmHg)	85.0 (79 - 96)	92.0 (80 - 108)	**0.007**
Serum creat (mg/dL)	9.40 (7 - 11)	10.4 (8 - 12)	**0.002**
ICU stay (days)	2.0 (2 - 3)	3.0 (2 - 4)	**0.003**
Hospital stay (days)	12.0 (10 - 16)	13.0 (10 - 19)	0.49
Hospital mortality, n (%)	5 (2.72)	8 (4.17)	0.44

Data are expressed as M (IQR)

Probability of length of stay in ICU



CONCLUSIONS

- Limits
- RIFLE classification
- Large proportion of AKI
- Length of stay
- Great mortality with AKI FAILURE (RRT)
- High risk patients
- Prospective study

THANK YOU