Acute Kidney Injury following TAVI:
Implementation of the updated VARC-2 Criteria

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Conflict of interest

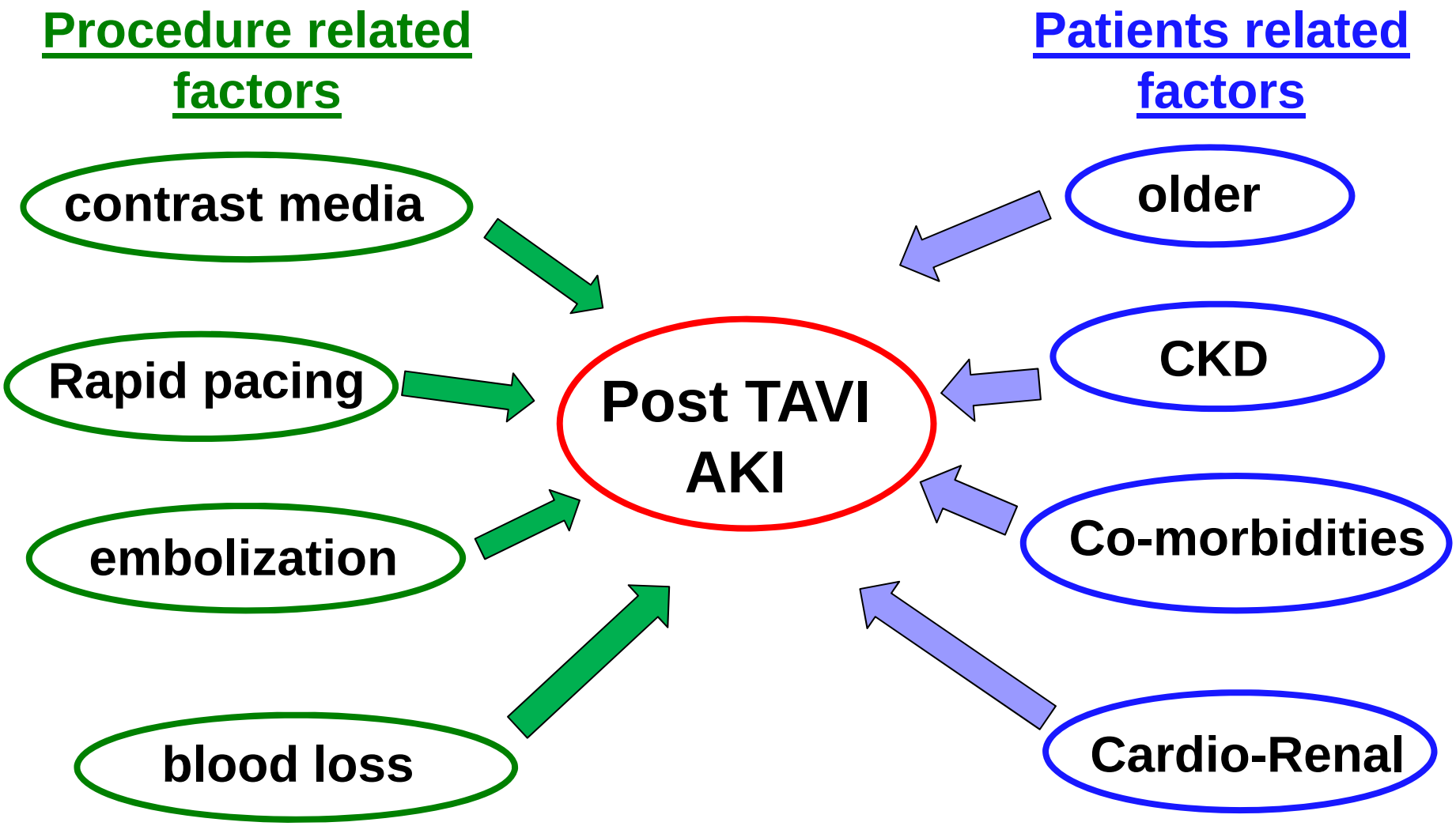
- none

Introduction

- Acute kidney injury (**AKI**) is a frequent and unfavorable complication of coronary angiography

- The current **TAVI patients** are **at increased risk** to develop AKI
  - Older
  - Co morbidities
  - High prevalence of CKD

Pathophysiology



Introduction

- AKI post TAVI is **frequent** and associated with **adverse outcomes**
  - AKI Observed in **12–41%** of TAVI patients(*)
    - Dialysis required in 1.5-10%
  - **X4** higher post-procedural **Mortality**
- Impact of **different bioprosthesis** on AKI has not been thoroughly investigate

* Genereux PU, et.al, American J of Cardiol, 2013
Saia F, et.al, Int J Cardiol, 2012
Khawaja MZ, et.al, EuroIntervention, 2012

Classification criteria

- The wide range of AKI incidence is probably related to **multiple classification** criteria

- The Valve Academic Research Consortium
  - Standardization
    - **VARC-1** – 2011
    - **VARC-2** – 2012

- Increase in creatinine **within 48 hours**

VARC-2 classification*

Table 6 Acute Kidney Injury (AKIN Classification*)

Stage 1	
	Increase in serum creatinine to 150–199% (1.5–1.99 x increase compared with baseline) OR increase of >0.3 mg/dl (>26.4 mmol/l) OR
	Urine output <0.5 ml/kg/h for >6 but <12 h
Stage 2	
	Increase in serum creatinine to 200–299% (2.0–2.99 × increase compared with baseline) OR
	Urine output <0.5 ml/kg/h for >12 but <24 h
Stage 3†	
	Increase in serum creatinine to >300% (>3 × increase compared with baseline) OR serum creatinine of >4.0 mg/dl (>354 mmol/l) with an acute increase of at least 0.5 mg/dl (44 mmol/l) OR
	Urine output <0.3 ml/kg/h for >24 h OR
	Anuria for > 12 h

The increase in creatinine must occur within 48 h. *Mehta et al. (31). †Patients receiving renal replacement therapy are considered to meet Stage 3 criteria irrespective of other criteria.

* Kappetein AP, et.al, J Am Coll Cardiol, 2012

Objectives

- To identify:
  - **Incidence** of AKI
  - **Risk factors** for AKI
  - Effect of **different bio-prostheses**

Methods

- **Study population**
  - **Retrospective**, **Single center** analysis
  - First **300** consecutive patients
  - Excluded:
    - Patients on hemodialysis
    - Patients without adequate laboratory follow up.

Methods

- **TAVI procedure**
  - All patients received **AKI prophylaxis** of:
    - I.V hydration
    - Oral N-Acetylcysteine
  - **Contrast media** used in all patients:
    - Visipaque®: Iodoxinol an iso-osmolar contrast media
  - **Valves** used:
    - **Type** - Edwards-Sapien XT or CoreValve prostheses
    - **Size** - larger (29-31mm) or smaller (23-26mm)

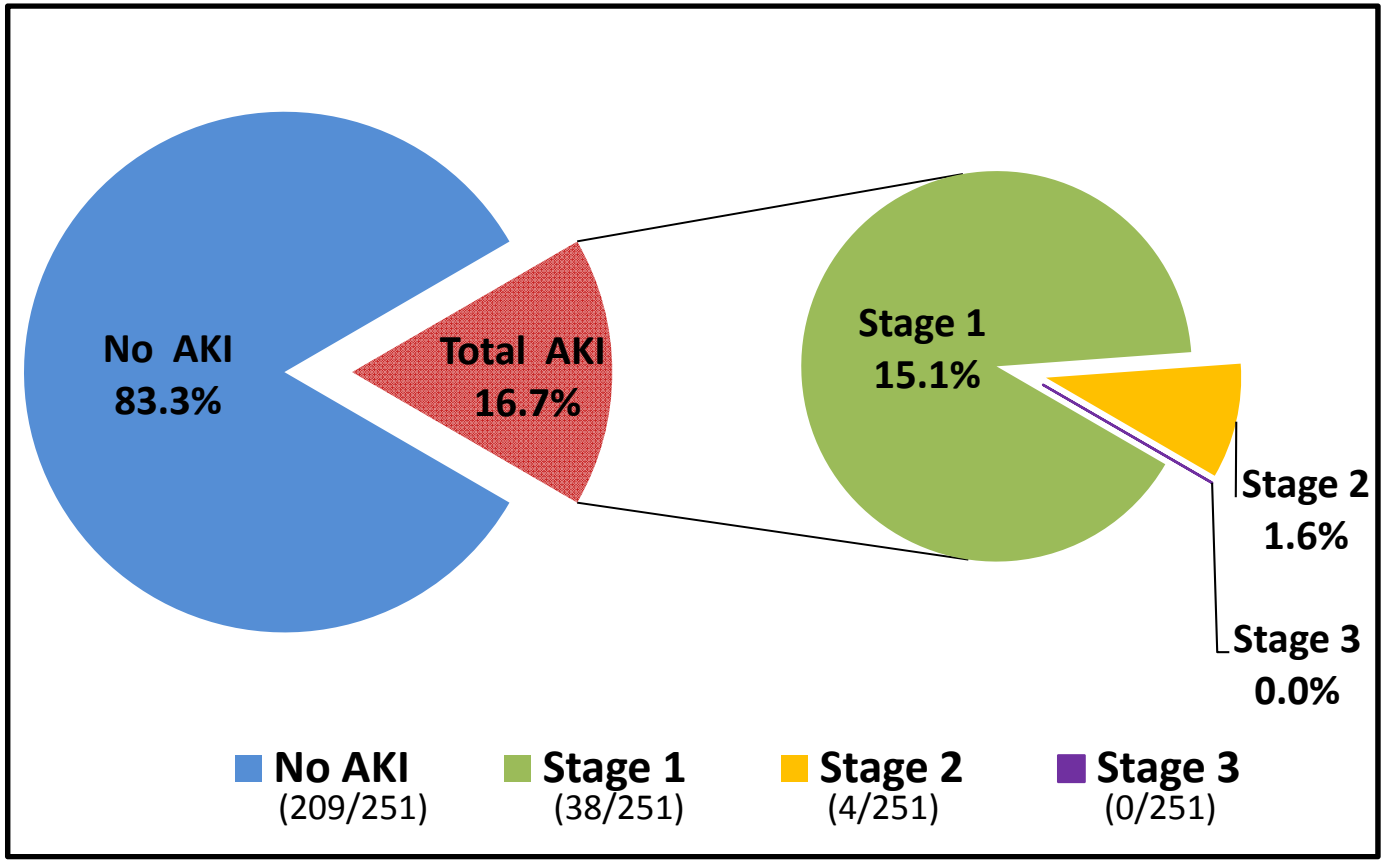
Results

- **Patient data**
  - The final study population included **251 patients**
    - Mean **age** of **83±5**
    - **63% females**
    - High prevalence of co-morbidities and prior vascular disease
  - **Valve type distribution:**
    - **CoreValve - 85%** (213/251)
    - **Edwards - 15%** (38/251)

Variable	All cohort (251)
Pre-procedural clinical data	
Diabetes Mellitus (n, %)	**79 (31.4%)**
Hypertension (n, %)	**215 (85%)**
CKD (MDRD<60 ml/min) (n, %)	**113 (45%)**
Euroscore (mean±SD)	**26.1±12**
Procedure related data	
Contrast volume, ml (mean±SD)	**145.6±44.3**
Valve size 23-26mm (n, %)	**155 (61.8%)**
29-31mm (n, %)	**96 (38.2%)**

Results

- Rates of Acute kidney injury



Results

Factors associated with AKI

Variable	AKI (42)	No AKI (209)	p value
Estimated GFR (mean±SD) ml/min	54.3±19	63.8±17	**0.002**
PVD (n, %)	8 (19%)	17 (8.1%)	**0.03**
Euroscore (mean±SD)	30.1±13.1	25.3±12.6	**0.032**
Blood transfusion	24 (57.1%)	86 (41.1%)	**0.048**
Hypertension (n, %)	39 (92.8)	176 (84.2)	0.14
Diabetes Mellitus (n, %)	14 (33.3)	65 (31.1)	0.77
Contrast volume (n, %)	156.1±42	143±44	0.09
Valve type –corevalve (n, %)	33(78.5)	180 (86.1)	0.2
Valve size 23-26mm (n, %)	25 (59.5)	130 (62.3)	0.37
29-31mm (n, %)	17 (40.5)	79 (37.7)	0.74

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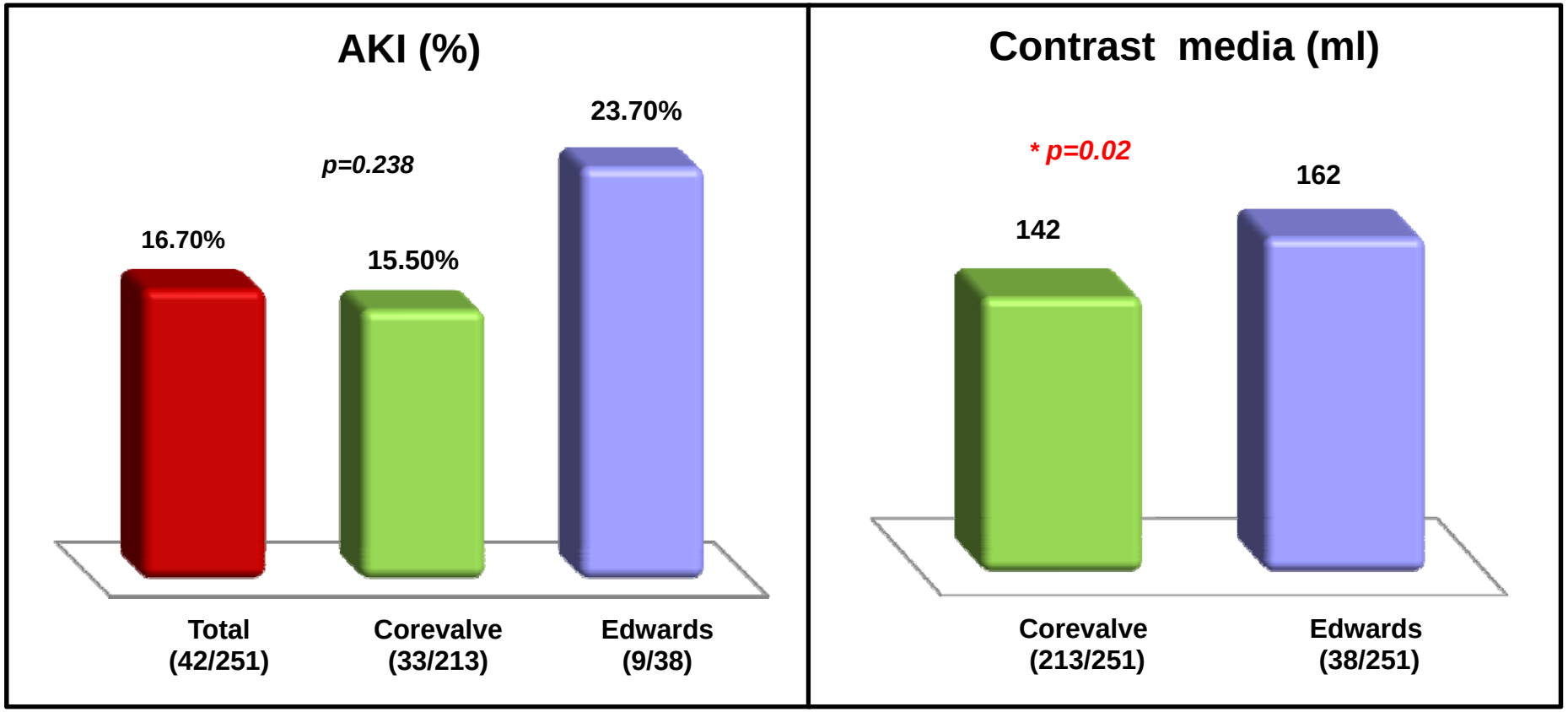
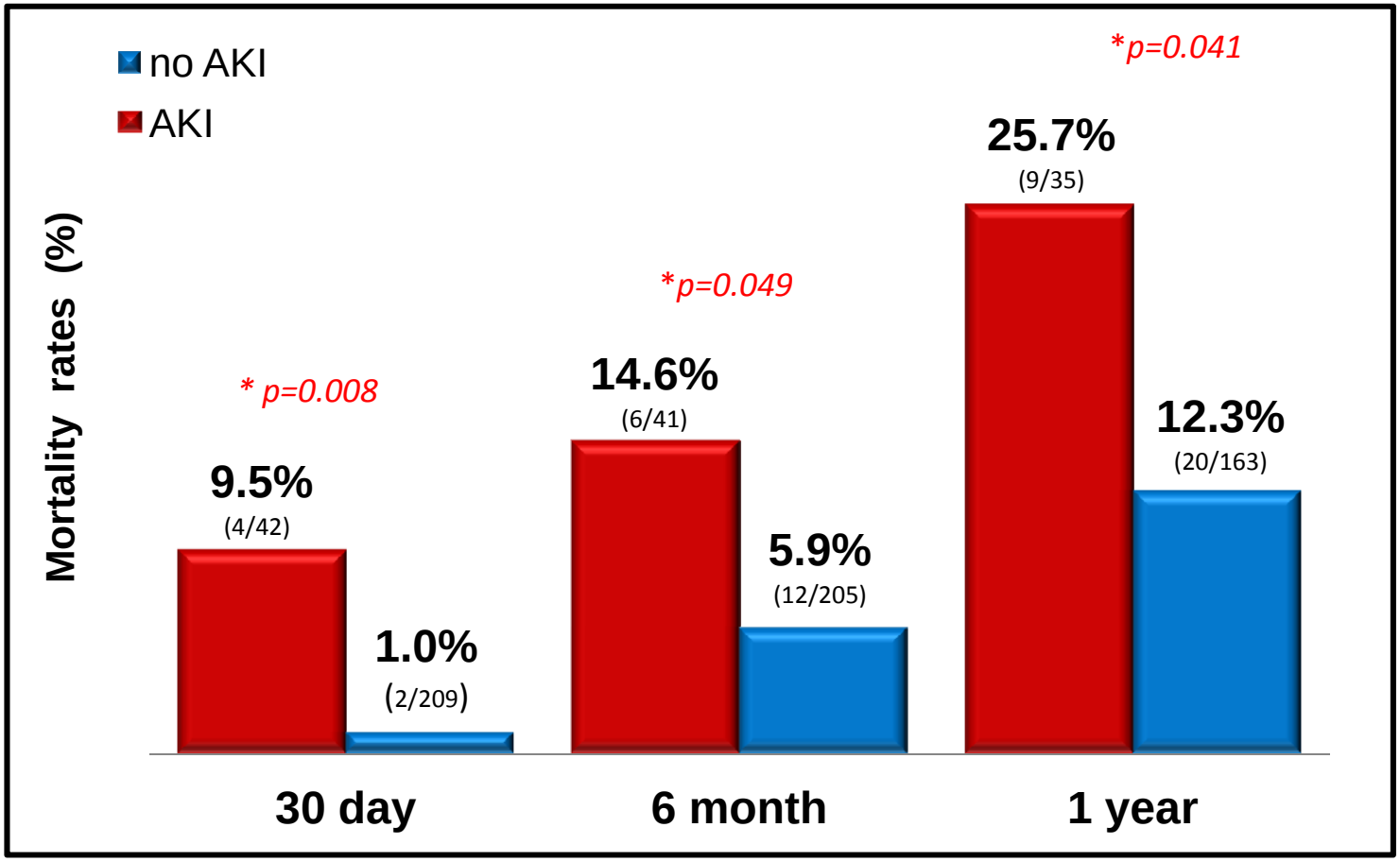
Results

- Comparison between Bio-prostheses



Results

- **AKI and mortality**



Conclusions

- In our cohort, according to VARC-2 classification**- <u>1 in every 6</u>** patients developed AKI
  - 90% stage 1

- **CKD**, **PVD**, **Blood transfusion** and high **EuroSCORE** were associated with **increased risk** to develop AKI

Conclusions

- **No significant difference between** different types and sizes of **bio-prostheses**

- Short and long term **mortality**

  was higher amongst patients with AKI

Thank you

AKI following TAVI:
Implementation of the updated VARC-2 Criteria

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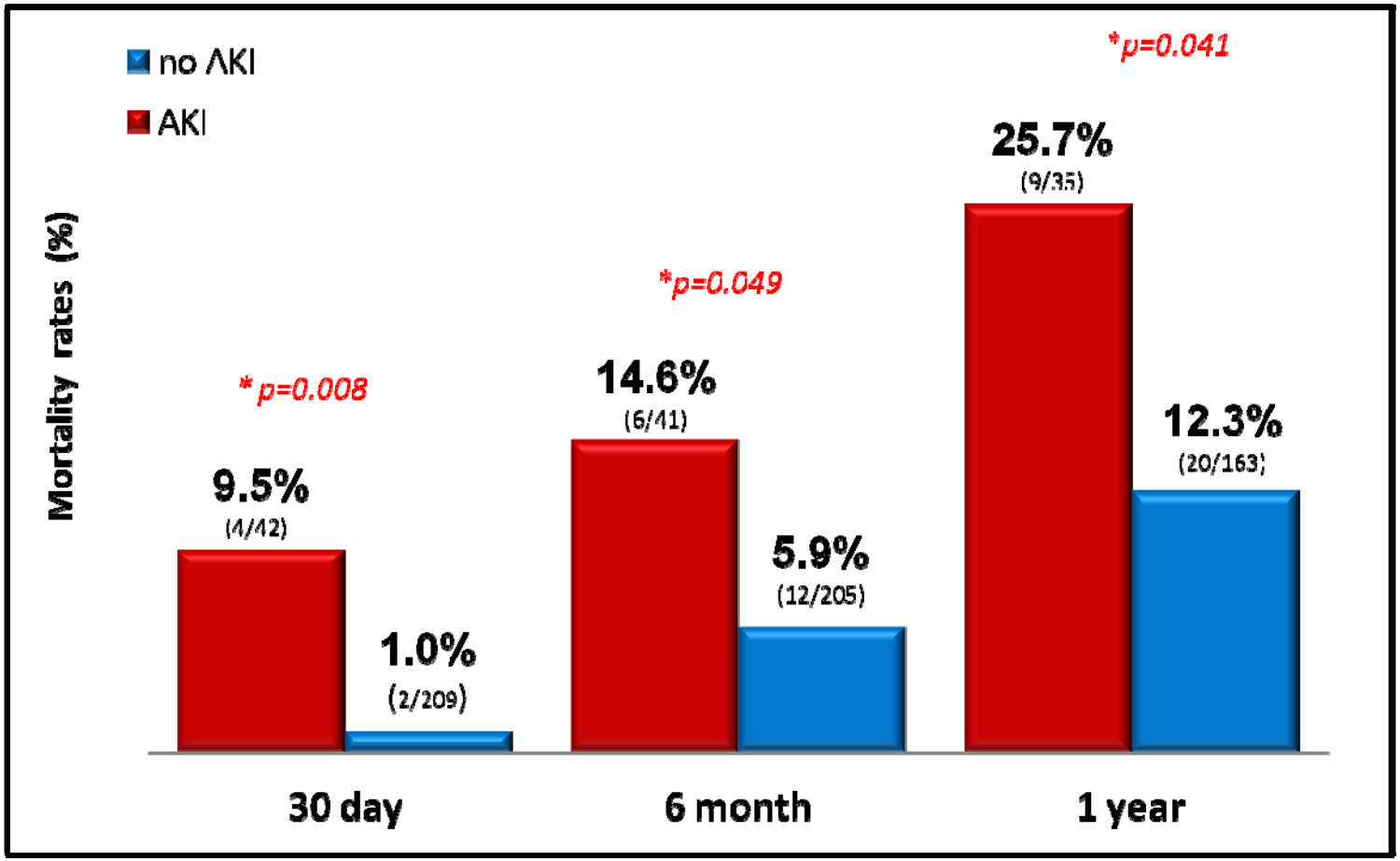
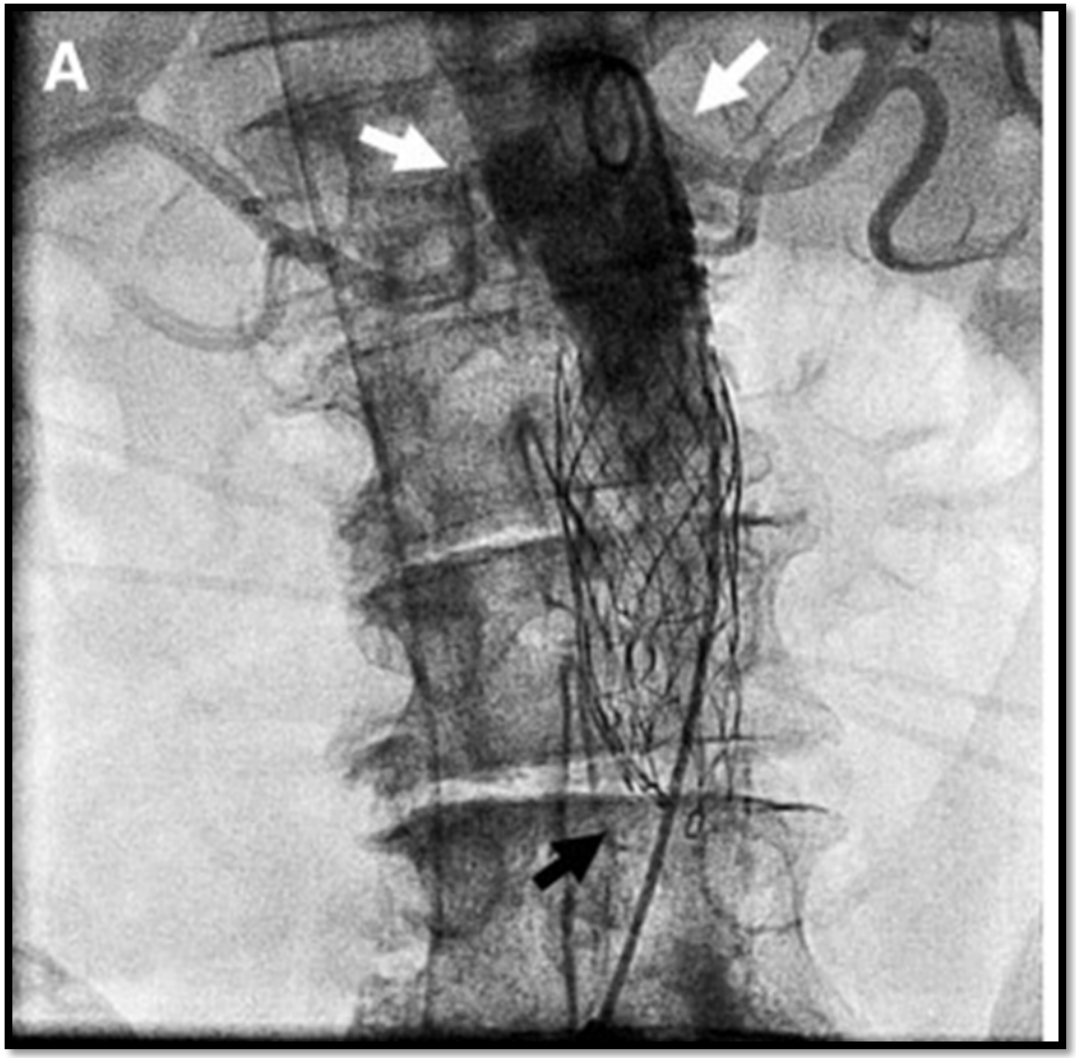
Results

- AKI and mortality



TAVI and the kidneys

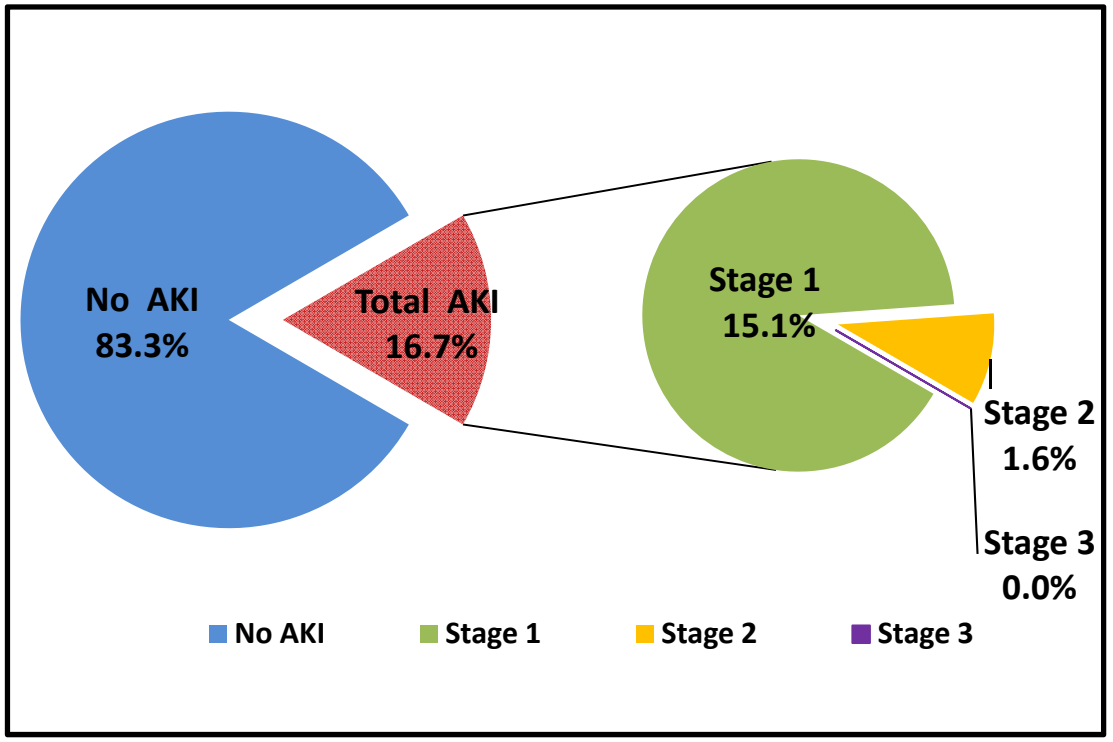


* Gerckens U, et.al, JACC Intervention, 2010

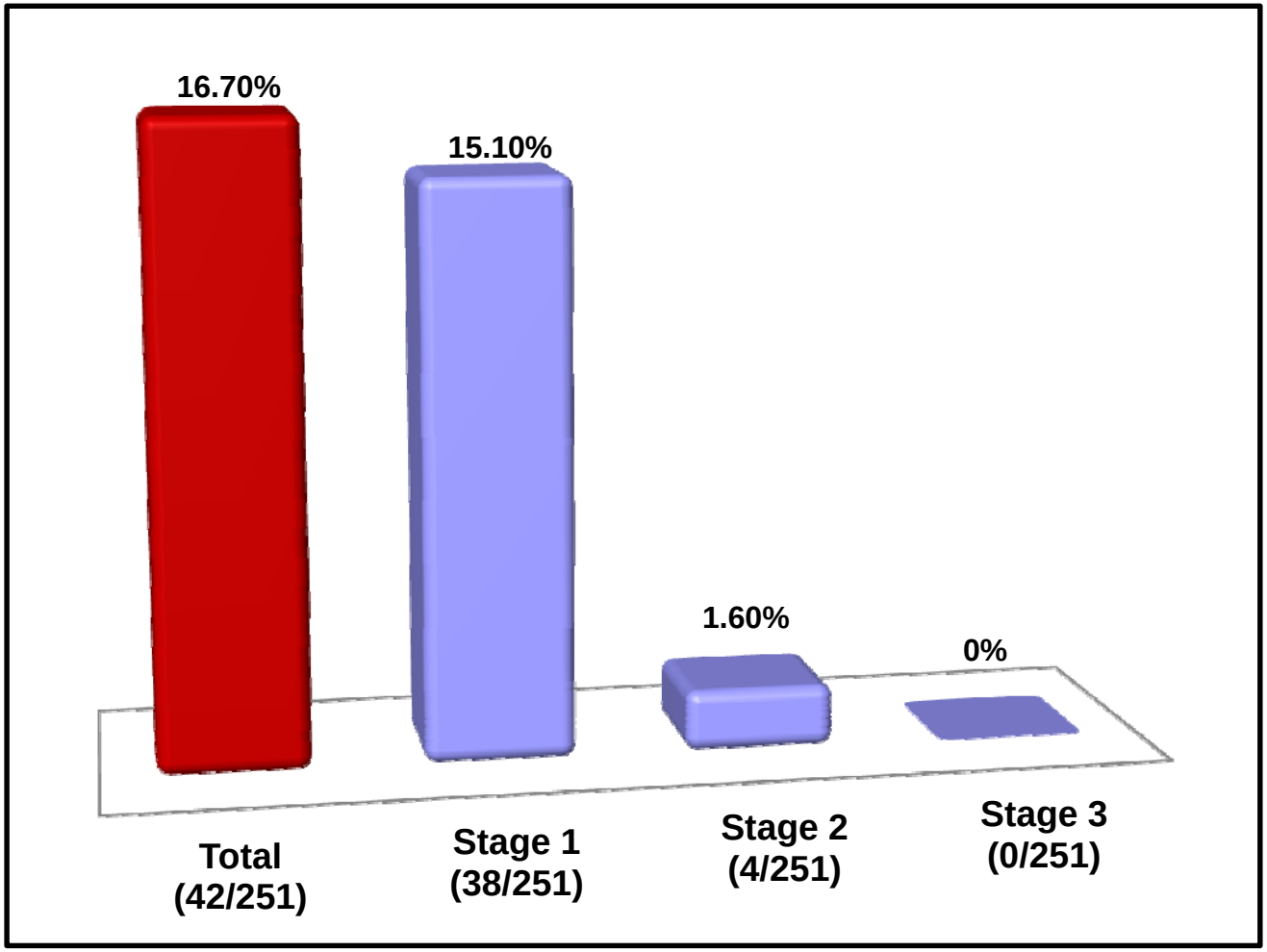
Results

- **Included 251** patients
  - Edwards implanted in 15.2% (38/251)
  - CoreValve implanted 84.8% (213/251)

- The **incidence** of AKI:
  - Total - **16.7%** (42/251)
  - Stage 1 - 15.1% (38/251)
  - Stage 2 - 1.6% (4/251)
  - Stage 3 - none



AKI following TAVI



Results - Factors associated with AKI

Variable	Odds ratio	95% Confidence interval		*p*-value
		Lower	Upper	
Gender (male)	1.24	0.621	2.516	0.546
Hypertension	2.43	0.689	8.113	0.160
Diabetes Mellitus	1.1	0.543	2.227	0.791
Dyslipidemia	1.26	0.55	2.9	0.578
PVD	2.644	1.058	6.608	**0.032**
CHF	1.258	0.638	2.479	0.508
CAD	2.28	0.84	3.4	0.131
CVA	1.7	0.59	5.1	0.302
COPD	0.8	0.38	1.93	0.728
Pulmonary HTN	2.05	0.97	4.2	0.054
Vascular complication	1.533	0.613	3.833	0.439
CKD (MDRD<60)	2.918	1.451	5.866	**0.002**
Blood transfusion	2	1.01	3.97	**0.034**
Valve type (corevalve)	1.6	0.735	3.901	0.213
Valve size (bigger)	1.1	0.569	2.201	0.745

AKI following TAVI

- **Edwards vs. CoreValve**:
  - Contrast media:
    - Higher volume used in Edwards vs. CoreValve
      - (142ml vs. 162 ml, *p=0.02*)
  - No difference in the incidence of AKI between:
    - Valve **types** (23.7% vs. 15.5%, P=0.238)
    - Valve **sizes** (17.7% vs. 16.1%, *p=0.745*)
      - larger (29-31mm) vs. smaller (23-26mm)