

***The Incidence and risk factors of  
acute kidney injury after coronary  
artery bypass graft surgery***

***Samira Tabiban MD***

**Rajaie Cardiovascular medical and  
research center**

# Introduction

Acute kidney injury (AKI) occurs in up to 30% of all patients following coronary artery bypass grafting (CABG) which is associated with a high mortality, a prolonged hospital stay and a higher risk for infection

# *Introduction*

- 50 percent increase in the serum creatinine concentration above baseline
- up to 30 percent of patients undergoing CABG; in 1 to 5 percent, the renal failure is severe and may require dialysis
- the 30 day mortality associated with this complication is 64 percent, compared to a mortality of 4.3 percent among those without renal failure .

# ***Risk Factor***

- poor cardiac performance
- advanced atherosclerotic vascular disease
- reduction in creatinine clearance
- The duration of cardiopulmonary bypass
- The presence of perioperative hemodynamic instability
- Use of radiocontrast agents immediately before surgery

# ***Risk Factors***

- Female gender
- Reduced left ventricular function
- Diabetes
- Peripheral vascular disease
- Preoperative use of an intra-aortic balloon pump
- Elevated preoperative serum creatinine

# *Methods*

- From March 2014 to April 2015, 490 consecutive patients who underwent On-pump CABG in Rajaie cardiovascular medical and research center were assessed.
- Baseline variables and perioperative data were collected and their association with the development of AKI was evaluated.

# ***Statistics:***

- Mean value, standard deviation (SD) and frequency was used as descriptive analysis.
- For evaluation the distribution of data one-sample Kolmogorov-Smirnov test was used.
- Qualitative data were compared with Chi square or Fisher's exact test.
- All data were analyzed using SPSS software, version 11.0 (SPSS Inc., Chicago, IL, USA). A value of  $P < 0.05$  was considered statistically significant.

Table 1: demographic and perioperative data of all patients (n=490)

Variables		N(%), M±SD
Sex	Male	353(72%)
	Female	137(28%)
Age (years)		67.9±12.5
DM		186(38%)
CKD		52(10.6%)
MI		70(14.9%)
emergency surgery		27(5.5%)
Number of graft	1graft	14(2.8%)
	2grafts	44(9%)
	3grafts	245(50%)
	4grafts	167(34.1%)
	5grafts	19(3.9%)
	6grafts	1(0.2%)
Pump time	<120 min	389(79.4%)
	≥120 min	101(20.6%)
LVEF (%)		45.90±7.13
Preop-Cr (mg/dL)		1.23±0.3
Postop-Cr (mg/dL)		1.24±0.75
Death		6(1.3%)

**DM:** Diabetes mellitus, **CKD:** chronic kidney disease, **MI:** Myocardial infarction, **LVEF:** left ventricle ejection fraction, **min:** minute, **Cr:** creatinine **N:** number, **M:** mean, **SD:** standard deviation



**Table2:** Perioperative variables and their association to the development of ARF following CABG surgery

Variables		AKI (n=13)	No AKI (n=477)	p-value
Sex (M/F)		6/3	324/129	0.74
Age (years)		65.70±8.7	60.68±9.7	0.48
CKD		2(15.3%)	49(10.2%)	0.28
DM		4(30.7%)	176(36.8%)	0.73
MI		3(23.0%)	65(13.6%)	0.11
emergency surgery		0(0%)	27(5.66%)	0.51
Number of graft	1graft	0(0%)	14(2.93%)	0.40
	2grafts	1(7.69%)	33(6.91%)	
	3grafts	4(30.7%)	231(48.4%)	
	4grafts	3(23.0%)	158(33.1%)	
	5grafts	1(7.69%)	16(3.35%)	
	6grafts	0(0%)	1 (0.20%)	
Pump time (min)		132.9±36	92.4±39.1	0.02
Preop-LVEF (%)		42.08±5.9	45.18±3.5	0.30
Postop-LVEF (%)		35±7.4	43.25±8.8	0.01
MV time(min)		24.85±40.7	20.88±42.2	0.48
Death		1(7.69%)	5(1.04%)	0.01

**DM:** Diabetes mellitus, **CKD:** chronic kidney disease, **MI:** Myocardial infarction, **LVEF:** left ventricle ejection fraction, **MV:** Mechanical Ventilation, **min:** minute

Table 3: Serum creatinine before and 74h after surgery associated with AKI

Variable	AKI (n=13)	No AKI (n=477)	P value
Baseline serum creatinine (mg/dL)	1.5±1.1	0.9±1.1	0.04
Serum creatinine after 72 hours (mg/dL)	2.27±0.9	1.1±0.6	0.001

Table4: Intraoperative variables associated with AKI

Variable	AKI (n=13)	No AKI (n=477)	P value
SaO <sub>2</sub> , %	99.7±0.03	99.7±0.01	0.94
PaO <sub>2</sub> , mmHg	325±2.1	318±1.9	0.43
MAP, mmHg	68.6±12.3	66.2±10.0	0.85
Arterial O <sub>2</sub> content, mL/dL	12.3±1.3	13.7±1.0	0.004
Hemoglobin concentration, g/dL	8.0±0.5	9.1±0.7	<0.001
Red blood cell transfusion, mL	750±205	500±200	<0.001

**MAP:** Mean arterial pressure, **PaO<sub>2</sub>:** oxygen pressure of arterial blood, **SaO<sub>2</sub>:** oxygen saturation of arterial blood

# Conclusion:

- Acute kidney injury is the important postoperative organ dysfunction in patients who underwent CABG
- Preoperative elevated serum creatinine concentration
- Cardiopulmonary bypass time >120 min
- Intraoperative anemia and blood transfusion are serious risk factors associated with AKI.

