

Renal Artery Stenosis Impacts Postoperative Complications After Major Vascular Surgery

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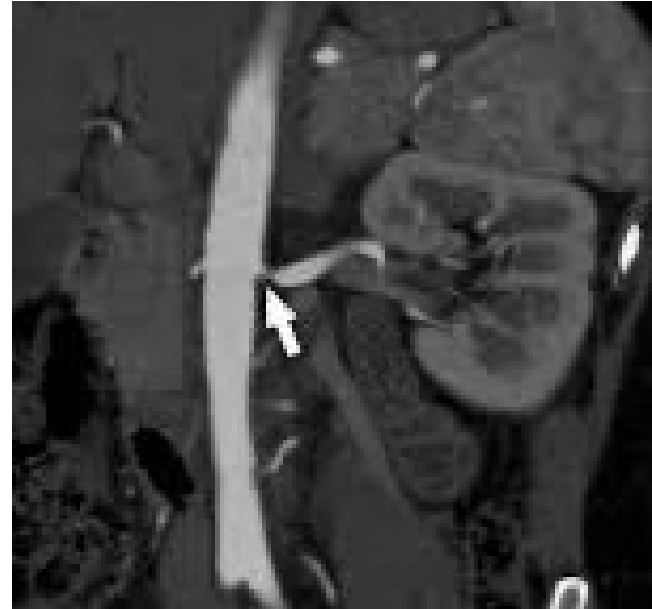
INTRODUCTION

- Postoperative acute kidney injury (AKI) is common after major vascular surgery and is associated with increased morbidity and mortality
- Incidental atherosclerotic renal artery stenosis (RAS) has been shown to be an important feature contributing to the development of postoperative AKI

DEFINITIONS

- RAS, if $1 - (\text{min diameter}/\text{normal diameter}) * 100 \geq 50\%$
- No RAS, if $1 - (\text{min diameter}/\text{normal diameter}) * 100 < 50\%$
- Bilateral RAS, if $\geq 50\%$ stenosis in both the left and right renal arteries, or with a single perfused kidney with $\geq 50\%$ stenosis

- It was hypothesized that patients with RAS (defined as $\geq 50\%$) undergoing major vascular surgery procedures have a higher incidence of AKI and postoperative complications than those without RAS

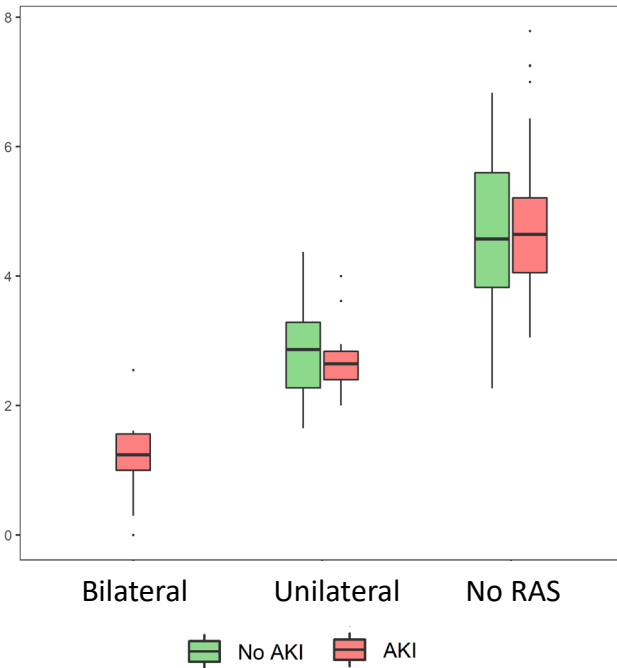


- Retrospective cohort study of 200 patients who underwent elective open aortic or visceral bypass surgery (100 with AKI, 100 without AKI)
- RAS was evaluated by a review of pre-surgery CTAs with reviewers blinded to AKI status
- Univariate and multivariable logistic regression was used to assess association of unilateral and bilateral RAS with postoperative outcomes

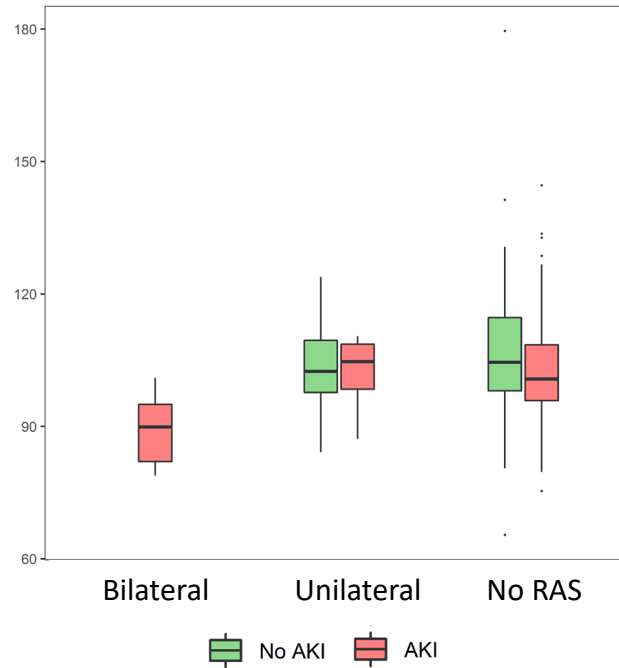
Preoperative Cohort Characteristics	No RAS (n=123, 77%)	Unilateral RAS (n=28, 17%)	Bilateral RAS (n=10, 6%)
Age, median (IQR)	69 (60,74)	75 (66,78)	73 (70,74)
Comorbidities, n (%)			
Peripheral arterial disease	123 (100)	28 (100)	10 (100)
Hypertension	110 (89)	27 (96)	10 (100)
Hyperlipidemia	37 (30)	11 (39)	2 (20)
Chronic kidney disease	24 (20)	12 (43)*	6 (60)*
Coronary artery disease	12 (10)	10 (36)*	2 (20)
Blood Pressure, median (IQR)			
Systolic	135 (118,148)	139 (125,153)	133 (117,142)
Diastolic	76 (67,82)	71 (63,82)	75 (67,82)
Mean arterial pressure	93 (83,103)	92 (86,108)	87 (79,94)
Preadmission Cr, median (IQR)	0.9 (0.8,1.0)	1.0 (0.8,1.0)	1.0 (0.8,1.4)
Preadmission GFR, median (IQR)	85 (74,94)	76 (59,92)	66 (42,78)*

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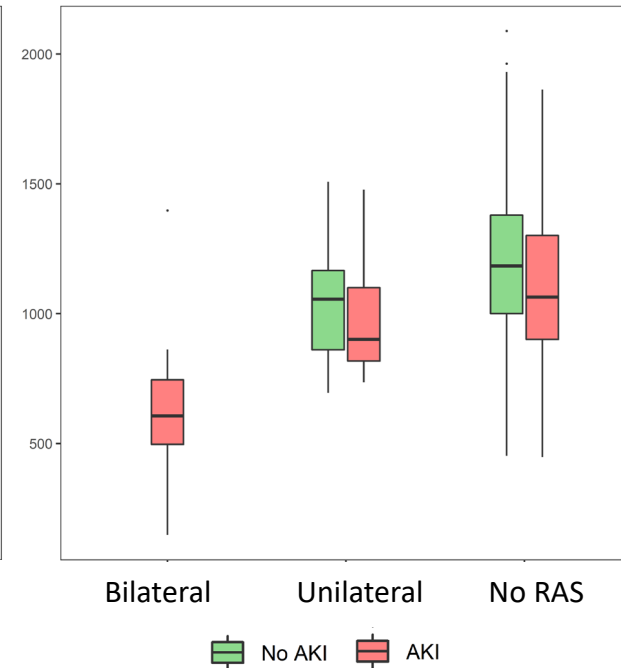
Minimal renal diameter (mm)



Kidney length (mm)



Cortical area (mm²)



Outcomes	Overall (n=161)	Unilateral + no RAS (n=151)	Bilateral RAS (n=10)
AKI, n (%)			
Within 3d of surgery	71 (44)	62 (41)	9 (90)*
Within 7d of surgery	76 (47)	66 (44)	10 (100)*
Anytime	78 (48)	68 (45)	10 (100)*
KDIGO Staging for AKI Severity			
Stage 1	43 (27)	39 (26)	4 (40)
Severe AKI (\geq Stage 2)	35 (22)	29 (19)	6 (60)
Stage 2	17 (11)	15 (10)	2 (20)
Stage 3	6 (4)	4 (3)	2 (20)
Stage 3 + RRT	12 (7)	10 (7)	2 (20)

Abbreviations: RAS, Renal Artery Stenosis; AKI, Acute Kidney Injury; ¹KDIGO, Kidney Disease Improving Global Outcomes; RRT, Renal Replacement Therapy. Worst stage of AKI was based on AKI stage during entire hospitalization. *P value < 0.05

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Preoperative bilateral RAS is associated with*



severe AKI
OR 5.8



in-hospital mortality
OR 5.7



30-d mortality
OR 10.6



90-d mortality
OR 6.9

*In models adjusted for intraoperative hypotension, sex, race, age, GFR, BMI, DM, CAD

- 100% of patients with bilateral RAS had postoperative AKI compared with 45% of patients with unilateral or no RAS
- Bilateral RAS is associated with an increased OR of
 - severe AKI
 - in-hospital mortality
 - 30-d mortality
 - 90-d mortality
- This suggest that RAS is a marker of poor outcomes and should be considered in preoperative risk stratification



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