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## Cardiothoracic Surgery

# **Inter-Related Effects of Preoperative Pulmonary Dysfunction and Renal Dysfunction on Outcomes of Descending and Thoracoabdominal Aortic Aneurysm Repair**

Christopher Lau, Eilon Ram, Lamia Harik, Gianmarco Cancelli, Ivancarmine Gambardella,  
Mohamed Rahouma, Camilla Sofia Rossi, Mario Gaudino, Leonard N. Girardi

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Nothing to disclose.

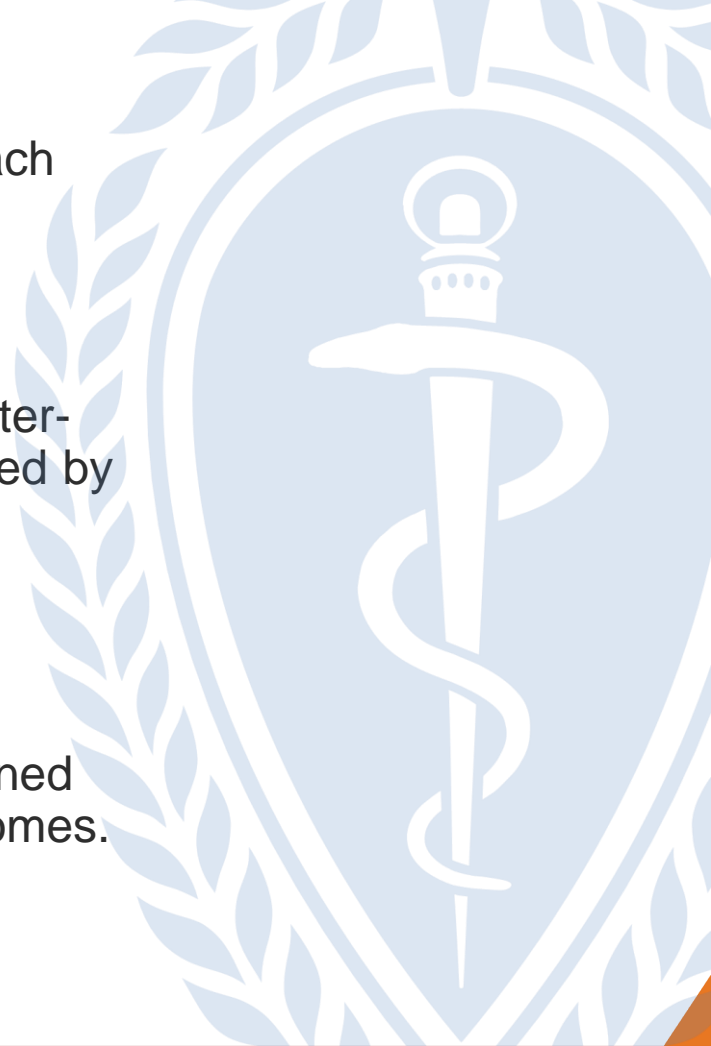


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# Background

- Preoperative pulmonary and renal dysfunction each independently increase operative mortality in descending (DTA) and thoracoabdominal aortic aneurysm (TAAA) repair.
- Pulmonary and renal organ systems are highly inter-related since aggressive fluid resuscitation followed by diuresis are required in the perioperative period.
- Maneuvers to optimize one organ system may adversely affect the other.
- There is scarce data on the relationship of combined renal and pulmonary dysfunction on clinical outcomes.



# Objectives

To evaluate:

- The impact of combined pulmonary/renal dysfunction on outcomes of DTA/TAAA repair
- The impact of preoperative pulmonary dysfunction on postoperative renal outcomes
- The impact of preoperative renal dysfunction on postoperative pulmonary outcomes



# Methods

Retrospective, single-center study of 1053 patients undergoing DTA/TAAA repair from 1997 to 2023.

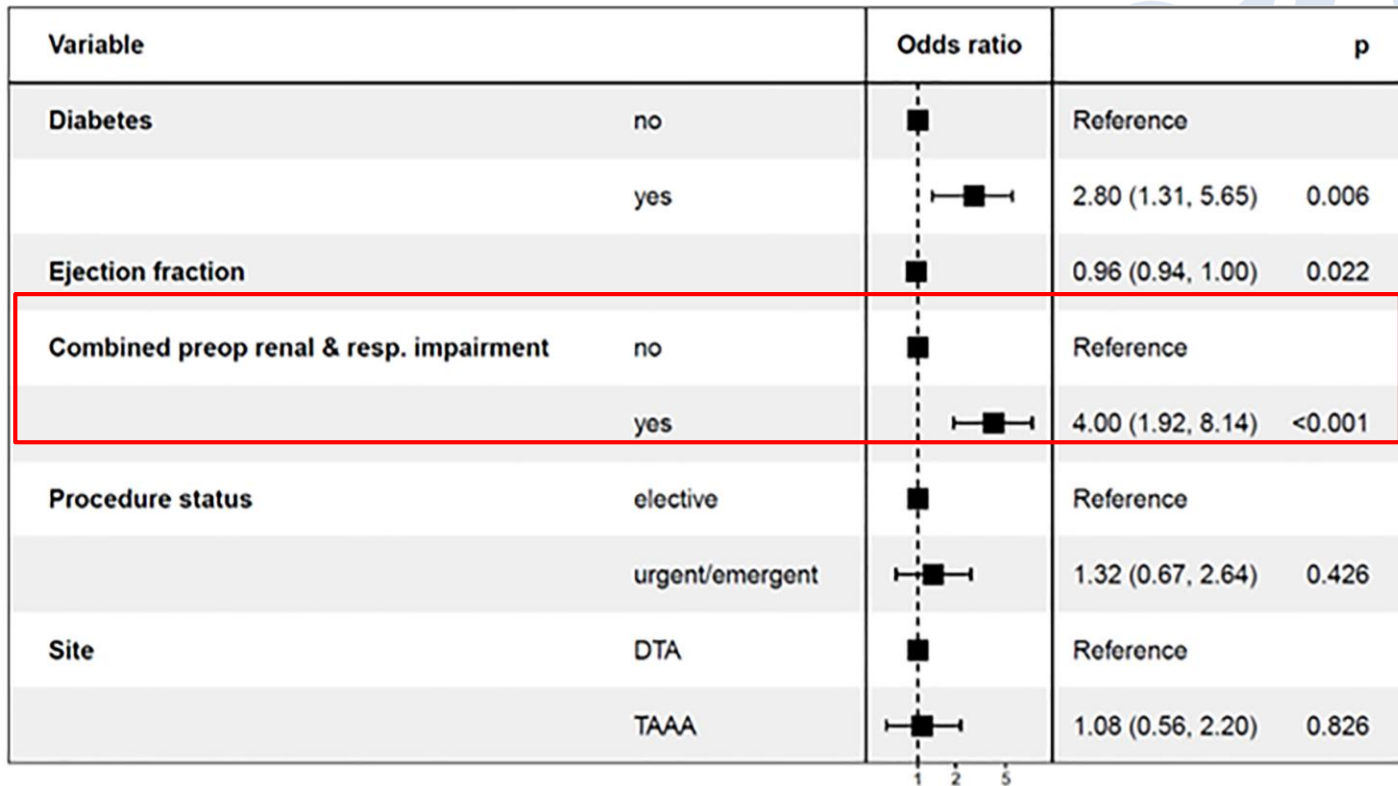
- Preoperative pulmonary dysfunction (FEV1  $\leq$ 50% predicted) and renal dysfunction (creatinine  $\geq$ 1.5mg/dL or dialysis) were identified
- Primary outcome: operative mortality
- Secondary outcomes: major adverse events
- Multivariable models for factors associated with:
  - Operative mortality
  - Postoperative respiratory failure
  - Postoperative renal failure

Baseline patient characteristics (n, %)	No combined renal and respiratory impairment (n=950)	Combined renal and respiratory impairment (n=103)	p
Age (median [IQR])	67.00 [56.0, 74.0]	74.00 [68.0, 78.0]	<0.001
Male	581 (61.2)	62 (60.2)	0.93
Smoking history	676 (71.2)	102 (99.0)	<0.001
NYHA Class III/IV	34 (3.6)	36 (35.0)	<0.001
Hypertension	904 (95.2)	102 (99.0)	0.12
COPD	323 (34.0)	92 (89.3)	<0.001
Diabetes	92 (9.7)	17 (16.5)	0.047
Previous CVA	105 (11.1)	13 (12.6)	0.75
Preoperative renal impairment	170 (17.9)	103 (100.0)	<0.001
Ejection fraction (median [IQR])	50.0 [50.0, 50.0]	50.0 [40.0, 50.0]	<0.001
Connective tissue disease	123 (13.0)	3 (2.9)	0.005
Preoperative shock	15 (1.6)	21 (20.4)	<0.001
TAAA	661 (69.6)	72 (69.9)	1
Aneurysm size (median [IQR])	6.50 [6.0, 7.3]	7.4 [6.5, 8.5]	<0.001
Aneurysm rupture	82 (8.6)	49 (47.6)	<0.001
Urgent/Emergent procedure	407 (42.8)	87 (84.5)	<0.001

**Patients with combined renal/respiratory impairment were older, with more comorbidities, and more likely to present with an acute aortic event.**

Postoperative outcomes (n, %)	No combined renal and respiratory impairment (n=950)	Combined renal and respiratory impairment (n=103)	p
<b>Operative mortality</b>	29 (3.1)	16 (15.5)	<0.001
<b>Composite of operative mortality, MI, CVA, tracheostomy, and dialysis</b>	99 (10.4)	41 (39.8)	<0.001
<b>MI</b>	5 (0.5)	0 (0.0)	1
<b>CVA</b>	18 (1.9)	1 (1.0)	0.78
<b>Respiratory Complications</b>			
>48h intubation	65 (6.8)	14 (13.6)	0.02
ARDS	4 (0.4)	1 (1.0)	0.99
Pneumonia	10 (2.0)	0 (0.0)	0.29
Reintubation	22 (2.3)	4 (4.9)	0.22
Tracheostomy	48 (5.1)	22 (21.4)	<0.001
Postoperative respiratory impairment	93 (9.8)	28 (27.2)	<0.001
Postoperative dialysis	32 (3.4)	18 (17.5)	<0.001
Takeback for bleeding	24 (2.5)	4 (3.9)	0.624

**Higher incidence of operative mortality, respiratory complications, renal failure, and major adverse events in patients with combined renal and respiratory impairment**



**Combined respiratory and renal impairment was associated with operative mortality (OR 4.00, 95% CI 1.92-8.14)**



## Multivariable associations with postoperative respiratory failure

Variable	Odds ratio	p
Age	1.02 (1.00, 1.04)	0.059
Sex	Reference	
	female	
	male	0.57 (0.38, 0.87) 0.009
COPD	Reference	
	no	
	yes	1.76 (1.12, 2.76) 0.014
Diabetes	Reference	
	no	
	yes	1.02 (0.54, 1.83) 0.949
Previous CVA	Reference	
	no	
	yes	1.31 (0.70, 2.36) 0.379
Ejection fraction	0.99 (0.97, 1.02)	0.683
Combined preop renal & resp. impairment	Reference	
	no	
	yes	1.55 (0.88, 2.68) 0.122
Connective tissue disease	Reference	
	no	
	yes	1.00 (0.41, 2.21) 0.991
Previous cardiac surgery	Reference	
	no	
	yes	1.05 (0.69, 1.59) 0.831
Procedure status	Reference	
	elective	
	urgent/emergent	2.20 (1.42, 3.46) <0.001
Aneurysm size	1.13 (0.97, 1.30)	0.101
Site	Reference	
	DTA	
	TAAA	1.38 (0.85, 2.29) 0.205

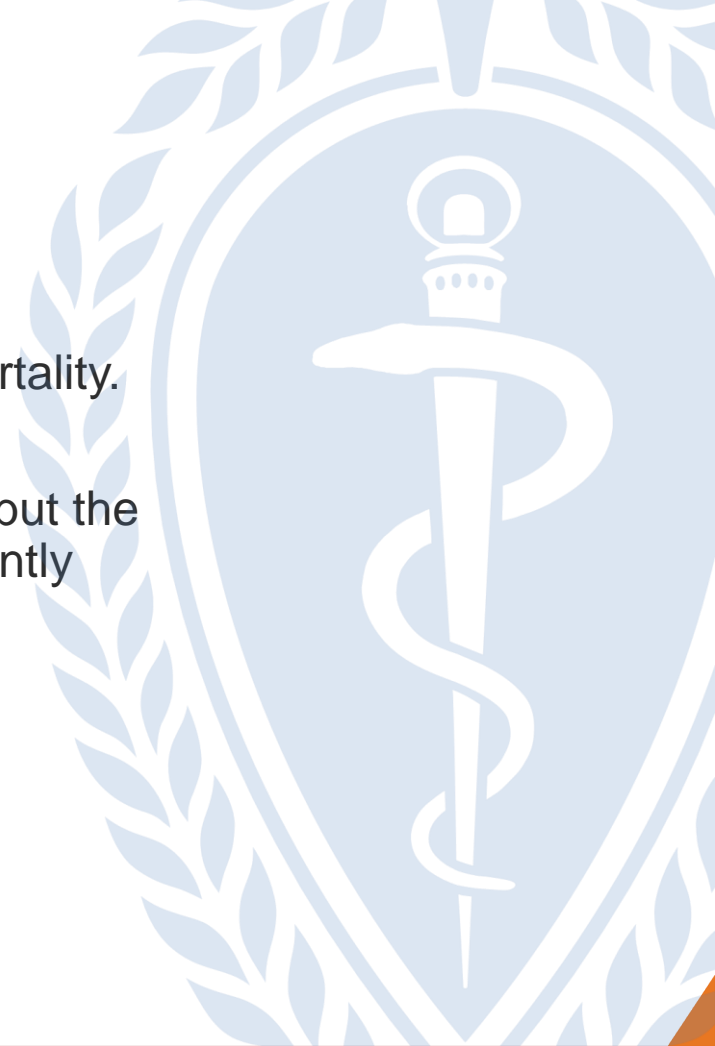
## Multivariable associations with postoperative renal failure

Variable	Odds ratio	p
Age	1.02 (1.00, 1.04)	0.03
Sex	Reference	
	female	
	male	1.23 (0.76, 2.00) 0.40
Diabetes	Reference	
	no	
	yes	1.36 (0.67, 2.57) 0.36
Ejection fraction	1.00 (0.97, 1.03)	0.81
Combined preop renal & resp. impairment	Reference	
	no	
	yes	2.81 (1.54, 5.05) <0.001
Procedure status	Reference	
	elective	
	urgent/emergent	1.94 (1.18, 3.24) 0.01
Aneurysm size	0.99 (0.83, 1.17)	0.93
Site	Reference	
	DTA	
	TAAA	3.26 (1.74, 6.64) <0.001

**Combined respiratory/renal impairment was associated with renal failure (OR 2.81, 95% CI 1.54-5.05), but not respiratory failure (OR 1.55, 95% CI 0.88-2.68)**

# Conclusions

- Combined preoperative respiratory and renal dysfunction is associated with worse operative outcomes and a 4-fold increase in operative mortality.
- Respiratory and renal function are inter-related but the presence of impairment in one is not independently associated with failure of the other.



# Thank you



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