



Longitudinal assessment of renal function after lung transplantation for cystic fibrosis: transition from post-operative acute kidney injury to acute kidney disease and chronic kidney failure (FFC#27/2019)

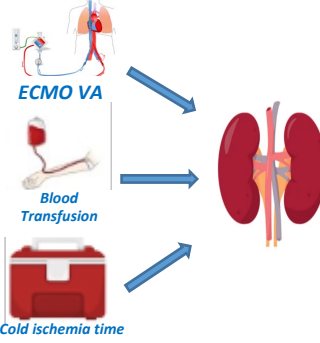
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Cystic Fibrosis

Lung transplant

AKI



Objective: We described the clinical trajectory of renal function, from post-operative AKI to AKD and CKD, the short and long-term outcomes of AKI and AKD, possible risk factors associated with post-operative AKI and AKD.

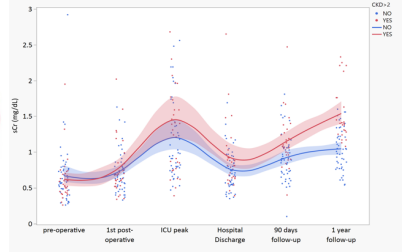


Figure 1. Serum Creatinine trajectory over time. Scr, serum creatinine; ICU, intensive care unit; CKD, chronic kidney disease

Method: We performed a retrospective analysis of medical records of all 85 consecutive CF patients who underwent LUTX at our Institution from January 2013 to December 2018. According to Kidney Disease Improving Global Outcomes (KDIGO) criteria for AKI, AKD, and CKD, patients were classified as having a) pre-operative CKD; b) post-operative AKI; c) post-operative AKD stage; d) 1-year follow-up CKD. The pre-operative, intra-operative recipient, donor characteristics and survival at 31st May 2021 were collected.

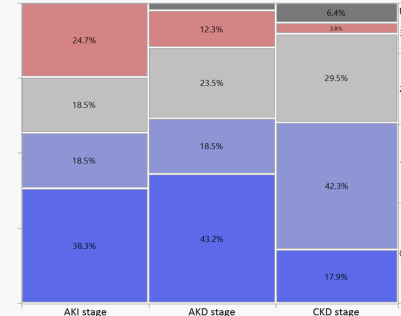


Figure 2. Overall incidence of renal dysfunction. AKI, acute kidney injury; AKD, acute kidney disease; CKD, chronic kidney disease.

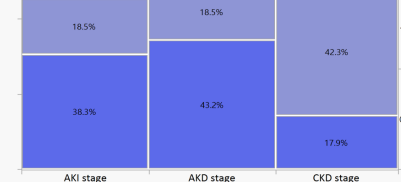
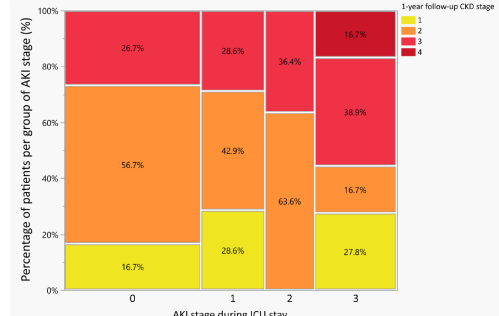


Figure 3. Incidence of acute kidney injury and impact on long-term chronic kidney disease. Mosaic plot of the incidence of 1-year follow-up chronic kidney disease vs. acute kidney injury during ICU stay.



Results: Creatinine peaked 3 days after LUTX (Figure 1). AKI stage was associated with worsening AKD stage ($p=0.009$) and CKD stage ($p=0.015$) (Figure 3). Of the 50 patients with AKI, 32 (66%) transitioned to AKD stage > 0, and then 27 (56%) to CKD stage > 1, with only 5 (10%) returning to normal renal function at 1-year follow-up. Need for ECMO at the end of surgery, intraoperative blood component usage, cold-ischemia time increase AKI risk (Table 1). Both post-operative AKI and AKD worsened long-term survival (Figure 4).

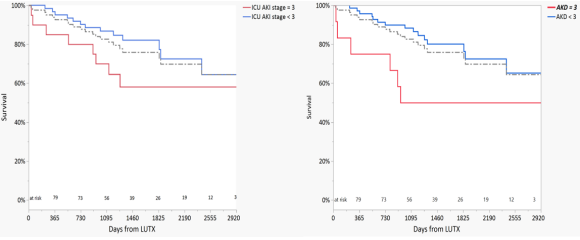


Figure 4. Probability of survival. Kaplan-Meier estimates of the unadjusted cumulative probability of survival following acute kidney injury (AKI) (left) and acute kidney disease (AKD) (right).

Clinical Characteristic	Acute kidney injury stage				P*	OR (95% CI)**
	0 (n=31, 38%)	1 (n=15, 18%)	2 (n=15, 18%)	3 (n=20, 27%)		
BMI (kg/m ²)	20.3 [18.4 - 21.8]	20.5 [18.3 - 22.6]	19.3 [17.9 - 21.1]	19.1 [18.8 - 20.6]	0.421	0.91 (0.74 - 1.13)
eGFR	125 [104 - 149]	132 [110 - 178]	121 [93 - 146]	140 [101 - 171]	0.211	8.56 (0.38 - 190)
LAS	35.3 [33.2 - 40.7]	35.3 [33.6 - 43.4]	34.2 [33.5 - 39.6]	37.4 [34.3 - 49.7]	0.077	1.04 (0.98 - 1.11)
Intraoperative ECMO	13 (41.9%)	6 (40.0%)	6 (40.0%)	14 (70.0%)	0.949	1.03 (0.41 - 2.58)
Postoperative ECMO	2 (6.4%)	3 (20.0%)	4 (26.7%)	9 (45.0%)	0.004	6.82 (1.44 - 32.1)
Red Blood Cells (units)	3 [1 - 5]	4 [2 - 7]	4 [1 - 10]	6 [3 - 9.75]	0.004	1.17 (1.01 - 1.35)
Donor total cold ischemia time (min)	827 [678 - 902]	858 [762 - 1230]	880 [620 - 1366]	951 [836 - 1101]	0.008	1.00 (1.00 - 1.01)

Table 1.

Conclusion: AKI is frequent in CF patients undergoing LUTX. Our analyses showed that higher severity of post-operative AKI was associated with subsequent worsening severity of AKD and finally CKD, leading to an overall shortened survival. Furthermore, the early occurrence of AKI, its persistence, and continuation into AKD suggests that intraoperative events may play an essential causative role in impairing renal function.

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