

Does Acute Kidney Injury After Cardiac and Lung Transplantation Predispose to Chronic Kidney Disease? A Single Centre Analysis



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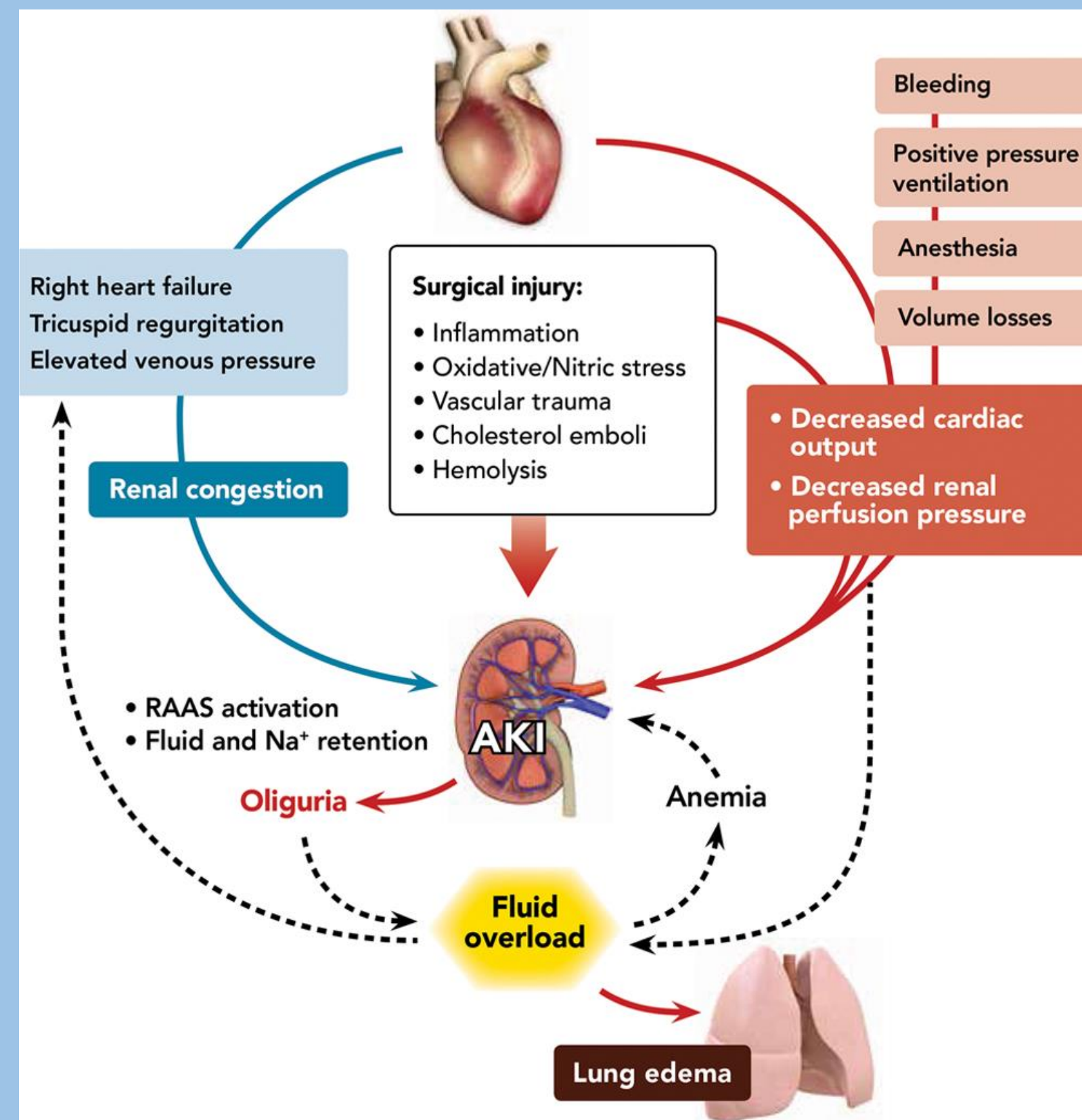
Introduction

Acute Kidney Injury (AKI) is a common side effect and an unsolved problem after cardiac surgery with cardio-pulmonary bypass. If patients with AKI achieved a specific threshold of blood creatinine, i.e. $>200 \mu\text{mol/L}$, they usually require the Continuous Veno-Venous Haemofiltration (CVVH). It is a short term treatment used in ICU patients with acute or chronic renal failure to lower serum creatinine, control fluid and electrolyte balance.

CVVH is a marker of renal injury which predicts later reduced renal reserve after cardiac surgery with cardiopulmonary bypass

Cardiac and Pulmonary transplants often involve cardiopulmonary bypass. In addition, the routine use of nephrotoxic Calcineurin Inhibitor (CNI) drugs as immunosuppression in the post operative period increases the renal insult, and is a cause of long-term renal dysfunction

We hypothesised that early CVVH would predict worse late renal function



Aims

- To investigate any linkage between early AKI and CKD in patients after cardiac and lung transplantation.
- To investigate the effect of CVVH for patients who underwent transplant.
- To compare patients with CVVH programme and those without it.
- To compare the effect of immunosuppressant (ATG) in lungs transplanted patients.

Methods

In this study, we included adult patients from Freeman Hospital in Newcastle upon Tyne, undergoing heart or lung transplant from 1995 to 2016. There were 602 patients, with 271 cardiac and 331 lung transplants. Steps were as followed:

Start with patients after year 2007 from ICU and hospital's renal databases, record blood creatinine. CVVH patients are defined here as those who underwent it within 30 days pre-and post-transplantation

Approach patients' white charts to fill in the gaps of missing data

Correlates >year 2007 patients' data with those from NHS blood and transplantation (NHSBT)'s database. Includes patients from year 1995 to 2007.

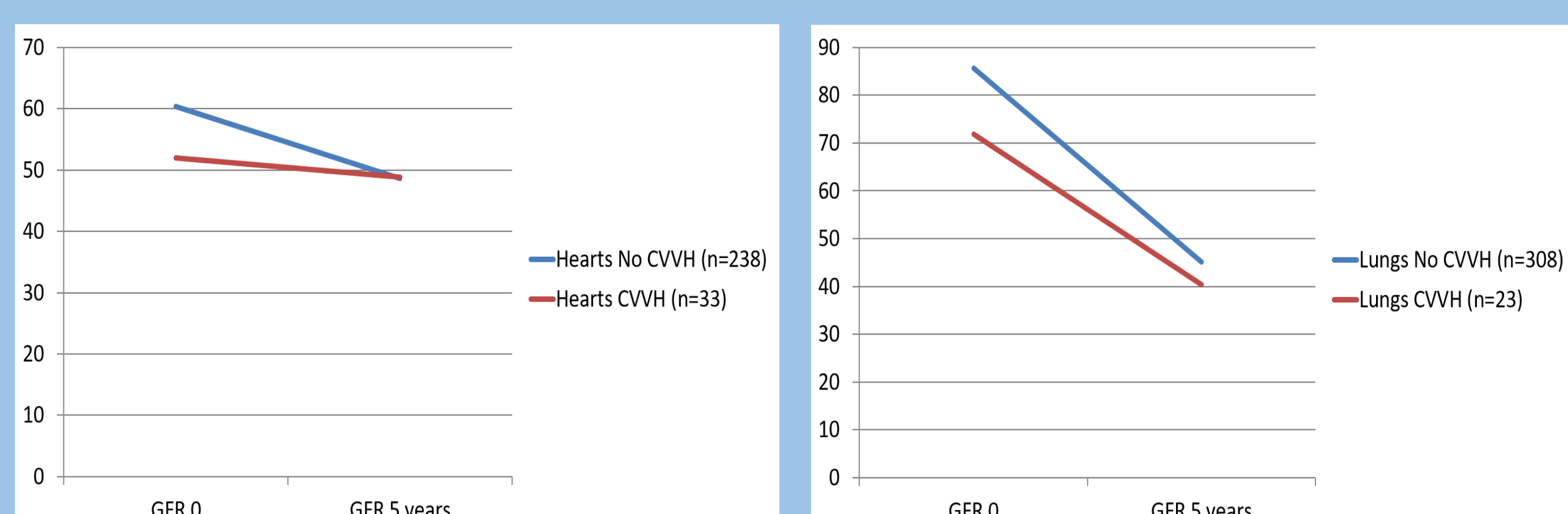
Approach patients' white charts again to fill in the gaps of missing data for those from year 1995 to 2007.

Convert blood creatinine into estimated Glomerular Filtration Rate (eGFR) by using a specific formula.

Export database into Excel Spreadsheet then into StatView 4.0. Paired t-test, descriptive statistics and graphs are produced from StatView 4.0.

Results

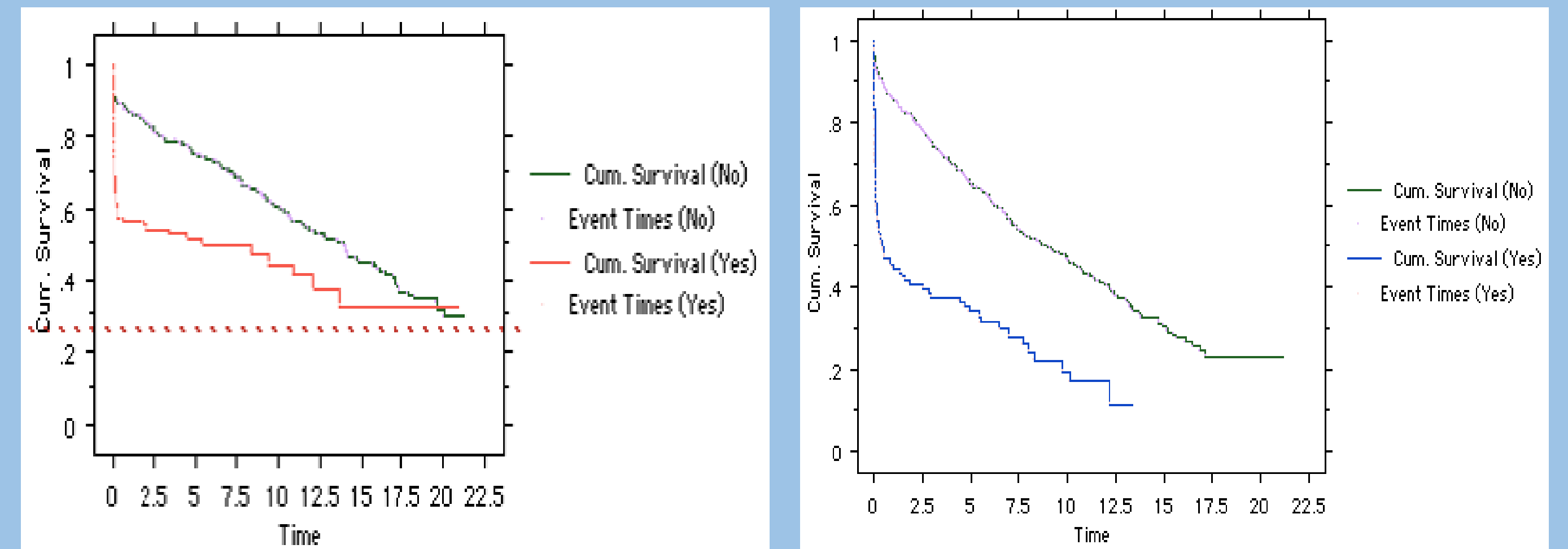
- Median of eGFR for patients with and without CVVH are compared for at the point of transplantation and after 5 years of transplantation.



Patients without CVVH shows a greater decline of renal function over 5 years. It is due to patients with CVVH are those who start with a lower eGFR, thus require CVVH to maintain their eGFR and prevent from further deteriorating.

- Kaplan-Meier Cumulative Survival Plot for patients with and without CVVH are obtained. Cardiac and lungs transplanted patients are separated.

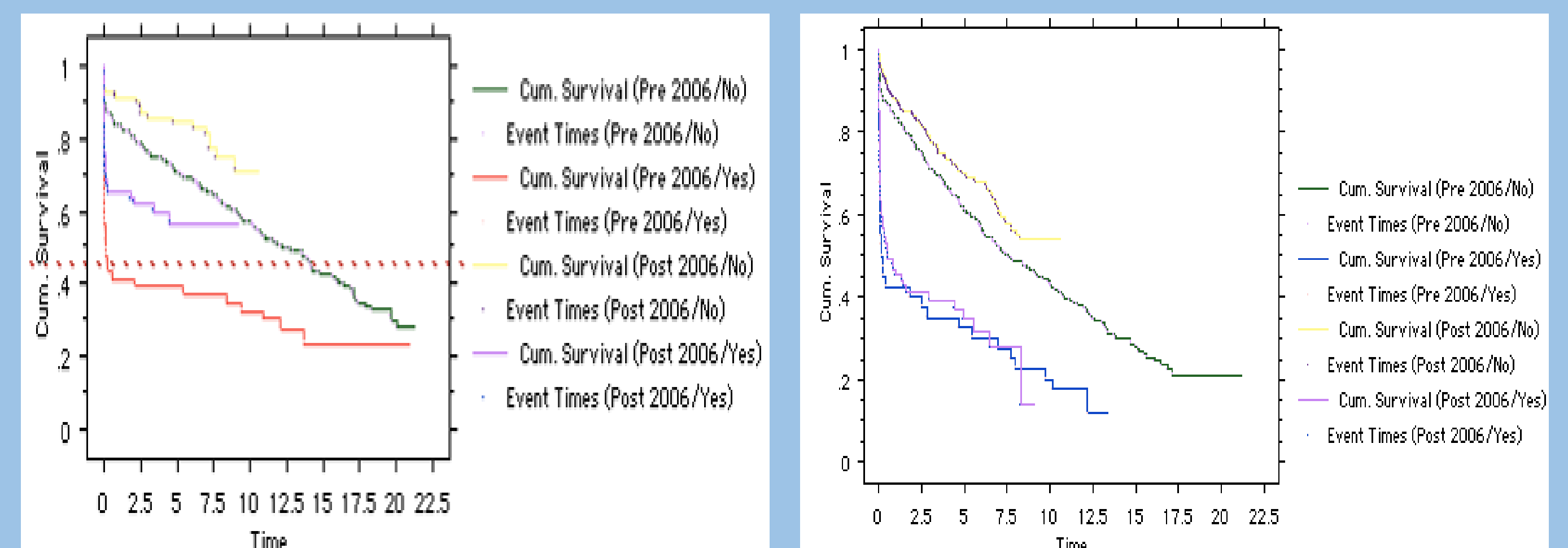
Graph of Heart(left) and Lungs(right) Patients showing Cumulative Survival with and without CVVH over years.



Both cardiac and lungs transplanted patients with CHHV show a greater drop in survival rate than those without CVVH. However, the main survival drop for both types of patients happened within 1 year after transplantation, or else the declination of survival rates are parallel for both with and without CVVH.

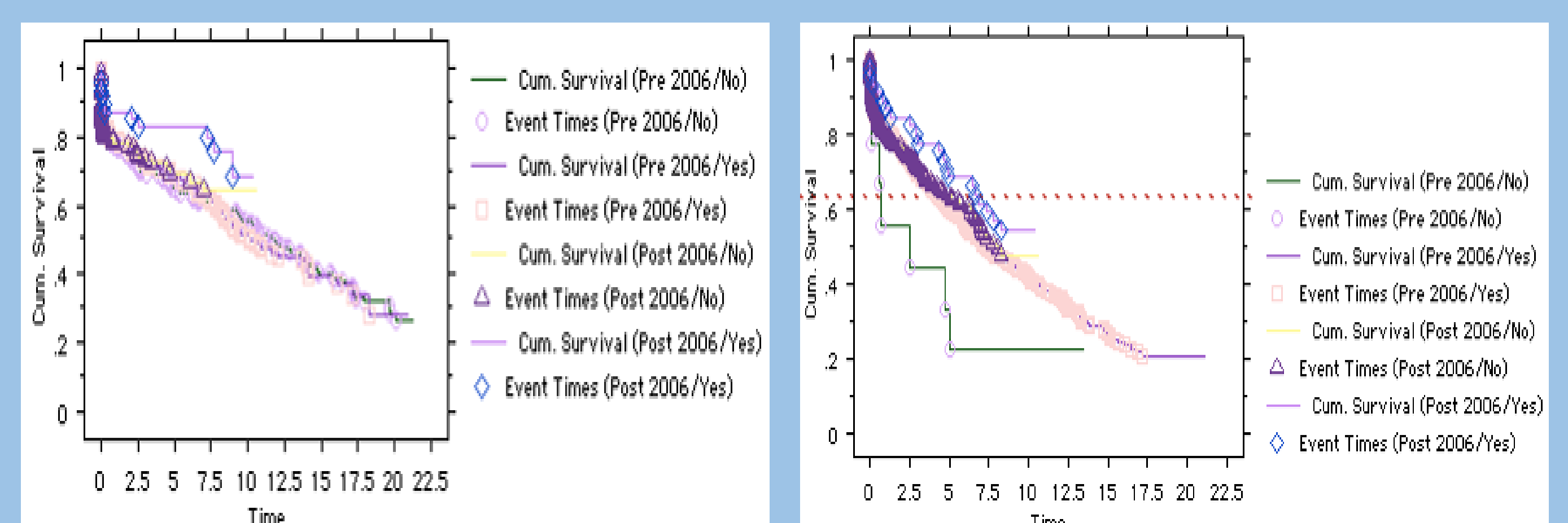
- Patients are separated into 2 eras, before and after year 2006.

Graph of Heart(left) and Lungs(right) Patients showing Cumulative Survival Pre- and Post-2006 with and without CVVH.



For both cardiac and lungs patients, those without CVVH has a higher survival rates than those with CVVH. In both types of patients, those post-2006 patients show a better survival rate than those in pre-2006. The difference between eras is more significant in heart transplanted patients, which shows a much better survival rate for those in post-2006, for either with or without CVVH.

- Graph of Heart(Left) and Lungs(Right) patients showing Cumulative Survival Pre- and Post-2006 with and without ATG



At first we suspected ATG might affect the survival rate, thus we compared 2 eras, pre-2006 (with ATG) and post-2006 (without ATG). However, it shows no significant difference.

Conclusion

- CVVH deteriorates patient's survival rates over years, it suggested that those patients with CVVH will have worse kidney function in later years, leading to death.
- ATG makes no impact on patients' survival.
- CVVH indicates AKI.

Further Improvement

- We plan to investigate the national patients from the United Kingdom. Requesting documents have been approved and awaiting for data analysis.
- Reason for worse condition of lungs transplanted patients than cardiac transplanted patients are yet to be investigated

References

- Legrand M, Payen D. Case scenario: Hemodynamic management of postoperative acute kidney injury. *Anesthesiology*. 2013;118(6):1446-54.