Successful management of Acute Kidney Injury with peritoneal dialysis in a patient after heart transplantation with Burkholderia septicemia.

Klara Paudel1, Rudreshwar P2, Rajeevalochana P2, Milly Mathew1, Georgi Abraham2

1Department of Nephrology, Charak Memorial Hospital, Pokhara, Nepal
2Department of Nephrology, Urology and Transplantation, Madras Medical Mission, Chennai, India

Abstract: Acute kidney injury is a common cause of morbidity and mortality after cardiac transplantation. Knowledge of various preoperative, intraoperative and post-operative risk factors allow prevention, early diagnosis and successful management of acute kidney injury. CRRT in the form of acute peritoneal dialysis is a modality of dialysis which is extremely cost effective and is non-inferior to other extra corporeal therapies. We present the successful management of acute kidney injury with peritoneal dialysis in a cardiac transplant recipient in the immediate post operative period who developed sepsis and non-oliguric AKI.

Keywords: Cardiac transplantation, AKI, Peritoneal Dialysis, septicemia.

Introduction

Cardiac transplant recipients are at high risk of graft rejection, infections, acute kidney injury (AKI), cerebrovascular incidents, mediastinal bleeding, arrhythmias, pericardial effusions and type 1 cardio renal syndrome in the immediate post-transplant period (1). Cardiac transplantation carries a risk for AKI in about 6-25% of patients (2, 3).

Continuous renal replacement therapy (CRRT) may be instituted in those requiring dialysis. Use of Hemodialysis is often associated with life threatening complications such as hypotension, acute myocardial ischemia and arrhythmias and infective complications (4, 5). Here we present a patient who had a orthotopic heart transplant who developed AKI and septicemia. The management included Peritoneal dialysis, anti-microbial therapy.

Case history

A female medical doctor 40 years age medical doctor weighing 75kg, with hypertrophic non-obstructive cardiomyopathy previously implanted with intracardiac defibrillator has undergone cardiac transplantation on july 13, 2016. She received the heart transplant from a twenty one year old male with brain death due to RTA. Cold is chemia time was 249 minutes. She was inducted with Basiliximab 20mg(two doses) and maintenance immunosuppression included tacrolimus, mycophenolate mofetil and prednisolone.

Postoperatively she developed fever with non-oliguric AKI. Inotropes and ventilatory support were continued. X ray chest showed bilateral lower zone infiltrates(figure 1,2). Blood cultures and central venous catheter tip culture revealed...
growth of Burkholderia cepacia. She was initiated on intravenous meropenem 500mg once daily and oral trimethoprim (160mg) / sulfamethoxazole (800mg) once a day every other day. Seventy two hours later patient had persistent fever and the treatment was changed to a fourteen day course of intravenous tigecycline 50mg once a day. Mycophenolate mofetil was held in view of active sepsis. On the third postoperative day she developed acute pulmonary edema and hypotension. Echocardiography confirmed cardiac tamponade. She was re-explored reopened and 500ml fresh blood with clots were evacuated from pericardium. In view of progressive renal impairment and fluid overload Tenckhoff Swan-neck double-cuff peritoneal dialysis (PD) catheter was implanted. Low volume intensive PD was commenced with 750ml, 30 minutes dwell time and 2.5% dextrose solutions. Dedicated peritoneal dialysis nurses manually did exchanges in the intensive care unit. In the first 24 hours a total ultrafiltration of 2900 ml was achieved. The next day dwell time was increased to 45 minutes and then to one hour. Fill volume was not increased to prevent pericatheter leakage. Patient continued to have recurrent episodes of pulmonary edema in view of which Continuous peritoneal dialysis was continued with the low volume short dwells till the eighteenth postoperative day. Endomyocardial biopsy was done on the fifteenth postoperative day which showed nonspecific inflammation and no evidence of acute rejection. Acute PD was converted to Continuous ambulatory peritoneal dialysis(CAPD) from nineteenth postoperative day with 1.5 litre volume, 3 hour dwell time with 2.5% dextrose solution and 1.5 litre overnight dwell with 7.5% icodextrin solution. Patients urine output fluctuated with the lowest urine volume being 595ml/day on the third postoperative day and the highest being 3905ml/day during the sixteenth postoperative day. Tacrolimus levels were monitored and dosages were adjusted accordingly. Patient gradually recovered from sepsis and fluid overload and Mycophenolate mofetil was restarted. As patient developed a pericatheter leak on the twenty third postoperative day, peritoneal dialysis was stopped and PD catheter was removed two days later. Echocardiography on discharge showed normal graft function with a left ventricular ejection fraction of 50%. Patients renal function recovered by twenty eighth postoperative day. The sequential renal function, immunosuppressive agents and course are depicted in Figure 3. The total cost of peritoneal dialysis during the hospital stay of 30 days was Rs.35000.
Discussion:

AKI is an important cause of in hospital mortality in the immediate post cardiac transplant period. Risk factors are age, diabetes mellitus, peripheral vascular disease, congestive cardiac failure, previous cardiac surgery, cardio pulmonary bypass time and transfusion requirement, left ventricular ejection fraction less than 35%, serum creatinine level, serum albumin level, use of intra-aortic balloon pump, previous calcineurin inhibitor use, ACE inhibitor use and cold ischemia time (3). Our patient had a very low ejection fraction of 25% pre operatively, cardiopulmonary bypass was used during surgery. Rylski, Bartosz et al showed that cold ischemia time of more than 180 minutes predisposed to AKI and increased the length of ICU stay in cardiac transplant recipients as in our patient(6).

Currently pharmacological approaches to prevent AKI such as the dopamine receptor agonist fenoldopam, pentoxifylline, etc have not been proven successful and are not recommended. Intermittent hemodialysis is not a safe modality in cardiac transplant patients due to the high risk of arrhythmias and other significant hemodynamic alterations. CRRT in the form of CVVHD/CVVHDF are expensive than intermittent hemodialysis and is associated with complications such as bleeding, thrombocytopenia, circuit clotting, immune activation, hypothermia, electrolytes and acid base imbalance all of which have a negative impact on the prognosis in the setting of an AKI associated with sepsis(7). Complement activation is another disadvantage of CVVHD/CVVHDF which is not seen in peritoneal dialysis.

Numbers of publications from developing countries including ours have shown non-inferiority of PD in such settings with enormous cost benefits compared to CVVHDF (6, 12). Retrospective analysis of 84 patients with type 1 cardiorenal syndrome treated with peritoneal dialysis in tertiary care centre revealed a mortality rate of 14% and none of these patients developed peritonitis (8).
Advantages of peritoneal dialysis include single access to peritoneal cavity, use of a flexible catheter, easy to perform, smooth ultrafiltration, easy availability and technique, hemodynamic stability, lack of anticoagulation, dextrose from dialysate provides calories, lack of immune activation, well tolerated even in children, gradual correction of metabolic and acid base disturbances, no need for vascular access and better preservation of residual renal function as in our patient (9,10,11).

If CRRT using CVVHD/CVVHDF was initiated anticoagulation, would have led to worsening of pericardial tamponade and hence PD saved the life of the patient. Strict aseptic precautions with skilled peritoneal dialysis nurses are the success of a PD program in critically ill patients with AKI. Appropriate multidisciplinary approach with cardiac surgeons, cardiologists, nephrologists and infectious disease support is mandatory in high end units which undertake complicated transplant procedures. Cost is a very important aspect of patient management and use of CVVHD/CVVHDF do not offer any significant advantage rather than putting enormous financial burden to the patients in a developing country (12).

Conclusions:

Majority of the world's population live in developing countries. In these resource poor settings where the incidence of acute kidney injury and sepsis is high, an extremely cost effective dialysis modality is required to save lives. Peritoneal Dialysis offers this advantage in saving lives (13,14).

References:


