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Urgent-Start Peritoneal Dialysis: Opening New Door for ESRD Patients Undergoing CABG

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Abstract: ***A 56 year old male with past medical history (PMH) of chronic kidney disease (CKD) Stage V due to IgA nephropathy, hypertension (HTN) and diabetes mellitus (DM) type 2 (II) presented with chest pain. The glomerular filtration rate (GFR) on presentation was 5 ml/ min. The patient was started on urgent- start peritoneal dialysis (PD). In the meantime, he was evaluated by cardiology, underwent immediate angiography and was found to have triple-vessel disease. Subsequently, it was decided that he needed an urgent coronary artery bypass surgery (CABG). The general practice is to place the patient on hemodialysis (HD) for optimizing the fluid and electrolytes balance before an urgent CABG, but it was for the first time that we opted to keep the patient on PD and proceed with the surgery. The patient had no post-op complications and extubated within 24 hours of the surgery.***

Keywords: Urgent -Start PD, ESRD, CABG

Abbreviations

PMH: Past Medical History
CKD: Chronic Kidney Disease
HTN: Hypertension
DM: Diabetes Mellitus
GFR: Glomerular Filtration Rate
PD: Peritoneal Dialysis
HD: Hemodialysis
CABG: Coronary Artery Bypass Surgery
ESRD: End-Stage Renal Disease
CAD: Coronary Artery Disease
CHF: Congestive Heart Failure
PVD: Peripheral Vascular Disease
CVD: Cerebrovascular Accidents
DLD: Dyslipidemia
EKG: Electrocardiogram
NSTEMI: Non-ST-Segment Elevation Myocardial Infarction
Cr: Creatinine
BUN/Cr: Blood Urea Nitrogen/Creatinine
LAD: Left Anterior Descending Artery
LCA: Left Circumflex Artery
RCA: Right Coronary Artery
AVF: Arterio-Venous Fistula
RRF: Residual Renal Function

1. Background

Cardiovascular disease is the major cause of morbidity and mortality in patients with end-stage renal disease (ESRD) [1, 2]. It can manifest as coronary artery disease (CAD), congestive heart failure (CHF), atherosclerotic peripheral vascular disease (PVD) and cerebrovascular accidents (CVA). Cardiovascular disease accounts for almost half of the total mortality in patients with ESRD. Ischemic heart disease is responsible for many cardiovascular deaths, with myocardial infarction accounting for approximately 15% of the cases [3]. A low threshold for diagnostic testing should be employed in patients with ESRD. When significant CAD is identified, ESRD patients appear to benefit more from revascularization compared to conservative medical management [4]. Before and after the revascularization procedure, the ESRD patient needs to be clinically optimized through dialysis, which can be either by HD or PD. We opted for urgent-start PD because of minimal risk of infection caused by central vein dialysis catheters.

2. Case Presentation

On June 21st 2014; a 56 year old male with PMH of CKD stage V due to lgA nephropathy, HTN, dyslipidemia (DLD), anemia and DM type II was brought to the emergency department due to chest pain. The pain started in the morning at 4 am, sudden in onset, pressure-like, poorly localized in the chest and radiating to the left arm. The pain disappeared after 4-5 minutes. The electrocardiogram (EKG) showed normal sinus rhythm with moderate voltage criteria for left ventricular hypertrophy. The patient was administered aspirin, nitrates and beta-blocker and was admitted in the hospital. A repeat EKG the other day showed marked changes as compared to the initial EKG, showing marked ST abnormality with possible inferolateral subendocardial injury. The patient was diagnosed as non-ST-segment elevation myocardial infarction (NSTEMI) and the treatment protocol for NSTEMI was started. Laboratory blood analyses showed serum creatinine (Cr) 11.3 mg/dl, blood urea nitrogen/creatinine (BUN/Cr) ratio 11, serum potassium (K+) 4.5 and GFR 5.3.One noticeable finding in the laboratory values was the K+ level which was in the normal range despite the fact that the GFR of the patient was 5.4 and the patient was suffering from CKD. This was because of the fact that a small percentage of kidneys were still making urine and the patient had an adequate urine output.

The patient was made aware of the need for urgent dialysis and different options of dialysis were discussed with him. He opted for PD. The next day the urgent-start PD catheter

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was placed and catheter flushing started. In the meantime, the cardiology department planned to perform the angiogram to look into the coronary vasculature of the patient. Since the patient was now on urgent start PD and his urine output was adequate, the risk of renal insult as a result of the angiography dye was minimal. The angiogram showed severe triple vessel CAD of left anterior descending artery (LAD), left circumflex artery (LCA) and right coronary artery (RCA). The CABG surgery was recommended. On consultation, the cardiovascular surgeon suggested to shift the patient from PD to HD before the cardiovascular surgery because of adequate volume management. The commonly held misperception regarding PD is that the fluid balance management is not adequate and that the optimal volume homeostasis is hard to achieve as compared to HD. We were of the view that PD, because of its continuous nature, is superior to HD in fluid balance management since it avoids fluctuant volume changes and affords better homeostatic stability [7]. Alongside there is a lesser risk of infection in PD as compared to HD since the jugular or femoral catheterization used for HD initially can lead to life-threatening infection [5]. PD also has some hemodynamic advantage over HD because of the absence of an arterio-venous fistula (AVF) contributing to a hyper circulatory state, and the avoidance of sudden and intermittent changes in volume [6]. Hence, the decision was made to keep the patient on PD, closely monitoring his volume status all the way.

In a week's time, patient underwent a successful CABG, without any intra or post-operative complications. He was extubated the very next day, had stable vitals and was doing fine. Later on he was resumed on his regular PD.

3. Conclusion

ESRD patients can be dialyzed in two ways: PD and HD. In such patients who are undergoing coronary artery revascularization the urgent-start PD is a better option than HD in a number of ways. Urgent start PD reduces the infection risk from starting the patient on dialysis with temporary HD dialysis catheters (infections second leading cause of death for ESRD patients after cardiovascular diseases). Residual renal function (RRF) is important for the removal of uremic toxins. Preservation of RRF is better in PD as compared with HD patients [8]. PD at the onset preserves a patient's vasculature. Reports indicate that transplant outcomes are better with PD patients as compared to HD patients and also costs lesser than in-center hemodialysis therapy.

Although urgent-start PD is associated with a potential risk of peritonitis while on peritoneal dialysis, particularly with lacing the therapy "urgently" with little time initially for modality training, but studies show that risk can easily be overcome with properly trained persons and PD connect technology, hence the benefits of urgent PD certainly outweigh its hazards. Questions arise about whether sick patients with immediate needs for dialysis care are the best candidates for home therapy.

4. Financial Declaration

No author participating in this study has any financial conflict.

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