Use Of CAPD As A Renal Replacement Therapy In Two Patients With Subacute Bacterial Endocarditis

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Abstract: Here we are presenting two patients with infective endocarditis involving aortic and mitral valves who had end stage renal failure. The female patient with rheumatoid arthritis was on maintenance hemodialysis using perm cath as the vascular access when she developed endocarditis of aortic and mitral valves. The male patient with end stage renal failure was on hemodialysis using a double lumen jugular access and had aortic root abscess. The causative organisms were Staph aureus and Enterococcus in the female patient and Staph. aureus in the male. The male patient had a valve replacement after switching over to continuous ambulatory peritoneal dialysis. The female patient was also switched over to continuous ambulatory peritoneal dialysis as the endocarditis was the result of infection through perm cath and was treated medically. Both patients recovered from infective endocarditis and continue on CAPD. This experience suggests CAPD is superior form of renal replacement therapy in patients with infective endocarditis.

Key Words: Perm catheter, Infective endocarditis, CAPD.

Introduction:

Infective endocarditis (IE) is an infection of endocardium that usually involves the valves and adjacent structures. A high index of suspicion should drive the investigations for diagnosing IE to reduce the morbidity and mortality. It should be considered in every patient with fever, anemia, cardiac murmurs and septicemia. Uraemic patients with defective cell mediated and humoral immunity with cardiac lesions who are on renal replacement therapy are particularly susceptible to IE. Although developments in clinical microbiology, antimicrobial therapy, cardiac imaging and surgery has revolutionized its diagnosis and prognosis, the incidence of disease has not changed over the past two decades (1).

As the epidemiological criteria for diagnosis and treatment of bacterial endocarditis has changed substantially in past two decades, yet little attention have been given to changing etiology of renal insufficiency and predictors of renal failure or relationship between renal failure and mortality in a patient with bacterial endocarditis. Renal impairment may be the sole manifestation of bacterial endocarditis (2). Acute admission with acute impairment of renal parameters in a febrile patient should raise the suspicion of IE since it may be the first manifestation, and acute impairment may lead to end stage renal disease (ESRD) and dialysis may be final outcome. Here we are presenting two patients with ESRD who developed IE and are successfully being treated with chronic peritoneal dialysis.

Case 1: A 40 years old female, with rheumatoid arthritis and hypothyroidism who was on maintenance hemodialysis over 16 months on different types of vascular access, developed high grade fever and hematuria. For the last few months her vascular access was a perm cath. Investigations showed BUN 75 mg/dL, Creatinine 6.6 mg/dL, RA factor positive, AST 53 u/L, ALT 24 u/L and T.bilirubin 1.0 mg/dL. The urine analysis showed proteinuria (3+), hematuria and leukocyturia. Hemogram showed Hb 7g/dL, WBC 8100/cumm, Neutrophils 82, Lymphocytes 15, Eosinophils 2, Prothrombin Time 13 seconds, INR 1.28. Blood Culture grew Enterococcus and Staph. aureus.

Two-D echocardiogram with colour doppler showed severe aortic regurgitation with insignificant aortic stenosis and vegetation were seen in both aortic (9 x 8 mm) and mitral (12 x 7 mm) valves. Mild LV diastolic dysfunction with EF 68%, and slight pericardial effusion was also present.

She was initiated on intravenous gentamycin 125mg and vancomycin 1gm once weekly based on culture and sensitivity reports but the spikes of fever continued. As the perm cath was considered to be the source of septicemia and IE, this was removed and a swan neck double cuff Tenckhoff catheter was implanted and she was initiated on supine peritoneal dialysis initially. Her spikes of fever decreased and she became

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Case 2: A 50 years old male was diagnosed to have aortic root abscess with IE, blood culture having grown *Staph. aureus* elsewhere. He was initiated on appropriate antibiotic therapy for *Staph. aureus* infection. He developed profound renal failure requiring dialysis. Investigations revealed Hb 11.6gm/dl, WBC 12400/cumm, neutrophils 91%, lymphocytes 18%, eosinophils 1%, BUN 49mg/dl, Creatinine 6.5mg/dl, bicarbonate 18mmol/L, phosphate 5.5mg/dl, sodium 130mmol/L, potassium 5.8mmol/L, chloride 99mmol/L, calcium 8.7mg/dl, uric acid 10.2mg/dl, prothrombin time 13 seconds, INR 1.1. He was dialysed through a temporary dual lumen jugular access. As he continued to have spikes of fever and the echocardiogram finding was suggestive of aortic root abscess, concentric LVH, LV dysfunction with EF 40% and grade II mitral regurgitation.

It was decided to replace the aortic valve. A Swan neck Tenckhoff double cuff catheter was implanted electively while removing the jugular access and the patient was taken up for valve replacement a week later while continuing intravenous vancomycin therapy. BENTALL’S procedure was done with 25mm Worex Bard graft with AVR with 25mm Medtronic valve. He continued with peritoneal dialysis using 2 litre exchanges 5 times a day, preoperatively and perioperatively. Four days after the surgery he developed *Pseudomonas aeruginosa* peritonitis which was treated with inj. gentamycin intraperitoneally for 21 days as per the ISPD recommendations. The peritonitis subsided with intraperitoneal antibiotics although he had initial ultrafiltration problems. While using gentamycin his residual renal function decreased with the urine output of < 250 ml/day. The patient was trained to do CAPD and he continues on 2 Litres x 4 exchanges per day with adequate ultrafiltration and solute clearance with no evidence of recurrence of infection. The patient is also on anticoagulation with oral warfarin for the prosthetic aortic valve.

Follow up echocardiogram showed normally functioning aortic prosthesis, no leak, clot or vegetations are seen, grade II mitral regurgitation, mild mitral regurgitation, LV dysfunction with EF 35-40%. Patient had recovery of renal function, with urine output of over one and half liters a day, serum creatinine came down to 2.3mg/dl, and CAPD was discontinued and the catheter was removed after four months. He his being regularly followed up.

**Discussion:**

In infective endocarditis, the primary event is the bacterial adherence to heart valves, which is completed within minutes during transient bacteremia, and involves valve tissue and bacterial factors. The second step involves persistence and growth of bacteria with local extension and tissue damage. There is 30-100 times high risk of bacterial endocarditis with 1 year mortality of 40-60% in patients on dialysis. Predominant organism is *gram positive* with 60-80% *Staph. aureus* with 15-20% coagulase negative *staphylococci*. Approximately 5% of cases of possible IE have negative blood cultures mostly caused by *Coxiella burnetti* and *Bartonella henselae*. PCR may be used in determining the aetiology of culture negative IE, thus providing essential treatment and epidemiological information. Left sided valves mainly aortic are more commonly involved. Certain features are seen alongside with IE, one is renal involvement. There are a few cases in literature reporting an IE presenting with renal failure. Lopez Garcia et al. (5) reported a case of IE presenting with acute renal failure and leukocytoclastic vasculitis. Masuda et al. (6) reported an IE presenting with macroscopic hematuria, marked anemia, leukocytosis and azotemia. After the antimicrobial treatment, renal failure gradually disappeared; they considered the cause of renal manifestations to be immune complex glomerulonephritis. Martinez-Costa et al. (7) described a 27-yr-old intravenous drug addict (IVDA) patient with tricuspid endocarditis caused by *Staph. aureus* whose first manifestation was an acute renal failure. Thus all these suggesting that ARF may be the first manifestation of IE, which should be treated aggressively. Pathophysiology behind renal dysfunction is

a) Both innate and acquired immunity are involved.

b) Decreased expression of co-stimulatory molecules on mononuclear cells together with increased synthesis of IL-6, 10, 12 play a pivotal role in T cell and B cell dysfunction.
c) Haemodialysis acts as a repeated stimulus for mononuclear cells which enhances a persistent micro inflammatory state with clinical expression of malnutrition and vasculopathy in dialysis patient.

Intravascular catheters are infected from sources including infection from insertion site, infection of catheter, bacteremia arising from another site, and contamination of infused solution. Within a few days of insertion, a sleeve of fibrin and fibronectin is deposited on catheter. *Staph. aureus* adheres to fibrin component and also causes endotheliosis that is very important in producing continuous bacteremia of *Staph. aureus*. Underlying etiology leading to rapidly progressive renal impairment might be due to immune complex glomerulonephritis.

IE is to be managed as per the standard antibiotic recommendations for IE. Surgery is necessary in 25-30% of cases during acute infection. The main indications for surgery comprise of refractory cardiac failure caused by vascular insufficiency, persistent sepsis caused by a surgically removable focus or a valvular ring or myocardial abscess, presence of >1 cm mobile vegetation and persistent life threatening embolization(8).

For renal failure, renal replacement therapy (RRT) is needed. Much debate and research is apparent in literature comparing haemodialysis and peritoneal dialysis as opposite modalities. We are here not concerned which modality is best but which flowchart of modalities leverages their advantages at appropriate time during patient’s treatment course so as to optimize the outcome. Comparative study of continuous ambulatory peritoneal dialysis (CAPD) with haemodialysis from different centres and countries have conflicting results even when allowing for case mix. Choice of treatment option for end stage renal disease must be based on each individual situation and the centre preference. The aim of RRT should be to restore patients to as normal a level of health as possible and to ensure full social and physical rehabilitation.

CAPD uses peritoneum as a natural permeable membrane through which water and solutes can equilibrate. It is less physiologically stressful than haemodialysis, can be performed at home, allows patient much greater flexibility, patient is not dependent on others for dialysis, and it does not require a vascular access, hence minimal chances of access related blood borne infection. Better preservation of residual renal function, low risk of HBV, HCV infection, better outcome after renal transplantation, lower cost, better quality of life, less diet and fluid restriction, more hemodynamic stability and delayed onset of dialysis related amyloidosis are some other factors supporting CAPD(9). It also has less acute morbidity during treatment that does not always require hospitalization. Its most important complication is peritonitis as in one of our patients, which can be treated on outpatient basis with intraperitoneal antibiotics. As cardiovascular complication are the main cause of death in patients on maintenance haemodialysis, IE increases the mortality risk manifold. Hence patients with IE may be optimally treated with CAPD as RRT.

In the above two cases patient had IE with renal failure and were on haemodialysis. Even though they were being managed as per the protocols of IE, neither their clinical condition nor the cardiac and renal parameters were improving. Then finally, the haemodialysis access which was serving as the source of infection was removed and the patient was initiated on CAPD while continuing the treatment for IE. With this there was a dramatic improvement in the clinical picture. Thus CAPD closed the entry point of bacteria, as the vascular access was no longer needed and removed. Hence proving important role of CAPD in patients with subacute bacterial endocarditis with renal failure.

**Conclusion:**

Thus, CAPD being superior mode of renal replacement therapy in those with infective endocarditis as there is no vascular access and no risk of reinfection or relapse.

**References:**


