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Case Series

Health Care Associated Infective Endocarditis in Hemodialysis: More than Just Valve Infection- A Case Series

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Abstract

Cardiovascular diseases and infections are the two main causes of mortality in Hemodialysis patients [1, 6]. Health care associated infective endocarditis among them carries higher morbidity and mortality. The following is a case series of 3 Enterococcal endocarditis in HD patients and our experience in the management.

Keywords: Infective endocarditis, Hemodialysis, Enterococcus faecalis, metastatic complications, Valve Replacement.

INTRODUCTION

The common causative agents of Health care associated infective endocarditis are Staphylococcus aureus, CoNS, Enterococci & Gram-negative non-HACEK organisms [1, 6]. In Hemodialysis patients, the principal source for infective endocarditis is through the vascular access, which can be a temporary or tunneled hemodialysis catheter followed by AV fistula [1]. Additional risk factor include preexisting valvular calcification due to bone mineral disease [1]. Mitral and Aortic valves are frequently involved. The management of enterococcal IE is challenging because of the lack of desired anti bactericidal activity of most antibiotics, longer duration of therapy, higher metastatic complications, drug resistance and the need for surgical intervention which further adds to the perioperative mortality [3]. We describe here our approach and experience in the management of three Hemodialysis patients with enterococcal endocarditis.

Case 1

A 44-year-old male, ESRD on hemodialysis via AV fistula presented with low grade fever for 1 month. He had pallor, systolic murmur in the apex & mild splenomegaly. On evaluation for PUO, echo cardiogram revealed 1.4*0.7 and 0.8*0.5 cm vegetation in the mitral and aortic valve respectively. His blood cultures revealed E faecalis sensitive to Gentamicin, Penicillin, Vancomycin. He was started on Inj Ampicillin and Ceftriaxone. He had metastatic complications in the form of splenic abscess which was drained by USG guided pig tail catheter and septic emboli to B/L cerebral hemispheres. He improved after a 6 week course of intravenous antibiotics.

Case 2

A 59-year-old male, CKD- stage 3 -diabetic nephropathy, hypothyroidism underwent CABG for triple vessel disease and mechanical AVR for calcified severe AS in oct 2022. He was on antiplatelets, statins and warfarin. He had history of multiple hospitalizations for surgical site infection. He presented with RPRF-RPGN presentation 6 months later requiring hemodialysis. As he had persistent low-grade fever in the background history of prosthetic valve, echocardiogram was done which showed 13*7 vegetations in the mitral valve and mechanical aortic valve being normal. His blood cultures showed E faecalis sensitive to vancomycin/teicoplanin and resistant to penicillin [MIC 8 mcg/ml] and HLAR resistance. He was treated with IV Teicoplanin and Ampicillin. He had septic emboli to the cerebral hemisphere. Cardiothoracic surgeon suggested conservative management in view of high perioperative mortality. After 6 weeks of antibiotic therapy, he improved clinically, however he remained hemodialysis dependent.

Case 3

A 29-year-old male, ESRD on hemodialysis via temporary catheter, developed iatrogenic right hydropneumothorax during HD catheter insertion 2 months back requiring intercostal drainage. He had worsening dyspnea and low-grade fever for 2 weeks which on evaluation diagnosed to have right empyema and presented to us for further management. He had clinical features of right heart failure. Echocardiogram showed 1.9*0.7 cm & 1.6 *0.7 cm vegetation on septal and anterior tricuspid valve. His blood cultures showed E. faecalis showing HLAR + and resistant to Ampicillin [MIC 16 mcg/ml] He was started on IV Ampicillin & Daptomycin. He underwent right lung decortication and tricuspid valve replacement with mechanical valve. He clinically improved after 6 weeks of injectable antibiotic therapy and heart failure symptoms resolved.

DISCUSSION

1>EARLY RECOGNITION IS THE KEY:

Prompt and early recognition of IE is the key factor as it helps in the early initiation of treatment. The threshold for doing an echocardiogram showed be low in HD patients with the strong clinical suspicion for IE like CLABSI not responding to appropriate antibiotic therapy, new onset heart failure in the absence of acute coronary syndrome, with stigmata of endocarditis, frequent intradialytic hypotension after ruling out tradition causes, history of prior IE, valve replacement surgery, intracardiac devices, pyrexia of unknown origin [5].

2>APPROPRIATE THERAPEUTIC REGIMEN:

Knowledge about the antibiotic susceptibility and resistance pattern of enterococci and the choice of appropriate antibiotic regimen in drug resistant organisms is essential for the clinician as Infectious disease experts are lacking in most centers.

These organisms harbor intrinsic low level antibiotic resistance and resistant to aminoglycosides because of the lack of cell wall permeability. Susceptibility is generally tested for Ampicillin, HLAR, Penicillin, Vancomycin and Teicoplanin & Daptomycin [2]. Beta lactams other than penicillin or ampicillin has low affinity & low bactericidal activity. Penicillin resistance is due to the expression of Penicillin binding protein 5 & rarely due to beta lactamase production. Therefore, testing for beta lactamase should be done using a nitrocefin disc. The next is for testing High level aminoglycosides resistance [HLAR] defined by using the concentrations of 2000 mg/L and 500 mg/L of streptomycin and gentamycin respectively on BHI agar, high concentration as these antibiotics lack cell wall permeability. Only gentamycin and streptomycin are approved in clinical practice to achieve the synergistic effect with beta lactams i.e., cell wall synthesis inhibitors [2, 4].

Combination treatment is indicated for enterococcal endocarditis thus the choice of aminoglycosides + beta lactams is most preferred [2]. However, there is risk of ototoxicity with gentamycin and streptomycin in ESRD patients and the timing of administration of these antibiotics in relation to HD is a concern because the desirable trough levels are not achieved. Hence, it is preferrable to start the dual beta lactam combination therapy Ceftriaxone + Ampicillin as in case no 1 [4]. This dual beta lactam combination is also the option in patients who show HLAR+. Ampicillin saturates PBP 1,4,5 and ceftriaxone saturate PBP 2,3 resulting in synergistic effect [4]. The incidence of vancomycin resistant enterococci [VRE] is on the raise and it a public health emergency as it is excreted in the faeces. The drug of choice for VRE is either linezolid and or daptomycin.

Another combination therapy in clinical practice is Daptomycin based, daptomycin when used along with beta lactams, beta lactams will cause cell wall surface changes in enterococci promoting daptomycin uptake and Daptomycin results in increased sensitivity to beta lactams which is defined as the seesaw effect [2]. This combination is used in our case number 2. Daptomycin along with Gentamycin is noted to attenuate the renal toxicity of gentamycin. However, daptomycin is not FDA approved for IE and the risk of myopathy with prolonged therapy. Our choice of antibiotic administration is based on the guideline from the Table 1.

Table 1: The choice for combination therapy in E faecalis endocarditis

BETA LACTAM	HLAR	COMBINATION THERAPY
SENSITIVE	SENSITIVE	BETA LACTAM+ AMINOGLYCOSIDE [SYNEGRY+]
BL- PRODUCER	SENSITIVE	BL-BLI+ AMINOGLYCOSIDES
RESISTANT		
PENICILLIN MIC 16-64[low level]	SENSITIVE	BETA LACTAM + AMINOGLYCOSIDES
AMPICIILIN MIC 16-32[low level]	SENSITIVE	BETA LACTAM + AMINOGLYCOSIDES
SENSITIVE	RESISTANT	CEFTRIAXONE + AMPICILILLIN
HIGH LEVEL RESISTANCE	SENSITIVE	VANCOMYCIN/DAPTOMYCIN + AMINOGLYCOSIDES
HIGH LEVEL RESISTANCE	RESISTANT	NO SYNERGY HIGH DOSE DPATOMYCIN OR DAPTOMYCIN+ AMPICILLIN

3>SOURCE CONTROL

Determination of foci & source control is imperative for the treatment of enterococcal infections [2]. In our first case, careful examination of the AVF did not show any evidence of infection and no history suggestive of a genitourinary or gastrointestinal source & splenic abscess were drained by pig tail catheter insertion. In the 2nd patient, previous wound infection was presumed to be the source, however his mitral valve was affected rather than the mechanical aortic valve suggesting pre-existing valvular calcification due to CKD as a risk factor. In the 3rd patient, the foci were thought to be a previous indwelling catheter causing vegetations of the tricuspid valve and empyema is managed by decortication of right lung.

4>EARLY SCREENING FOR METASTATIC COMPLICATIONS:

Metastatic complications are more frequently seen in E. faecalis than E. faecium and the calcified valves in CKD with vegetations are prone for embolization [1]. One should have a strong suspicion and look for metastatic complications like stroke, splenic abscess, septic arthritis & epidural abscess. Our first two patients had septic emboli to the brain and first patient had splenic abscess which was surgically drained and Rt empyema in our 3rd patient required decortication.

5>TIMELY SURGICAL INTERVENTION:

The 2015 ESC guidelines for surgical intervention in IE remains the same of ESRD patients being heart failure refractory to medical therapy, recurrent emboli, large vegetations > 10 mm, heart blocks and valvular complications like perivalvular leak, abscess, fistula, and perforation, regurgitation [5]. However, the risk of perioperative mortality and morbidity is higher in ESRD, hence decision should be taken on the risk benefit ratio. Though the size of the vegetation is more than 10 mm which is indication for surgical intervention in case number 1 and 2, no life-threatening complications were present hence surgical intervention was deferred. Next is the choice of prosthetic valve which is based on the life expectancy and risk for bleeding diathesis as patients on oral anticoagulation in the presence of mechanical valve are more prone to bleed during HD. Thus, if life expectancy is less & risk of bleeding is more bioprosthetic valves are considered. The risk for accelerated degeneration and valve calcification of bioprosthetic valve in CKD should be kept in mind. In our 3rd patient, the choice of mechanical valve was made as his life expectancy was more.

Thus, we suggest this “Bundle approach” for the management of Enterococcal IE in hemodialysis patients.

CONCLUSION

Health care associated infective endocarditis in hemodialysis patients carries significant morbidity and could be fatal. Knowledge about the resistance pattern of the causative organisms, using the right combination of antibiotics for appropriate duration is essential for bacteriological cure. The need for timely intervention and also weighing risk versus benefit of valve replacement surgery calls for close coordination between the Cardiovascular Surgeon and the Nephrologist for optimal patient outcomes.

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