



Case report

Cavo-atrial endocarditis: A case of non-valvular endocarditis in a hemodialysis patient

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Introduction

The incidence of infectious endocarditis (IE) is significantly higher for patients who are on chronic hemodialysis (HD) compared to the general population for a number of reasons [1]. Even with a higher incidence, right sided, specifically cavo-atrial, endocarditis is extraordinarily rare [2,3]. This case examines a 54 year old male with end stage renal disease (ESRD) who was receiving HD with an Ash Split Catheter and was subsequently diagnosed with cavo-atrial endocarditis.

Case report

A 54 year old male with a past medical history significant for end stage renal disease (ESRD), peripheral vascular disease, and coronary artery disease. Surgical history was significant for a quintuple coronary bypass surgery with a Maze procedure, surgical creation of thin scar tissue lines on the atria to decrease the propagation of atrial fibrillation, four years prior. He also had a recent placement of an arteriovenous (AV) fistula. The patient recently had difficulty with his AV fistula for dialysis, so an Ash Split catheter had to be placed. This is a dual lumen catheter that is inserted by a transcutaneous route into the central venous circulation for dialysis access. The patient was initially admitted to the hospital for a right femoral artery to popliteal artery bypass.

Approximately 20 min after induction of anesthesia, his blood pressure tracings were lost, and a pulse could no longer be palpated. He was given 1 mg of intravenous epinephrine and return of spontaneous circulation was obtained. The anesthesia team obtained a transesophageal echocardiogram (TEE) in the operating

room, which demonstrated a possible right atrial mass and hypovolemia. He was subsequently transferred to the intensive care unit and blood cultures were obtained. Cardiology was consulted, and another TEE was performed due to a possible atrial mass seen on the intra operative TEE. The second TEE demonstrated a small echodensity visualized at the superior vena cava-right atrial junction (Supplementary Figs. 1 & 2), which was suggestive of a vegetation. Due to these findings, the infectious disease service recommended to start vancomycin and cefepime. Two sets of blood cultures were obtained and one set grew *Staphylococcus epidermidis*. Since the only growth was *Staphylococcus epidermidis* the antibiotic regimen was narrowed to vancomycin. The patient was eventually discharged with orders for vancomycin to be given at dialysis for 4 more weeks, and since repeat cultures continued to show no growth a repeat echocardiogram was not completed.

Discussion

Patients, such as the one in this case, who are on HD have a significantly higher incidence of IE compared to the general population. Multiple factors are believed to play a role. The valvular changes that occur with ESRD are among the risk factors. Calcified valves are a well-known seeding ground for bacteria. Those who receive chronic hemodialysis are thought to accrue degenerative valve disease one to two decades earlier than the general population [4]. The patient in this case study did not have any evidence of valvular vegetations, which makes his diagnosis an anomaly. Along with the degenerative changes, a rate of bacteremia of approximately one episode per 100 patient care months, demonstrates why the age-adjusted incidence ratio for endocarditis compared to the general United States population is 17.86 [5].

Greater than 90% of IE in HD patients, and similarly the general population, occur on the left side of the heart. Hoen et al. examined the prevalence of anatomic locations of IE. Their study did not even list the cavo-atrial junction as a possible location of

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Table 1
Published cases of endocarditis noted in the area of the cavo-atrial junction.

| Publication | Age | Microbiology | Receiving Dialysis? | Catheter Type | Outcome |
|-----------------------|-----|---|---------------------|---|---------------------------------------|
| This Case | 54 | 1 out of 2 cultures positive for Staphylococcus epidermidis | Yes | Left Internal jugular dual lumen, along with a non functioning left arm arteriovenous fistula | Successful completion of antibiotics. |
| Thakar et al. [4] | 44 | Escherichia coli & coagulase negative Staphylococcus | Yes | Right internal jugular dual lumen | Paper noted successful treatment |
| Thakar et al. [4] | 49 | Methicillin Sensitive Staphylococcus aureus | Yes | Right subclavian dual lumen | Paper noted successful treatment |
| Thakar et al. [4] | 54 | Methicillin Resistant Staphylococcus aureus | Yes | Right subclavian dual lumen | Paper noted successful treatment |
| Thakar et al. [4] | 56 | Methicillin Sensitive Staphylococcus aureus | Yes | Right subclavian dual lumen, along with a left arm arteriovenous fistula | Paper noted unsuccessful treatment |
| Tzortzis et al. [10] | 72 | Candida albicans | No | Subclavian (Side not noted) | Paper noted successful treatment |
| Gressianu et al. [11] | 48 | Candida glabrata | No | Indwelling central venous port catheter | Paper noted successful treatment |

infectious endocarditis, most likely because of its rarity [2]. One reason why it is thought that left sided IE is more prevalent than right sided IE in HD patients is due to increased incidence of mitral annular calcification and aortic valve calcification, compared to the pulmonic and tricuspid valves [6]. There has not been extensive research on the pathophysiology behind right sided IE, but there does appear to be evidence that central venous catheters could have a relationship to the disease [7].

Six other cases of endocarditis were reported in the area of the cavo-atrial junction. All six of the publications had some form of central catheter (Table 1). This corresponds with our patient, who had an Ashsplit catheter for dialysis treatments. It is thought that the trauma that the catheter tip causes to the endothelium, in the vena cava or atrium, to form a site for vegetation to grow [2]. Stevenson et al. showed a significantly higher rate of vascular access infections with use of temporary catheters for dialysis compared to native fistulas or synthetic grafts [8]. When fistulas and grafts are placed, there is no longer a device penetrating the skin at all times, giving microorganisms less of an opportunity to enter the body. Chrissoheris et al. studied endocarditis complicating patients with central venous catheter blood stream infections (CVC-BSI). The patients in their study did not necessarily have the line in place for dialysis, but 58.4% of the study population did have chronic kidney disease. Eleven of the 24 patients who had endocarditis from a CVC-BSI resulted in atrial wall endocarditis [5]. These studies suggest that use of central catheters increases risk of cavo-atrial endocarditis.

Conclusion

Though extraordinarily rare, cavo-atrial endocarditis can be found in ESRD patients receiving HD through a central line. It is important to keep this in mind whenever a hemodialysis patient with a central line becomes bacteremic. Extra attention also needs to be paid to non-valvular areas on imaging when catheters are present, as these are not common locations for vegetations to form. TEE should be used if no vegetations are seen on a transthoracic echocardiogram, as TEE is a more sensitive diagnostic modality [8,9].

Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Author statement

William Lorson DO – Author and data researcher.
Gayathri Baljedly MD FACC- Project advisor and cardiologist.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:<https://doi.org/10.1016/j.idcr.2018.e00458>.

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