

Hemodialysis catheters: An overlooked source of fibrin sheath endocarditis

Ismael Valle, Miguel Colon

ABSTRACT

In recent years, healthcare associated infective endocarditis has shown an increasing trend most likely due to risk factor such as hemodialysis and diabetes. *Staphylococcus aureus* has become one of the most common causative organisms. We present the case of a 27-year Puerto Rican woman with diabetes mellitus and end stage kidney disease on hemodialysis who came to our Instruction with progressive dyspnea and a flu like illness with one week of evolution. Upon arrival to Emergency Department, a chest X-ray was performed revealing bilateral lung infiltrates and consolidates consistent with bilateral pneumonia. Empiric therapy for pneumonia was started but after seventy-two hours of antibiotic therapy patient continued deteriorating clinically. At that time, a chest computed tomography was performed, being remarkable for bilateral septic emboli and a large hyperattenuated lesion on the right atrium. Then, a transesophageal echocardiogram (TEE) was performed, since SVC and right atrium were unable to be properly assessed by transthoracic echocardiogram (TTE). The TEE revealed a large vegetation extending from superior vena cava to right atrial wall. Surgical management was then provided, in which a seven-centimeter vegetation was removed. Cephalosporin therapy was continued for six weeks leading to an uneventful

recovery. Fibrin sheath formation secondary to hemodialysis catheter has become a frequent source of endocarditis that is overlooked by TTE. In view of the latter, we recommend TEE as the main approach to diagnose fibrin sheath endocarditis.

Keywords: Cephalosporin therapy, Infective endocarditis, *Staphylococcus aureus*, Transesophageal echocardiogram

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INTRODUCTION

Infective endocarditis is defined as pathological evidence of microorganisms demonstrated by culture or histological examination of a vegetation, a vegetation that has embolized or intracardiac abscess alongside clinical evidence proposed by Modified Duke Criteria [1]. It is related to 40,000 to 50,000 new cases each year in the United States [2], being the most worrisome aspect, the increasing trend in health care associated factors, such as in hemodialysis patients [3, 4]. *Staphylococcus aureus* has been described as the most common causative organism of health care associated endocarditis including hemodialysis patients [1–5].

In the last decade and so, there are some cases reported [6, 7] among patients on hemodialysis with long term tunneled central venous catheters with associated

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fibrin sheath formation leading to a non-valvular source of infective endocarditis. The most common presentation of this entity is the formation of fibrin sheath vegetation in the superior vena cava [7,8], that can be overlooked by transthoracic echocardiography (TTE) [6, 7, 9]. Thus, transesophageal echocardiography (TEE) has been suggested as the initial diagnostic approach in such cases [6, 9].

We report a case of a young female patient with end stage kidney disease on hemodialysis who presents with progressive dyspnea associated to a flu like illness who was initially admitted under the presumptive diagnosis of community acquired pneumonia and was later diagnosed with infective endocarditis secondary to a fibrin sheath vegetation.

CASE REPORT

A 27-year-old Puerto Rican woman with Diabetes Mellitus Type I and End Stage Kidney Disease (ESKD) on hemodialysis (HD) presented to our institution after developed widespread diffuse pain and progressive dyspnea associated to one episode of vomiting and diarrhea. On presentation, blood pressure was 80/50mmHg, heart rate was 101 beats/min, respiratory rate was 28 respiration/min and a body temperature was 38.3°C. Upon examination, tachycardia and bilateral lung crackles more prominent on left side were noted. There were no murmurs, rubs or gallops nor jugular venous distention (JVD).

Pertinent, laboratory results included hemoglobin of 9.0g/dL, hematocrit of 26 %, platelet count of 125,000/ μ L, and white cell count of 11,500/ μ L. Blood urea nitrogen was 70mg/dl, creatinine was 5.8mg/dL and potassium was 3.2 mEq/L. Initial chest-X-ray (CXR) revealed bilateral patchy interstitial infiltrates suggestive of multilobar pneumonia (Figure 1). Then, empiric antibiotic therapy was started and patient was admitted. On the day of admission blood and sputum cultures were drawn.

After 72 hours of administration of antibiotic therapy, patient continue having multiple bouts of body temperature > 38.3°C, along complains of worsening shortness of breath. A chest CT scan was performed revealing bilateral pulmonary septic embolism and a right atrial hyperattenuated lesion (Figure 2). At the same time, blood culture and sputum culture results were remarkable for growth of gram positive cocci in clusters. In view of the aforementioned findings on CT and blood cultures a transthoracic echocardiography was performed and a catheter on the right atrium was noted but no abnormalities associated to it were reported. Thereafter, a transesophageal echocardiogram (TEE) was performed. Superior vena cava was properly interrogated, revealing large vegetation which projects from the superior vena cava into the right atrial wall (Figure 3). Hemodialysis catheter was subsequently

removed and patient was started on antibiotic therapy for Methicillin Sensitive *Staphylococcus aureus* (MSSA). Since patient had persistent bacteremia in spite of antibiotic therapy directed to MSSA, Thoracic Surgery evaluation was requested. Hence, thoracotomy procedure was recommended. An approximately, 7cm vegetation was removed (Figure 4) from the superior vena cava and after six weeks of Cephalosporin therapy, resolution of symptoms was achieved.

DISCUSSION

Infection associated to hemodialysis catheters is a serious complication which occurs in more than half of catheters placed [10]. As previously mentioned, a great number of tunneled catheter infections are related to *Staphylococcus aureus*, [1–5], leading to infective

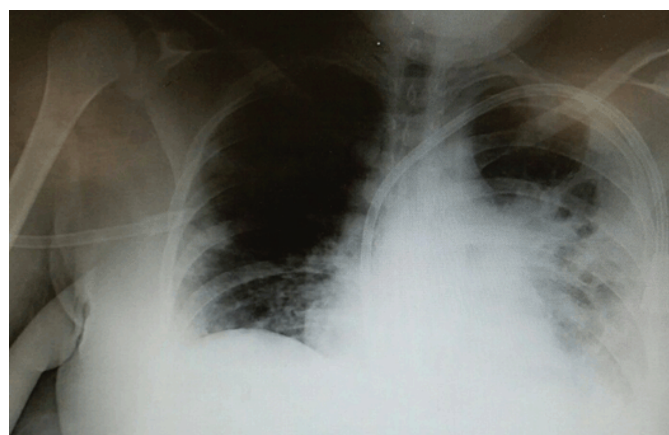


Figure 1: (A) Antero-posterior chest X-ray (CXR) showing a left subclavian tunneled dialysis catheter projecting into the right atrium (blue arrow) and (B) Lungs with bilateral interstitial infiltrates (yellow arrows).

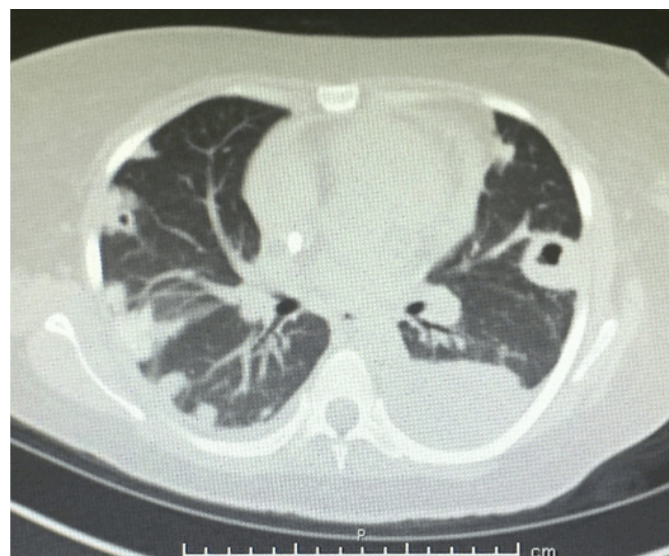


Figure 2: (A) Chest CT scan showing bilateral septic emboli (red arrow) and (B) Right atrium hyperattenuated mass like lesion with irregular contour (blue arrows).



Figure 3: Transesophageal echocardiogram bicaval view showing a protruding mass like lesion into the right atrial chamber, suggestive of a large vegetation.

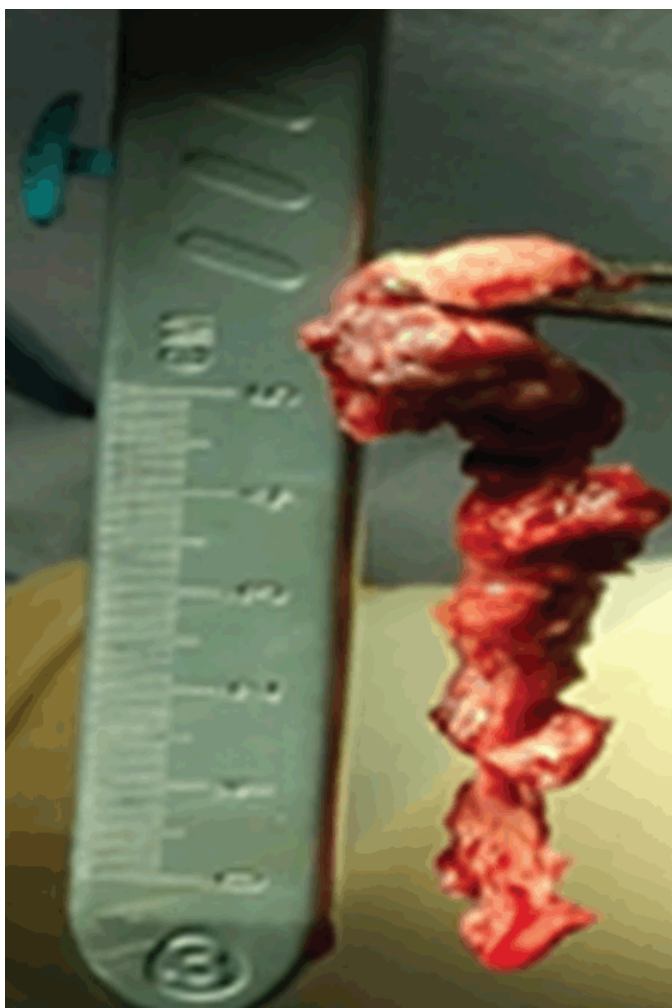


Figure 4: Fibrin sheath vegetation of approximately 7cm extracted from the superior vena cava.

endocarditis. The latter, is associated with higher mortality rates in patients on hemodialysis than in the general population [11], for which a prompt approach to make the aforementioned diagnosis can be lifesaving.

When central venous catheters are placed venous thrombosis and fibrin sheath formation might occur [12–14]. Sometimes these two entities can be overlooked since a proper interrogation of SVC is not possible with TTE, as occurred with our patient [6, 9]. In such cases, TEE emerges as the appropriate diagnostic tool [7, 15]. Once, these entities are detected, catheter removal should be encouraged [6, 13]. In some cases, as occurred with our patient also, fibrin sheath can lead to vegetation formation serving as a source of infective endocarditis and persistent bacteremia [6, 9]. In view of this clinical scenario, our patient was taken to the Operation Room (OR) by the Thoracic Surgeon and a 7 cm vegetation was successfully excised. After the course of six weeks patient received antibiotic therapy with complete resolution of bacteremia. Recovery from surgery was uneventful.

Fibrin sheath formation in central veins secondary to tunneled hemodialysis catheters are associated with infection, aside from being a source of thrombus formation. In recent years, there are reports that provides enough evidence that fibrin sheath formation in the SVC is a source of non-valvular infective endocarditis. Using transthoracic echocardiography can overlook aforementioned findings in SVC, as occurred in our case.

Our case showed the importance of the TEE as an early diagnostic tool in regards to vegetations associated to fibrin sheath formation as a source of non-valvular infective endocarditis. At the same time, it offers a different management approach in such cases, in which thoracotomy procedure can be employed to eradicate the source infection. However, this must be examined in basis of each case.

CONCLUSION

We proposed that TEE should be used as an initial approach and the goal standard diagnostic tool, to warranty a detailed interrogation of the SVC. This would help physicians to make an accurate diagnosis and confer guidance in the management approach as well, whether it is surgery, or medical therapy alone, in order to directly impact mortality associated to infective endocarditis in patient on hemodialysis.

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Author Contributions

Ismael Valle – Substantial contributions to conception and design, Drafting the article, Final approval of the version to be published

Miguel Colon – Substantial contributions to conception and design, Acquisition of data, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor of Submission

The corresponding author is the guarantor of submission.

Source of Support

None

Consent Statement

Written informed consent was obtained from the patient for publication of this case report.

Conflict of Interest

Authors declare no conflict of interest.

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