



Case report

Pseudomonas MitraClip[®] endocarditis: A case report and review of literature

Ralph Tayyar^a, Oneib Khan^a, Kashyap Chauhan^b, Andrew Ines^c, Erin Carnish^{a,*}

^a Internal Medicine Department, Lankenau Medical Center, Wynnewood, PA, United States

^b St George's University of London, London, United Kingdom

^c Sidney Kimmel Medical College, Thomas Jefferson University Hospital, Philadelphia, PA, United States

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ABSTRACT

Endocarditis from *Pseudomonas aeruginosa* is a rare cause of endocarditis with most of those cases in patients with intravenous drug abuse. The MitraClip[®] is a relatively new device with few incidences of endocarditis in the literature. Here we present the first reported case of pseudomonal endocarditis of a MitraClip[®] in a non-IV drug user.

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Introduction

Non-HACEK Gram negative endocarditis accounts for 4–10 % of native valve endocarditis and 2–15 % of prosthetic valve endocarditis [1]. Of these, a majority is attributed to *Escherichia coli* and just 22 % are caused by *Pseudomonas aeruginosa* [2,3]. The biggest risk factor for pseudomonal endocarditis is intravenous drug abuse (IVDA), seen in 90–95 % of cases [2,3].

The MitraClip[®] is a device used to treat mitral regurgitation through a percutaneous approach. It gained European market approval in 2009 and limited FDA approval in 2013 for high risk operative patients, with aim for broader approval in 2019 following larger studies investigating its long term safety [4,5]. While increasing in implementation, the MitraClip[®] is a relatively new device with little literature regarding the incidence of endocarditis, especially when compared to native and prosthetic valves. We present the case of a non IVDA woman who contracted a *Pseudomonas* infective endocarditis of the MitraClip[®].

Case report

An 87-year-old Caucasian female with a past medical history of severe mitral insufficiency status post MitraClip[®], paroxysmal atrial fibrillation, ischemic stroke, pulmonary embolism, coronary artery disease, and bilateral knee and hip osteoarthritis, presents

as a transfer from an outside hospital in February 2019 for workup of recurrent fevers and *Pseudomonas aeruginosa* bacteremia.

In August 2017, the patient was diagnosed with severe mitral regurgitation (MR) from posterior leaflet mitral valve prolapse with flail P2 segment, and underwent successful MitraClip[®] intervention with 2 clips. Post-op transoesophageal echocardiogram (TEE) showed mild residual MR with a pressure gradient of 4 mmHg across the valve.

In August 2018, she was admitted to an outside hospital for fevers secondary to bilateral acute pyelonephritis. Blood cultures grew pan-susceptible *Pseudomonas aeruginosa* and she was treated with 2 weeks of ceftazidime. In October, she was admitted for aphasia and right-sided weakness found to have acute left middle cerebral artery (MCA) M2 territory ischemic stroke on head MRI. As part of the stroke work up, a transthoracic echocardiogram (TTE) was completed showing no vegetation, however TEE was not performed. She returned in December after 3 weeks of lower back and severe left hip pain; an MRI pelvis showed two left iliopsoas abscesses, measuring 1.4 cm and 2 cm, and a septic left hip joint (Fig. 1). She underwent left hip arthroscopy from which cultures grew pan-susceptible *Pseudomonas aeruginosa*. During this admission, she developed an increase in the size of the previously seen left MCA M2 territory stroke, with multiple new bilateral subacute focal cortical infarcts (Fig. 2). Repeat TTE was unchanged. Patient was discharged with a 6-week course of ceftazidime.

In February 2019, she presented with 1 week of intermittent fevers up to 102.3 °F, associated with fatigue and chills. She had no history of recent travel, recent dental procedures or illicit drug use. Surgical history was pertinent for bilateral total knee arthroplasty ten years prior to presentation. Vital signs were significant for

* Corresponding author.

E-mail address: carnishE@mlhs.org (E. Carnish).

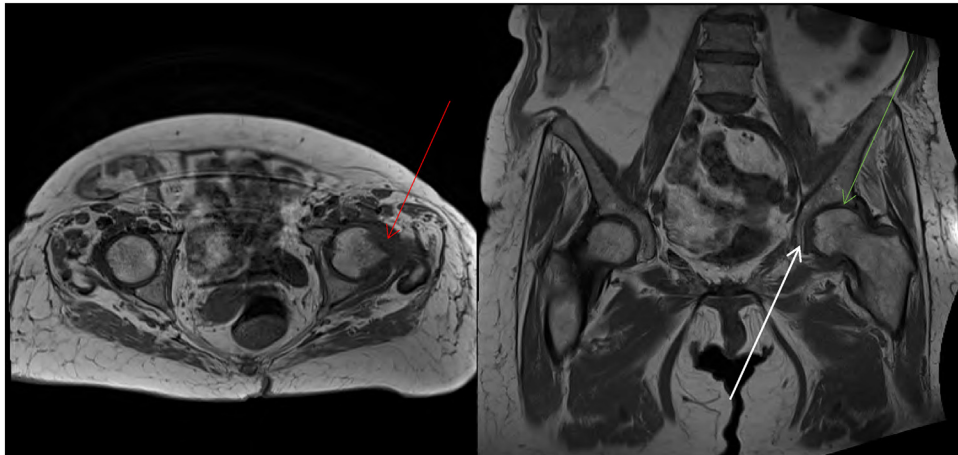


Fig. 1. MRI abdomen pelvis (axial and coronal T1 images) with joint effusion (red arrow), severe left hip joint space.

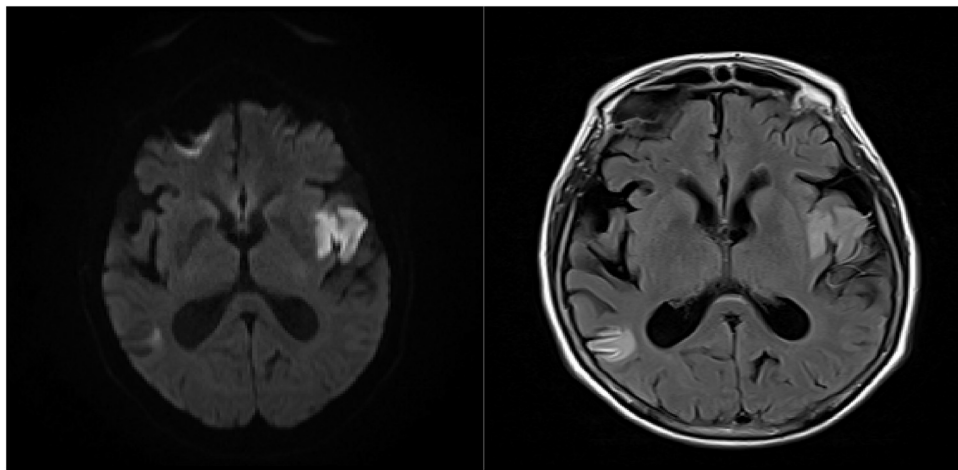


Fig. 2. Diffusion weighted image (left) and axial flair (right) demonstrating acute to sub-acute infarct in the posterior insula.

temperature of 100.1 °F and heart rate 102 bpm. Physical exam revealed a 2/6 holo-systolic murmur heard at the left lower sternal border. She demonstrated normal range of motion of both knee and hip joints without pain, and the left hip wound was well-healed without evidence of infection. Her laboratory studies were significant for elevated C-reactive protein (104.34 mg/L; reference range <7.48 mg/L) and normal white blood cell count (7.74 K/ μ L; reference range 3.80–10.50 K/ μ L). CT abdomen and pelvis showed bony erosive change of the femoral head neck junction consistent with previous infection with no abscesses or fluid collections. She

was empirically started on meropenem before blood cultures again grew pan-susceptible *Pseudomonas aeruginosa*.

The patient was transferred to our hospital for determination of infectious source. Meropenem was narrowed to ceftazidime. Orthopaedic surgery cleared the left hip as a possible source of infection after a repeat MRI showed improvement in the degree of enhancement seen in both the bones and muscles. Given concern for endovascular infection, a TEE was completed showing residual mild to moderate MR with a 2-cm highly mobile vegetation with filamentous extensions on the mitral leaflet, likely on the

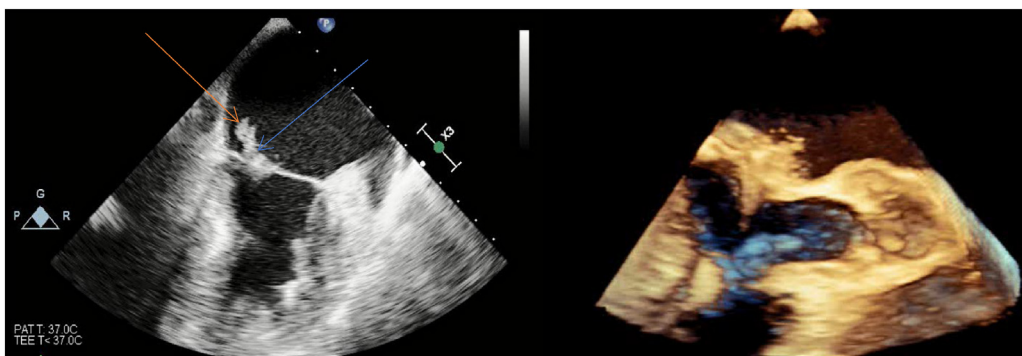


Fig. 3. TEE with 2-cm vegetation (orange arrow) on MitraClip® (blue arrow) with a 3-D constructed image.

MitraClip® (Fig. 3). The patient was evaluated by the cardiothoracic team for possible MitraClip® removal, however was considered too high risk for surgical intervention secondary to comorbidities. Gentamicin was added to her antimicrobial regimen and she was discharged on 6 weeks of ceftazidime and 4 weeks of gentamicin followed by lifelong quinolone suppressive therapy.

Discussion

Left sided pseudomonal endocarditis maintains mortality rates as high as 64 % [2]. One explanation, as noted in previous literature reviews, is the frequent failure of antimicrobial therapy [2]. Even patients on synergistic antimicrobial regimens will often require surgical intervention if curative therapy is the goal. The mechanism of this failure is poorly understood. Studies, although with small sample size, suggest that combined medical and surgical therapy is superior to medical therapy alone [3]. A recent review article noted the mortality of pseudomonal endocarditis to be 62 % with antimicrobials alone and 31 % in a combined medical and surgical approach; however, non-operative mortality may have been overestimated as patients who could have benefited from surgery were denied because of high risk surgical candidacy [6].

In the above case, the patient unfortunately not only had left sided pseudomonal endocarditis, but it manifested on a MitraClip®. With a 5 year post-op event rate of 0.2 %, MitraClip® endocarditis is exceedingly rare. Unfortunately, this complication burdens mortality rates as high as 50 % [7]. What arises in these scarce situations is a dilemma involving surgical management. When examining all cases of prosthetic valve endocarditis, around 40–50 % are managed with the addition of surgical intervention [8,9]. The evidence behind this practice is limited to observational and cohort studies [10]. As such, even with current guidelines, surgical decision making is often done on a case by case basis in prosthetic valve endocarditis. Calculators such as European System for Cardiac Operative Risk Evaluation (EuroSCORE II) and Society of Thoracic Surgeons (STS) score are useful tools in helping to distinguish appropriate surgical candidacy.

Percutaneous edge-to-edge repair with the MitraClip® is an appealing option particularly for patients evaluated to be moderate to high risk for other forms of mitral valve repair or replacement. In the unlikely event of prosthetic valve endocarditis, most of the cases cited in the literature prefer an operative approach [11]. This decision is heavily based on surgical risk. However even with calculators, there is ambiguity among operators about what is an acceptable level of risk in these patients. There are reported cases with EuroSCORE II as high as 56.8 % that have successfully undergone mitral valve replacement in the setting of MitraClip endocarditis [12]. Our case illustrates the difficulty in making this decision. Medical management was the course taken with our patient, and while prosthetic valve endocarditis is frequently treated with this alone, there has only been one documented case of successful medical management for MitraClip® endocarditis [13]. Cases similar to this likely benefit from a multidisciplinary approach involving cardiothoracic surgery, cardiology, infectious disease, and palliative care.

With regards to our case, unfortunately there was not a higher index of suspicion for endovascular infection despite evidence of recurrent *Pseudomonas* bacteremia without a singular source and embolic strokes in a patient with a prosthetic heart device. These complications may have been prevented if a TEE was performed and endocarditis was diagnosed earlier. However, the development of pseudomonal endocarditis after bacteremia is a rare complication, even in patients with prosthetic

valves. Further research is needed to determine if it is cost effective to rule out endocarditis in patients with recurrent pseudomonal bacteremia; however, in this patient with multiple risk factors (advanced age, embolic phenomenon, and presence of prosthesis), earlier testing may have been warranted. Additionally, the hospital center at which this patient presented is low volume for MitraClip® placements which may have further affected the likelihood of surgical intervention. In conclusion, this case illustrates the need for further research and analysis of MitraClip® endocarditis to aid in the decision to undergo surgery versus long-term antimicrobial suppression.

Declaration of Competing Interest

None.

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Consent

Written informed consent was obtained from the patient's spouse for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Authors contribution

All authors made substantial contributions to all of the following: (1) drafting the article, (2) final approval of the version to be submitted.

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