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Case Report

Catheter Related Atrial Thrombus: A Case Report and Review of the Literature

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Abstract

Catheter Related Right Atrial Thrombi (CRAT) is a rare, yet potentially serious complication associated with central venous catheters. Currently, there is a paucity of management guidelines available in the current literature addressing this issue. We present a case of Catheter-associated Right Atrial Thrombus (CRAT) complicating long-term totally implanted venous access device (TIVAD) insertion in a 60-year-old lady, with her device left in-situ for 10 years. Transesophageal echocardiography (TOE) performed revealed mobile echogenic 1.2 x 2.0cm pedunculated thrombus extending from the right atrium towards the Superior vena cava, at the site of her previous TIVAD catheter tip. We elected for a medical management strategy using systemic anticoagulation with Rivaroxaban, and three months of antibiotic therapy. Complete thrombus dissolution was observed on surveillance TOE at 1 month. She remained well post cessation of anticoagulation without any further complications. DOACs potentially represent a feasible treatment option for CRAT, although appropriate and timely surveillance should be arranged to monitor for potential treatment failure and further intervention if indicated.

Introduction

Catheter Related Atrial Thrombus (CRAT) is an uncommon but potentially serious complication of central venous access, reported in up to 18% of patients with long term venous catheters, and associated with a mortality rate of 20% [1]. Clinical manifestations can include pulmonary emboli, infection with septic emboli or hemodynamic compromise [2]. However, a significant proportion of patients are asymptomatic, and thus the true incidence of CRAT may be underestimated [3]. There is a paucity of evidence-based guidelines in the management of CRAT. A 60-year-old lady with a past medical history of Hypertension and Haemochromatosis presented to our emergency department with a febrile illness associated with lower respiratory tract symptoms. She had a Port-A-Cath®, a type of totally implanted venous access device (TIVAD) inserted via her right subclavian vein 10 years ago to facilitate periodical venesection. She had since been lost to follow-up with her catheter remaining in-situ despite no longer requiring venesection for the past 4 years. She had no other pre-existing cardiac history. She was febrile at the time of presentation (38 degrees Celsius), and index blood cultures taken prior to administration of antibiotics were negative. Other vital signs on presentation included a heart rate of 82bpm, and blood pressure of 135/78, and SpO2 of 100%. She had no clinical signs of heart failure or peripheral stigmata of infective endocarditis. Hb was 143g/L, and inflammatory markers were raised with CRP of 75 and WCC of 8.4.She was commenced on antibiotic therapy and admitted her to our unit for investigation of potential sepsis and for exclusion of infective endocarditis (IE) due to her history of retained TIVAD. Transthoracic echocardiography (TTE) performed on Day 1 of admission was unremarkable with normal left ventricular size and function, and the tip of the Port-A-Cath® was visualized extending from the superior vena cava (SVC) just inside the right atrium. No other significant valvular pathology or vegetations were observed. Attempts at removing her TIVAD with conventional techniques involving incision above the reservoir site were unsuccessful, and on Day 3 of her admission, the patient underwent fluoroscopic guided loop snare retrieval via the right common femoral vein with

an Interventional Radiologist, where her catheter was successfully removed in entirety. The removed catheter tip was sent for culture but did not grow any microbial organisms. She defervesced within 24 hours of starting antimicrobial therapy and blood cultures remained negative. Transesophageal echocardiography (TOE) was performed which demonstrated a mobile echogenic 1.2 x 2.0cm pedunculated mass extending from the right atrium towards the Superior vena cava causing partial obstruction of the ostium (Image 1). TOE excluded the presence of Patent Foramen Ovale, and thus did not require more expectant management due to the risk of paradoxical embolism. Computed Tomography Pulmonary-Angiogram (CTPA) showed a 12 mm (craniocaudal dimension) filling defect in the right aspect of the lower superior vena cava and cavoatrial junction with associated moderate luminal narrowing, corresponding to her TOE findings, and no evidence of pulmonary thromboembolism. A subsequent 18 Flurodeoxyglucose-(FDG) PET/CT was performed which found no evidence of disseminated foci of disease. Differentials including thrombus, vegetation or super-infected thrombus were considered. Due to the clinical history with a short and clearly defined onset of respiratory symptoms, location of the thrombus at the RA/SVC junction where the catheter-tip previously resided, and absence of any disseminated infective foci, CRAT in the setting of concurrent respiratory infection was felt to be the probable diagnosis as opposed to a primary vegetation. Surgical opinion was considered with multidisciplinary review from Cardiac surgeons and and Infectious Diseases, a medical management and surveillance strategy was chosen in the first instance due to the relatively small size of the thrombus, and the patient's clinical stability. Our patient was also treated with four weeks of intravenous antibiotics via a hospital-in-the-home service. She was monitored clinically with regular blood tests, with a view for repeat TOE in six weeks to assess the presence and size of any residual thrombus and consider need for further surgical intervention. Rivaroxaban was chosen for therapeutic anticoagulation, and she was commenced on 15mg twice daily for 4 weeks before to switching to 20mg daily. Our patient remained completely well during the surveillance period with no chest pain, fevers, or new symptoms. Her inflammatory markers remained normal, and surveillance blood cultures were negative following cessation of antibiotics at the three months. The interim repeat TOE at six weeks showed a complete resolution of the thrombus with no valvular dysfunction, vegetations or intra-cardiac thrombus. Anticoagulation was also ceased following a total of 3 months duration. She continued to remain well on repeat outpatient review was discharged from our service six months after her initial presentation.

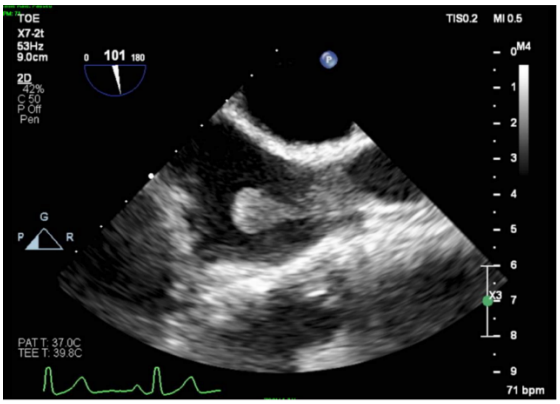

Figure 1: Transesophageal echocardiography (TOE) showing a mobile echogenic 1.2 x 2.0cm pedunculated mass extending from the right atrium towards the Superior vena cava.

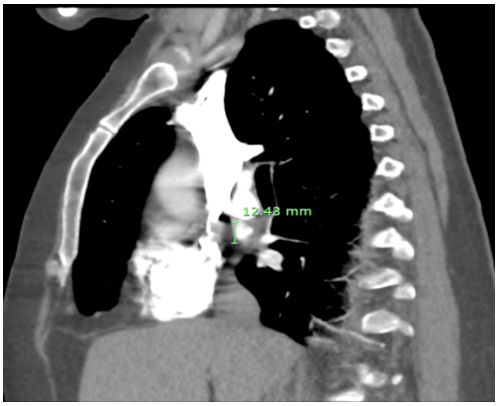

Figure 2: 12 mm (craniocaudal dimension) filling defect in the right aspect of the lower superior vena cava and Cavo atrial junction with associated moderate luminal narrowing on CT Pulmonary Angiogram, corresponding to TOE findings.

Discussion

There are several proposed mechanisms of CRAT formation, predominantly involving mechanical atrial wall injury from catheter tip placement in the right atrium, causing endothelial trauma from abrasion during cardiac contractions, and subsequent platelet activation [4,5]. Catheter tip placement location inside the RA has been shown to be an independent risk factor strongly associated with increased incidence of CRAT in multiple studies. Transesophageal echocardiography (TOE) has superior diagnostic sensitivity compared to transthoracic echocardiography (TTE) the detection of right atrial thrombus, and is better able to characterize

the attachment site, mobility and size of thrombus [6]. In one study of 16 patients, TTE was only able to detect 50% of right atrial thrombi detected on TOE [7] our case exemplifies the importance of referring patients for TOE in any cases where CRAT is potentially suspected. Managing CRAT can pose a dilemma, as there are no established guidelines on how to treat it. Literatures regarding CRAT treatment predominantly comprises of case reports, and describes a variety of treatment options including systemic anticoagulation, thrombolysis, or surgical thrombectomy in unstable cases [8-10]. The large study examining this to date addressing efficacy found an overall anticoagulation success rate of 73% compared to 67% in thrombolysis [11]. However, there is no comparative data on outcomes between Vitamin K antagonists and direct anticoagulant (DOACs), and the optimal duration of anticoagulation therapy is also unknown. Based on our patient's clinical presentation, it was decided to adopt an initial medical management strategy with anticoagulation and adjunct antibiotics and assess response to therapy. We elected to use a Rivaroxiban, based on extrapolated data from the management of pulmonary embolism. The plan was to escalate therapy should thrombus fail to resolve, or if the patient developed new complications or became symptomatic. Although limited, there is some evidence that DOACs may be effective for intracardiac thrombus and in some cases superior to Warfarin, based on data for Left atrial and left atrial-appendage associated thrombus [12,13]. To our knowledge, this is the first reported case of using Rivaroxaban for CRAT. In this case, a favourable outcome with complete thrombus dissolution was observed on medical therapy alone. This demonstrates the importance of taking into account patient and clinical factors and suggests that DOAC is potentially a viable initial treatment option for CRAT where patients are hemodynamically stable and thrombus size is small, although further prospective research is needed to study relative efficacy of various anticoagulant agents.

Conclusion

We present a case of Catheter-associated Right Atrial Thrombus (CRAT) complicating long-term totally implantable venous catheter insertion, successfully treated with Rivaroxaban. DOACs potentially represent a feasible treatment option, although appropriate surveillance for response to treatment should be ensured to allow escalation of therapies in the event of an inadequate response.

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Conflict of Interest: None to declare.

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