

## Intravenous Drug Abuse Resulting in Infected Retained Cardiac Needle Embolization and Septic Pulmonary Emboli

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### ABSTRACT

Intravenous drug abuse remains a significant health concern worldwide. Complications of intravenous drug use include transmission of infectious diseases, infective endocarditis, and localized infection. Central needle embolization of needle fragments from intravenous drug use is extremely rare and can result in life threatening complications. However, management of these patients poses a clinical dilemma for physicians when considering conservative versus surgical treatment. We present a case of a young male with a history of intravenous drug abuse who presented with fevers and shortness of breath and was found to have infective

endocarditis and septic pulmonary emboli secondary to a retained needle fragment. Ultimately, a conservative management approach was decided after risk versus benefit analysis was completed.

**Key words:** Needle embolization; Intravenous drug abuse; Septic emboli; Endocarditis

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### INTRODUCTION

Intravenous drug use (IVDU) in the United States remains one of the largest growing public health concerns. Due to its increasing prevalence, complications of IVDU have proven to be a clinical decision making dilemma for physicians as guidelines for management are limited<sup>[7]</sup>. There are occasional reports of needle breakage into the skin or subcutaneous tissue amongst individuals who abuse drugs intravenously. However, central needle embolism continues to be a rare complication that has been infrequently reported in the literature<sup>[5,6]</sup>.

Central needle embolization with retention of an intracardiac needle can lead to complications such as cardiac tamponade, devastating cardiac perforation, and infective endocarditis<sup>[6]</sup>. We report a rare case of an intravenous drug abuser with central needle embolus retained in the inferior wall of the right ventricle who presented with persistent bacteremia and septic pulmonary emboli. We also discuss potential treatment options for this clinical dilemma through a review of the literature.

### CASE REPORT

A 29-year-old male presented to the emergency department with fevers, shortness of breath, and pleuritic chest pain. At the time of presentation, he admitted to recent use of intravenous heroin and

cocaine. Due to his level of intoxication, he was unable to provide additional history or an adequate review of systems.

On physical examination, his vital signs were the following: Temperature of 100.7 degrees fahrenheit, blood pressure 102/59 mmHg, and heart rate of 140 beats per minute. The remainder of his examination was significant for mild respiratory distress with rhonchi present in bilateral lung fields. There were also multiple areas of ecchymosis on his upper and lower extremities with associated track marks.

His admission labs were significant for a white blood cell (WBC) count of 27,000/uL with a differential revealing 90% neutrophils, hemoglobin of 8.9 g/dL, and creatinine of 1.41 mg/dL. Blood cultures were positive for gram positive cocci, further speciating as staphylococcus aureus. He was then started on empiric antibiotics of vancomycin and ampicillin-sulbactam. Urine drug screen was positive for opiates and cocaine. EKG revealed sinus tachycardia at 140 beats per minute with incomplete right bundle branch block. A portable chest x-ray revealed findings consistent with bilateral lower lung infiltrates, a small right pleural effusion, and cystic changes noted at the right lung base. A computerized tomography (CT) scan of the chest without contrast was done due to acute renal dysfunction,

which revealed bilateral lungs with cavitory lesions concerning for septic emboli. The left lower lobe demonstrated a large 8.4cm cavity and a large right sided multiseptated cavitory lesion with air fluid levels and associated hydropneumothorax. In addition, a linear lesion was apparent towards the apex of the heart (Figure 1).

A transthoracic echocardiogram (TTE) was performed due to concern for endocarditis and revealed no gross evidence of vegetation, mild mitral regurgitation, and hyperdynamic left ventricular ejection fraction estimated to be 75%. The Interventional Radiology team placed a right sided pigtail catheter in the left lung and injected tPA dornase for treatment of the loculated cavity. A fluid analysis of the cavitation revealed WBC of 644, RBC of 23,496, glucose of 73, LDH of 497, and protein of 3.5, meeting Light's criteria for an exudative effusion. Cytology was negative for malignancy and cardiothoracic surgery was consulted. A right sided video-assisted thoracoscopic surgery (VATS) with empyectomy and right middle and lower lobe wedge resection was performed. A review of the specimen by pathology revealed a right middle and lower lobe resection with focally organizing acute pneumonia with abscess formation and focal necrosis with foreign body giant cell reaction present.

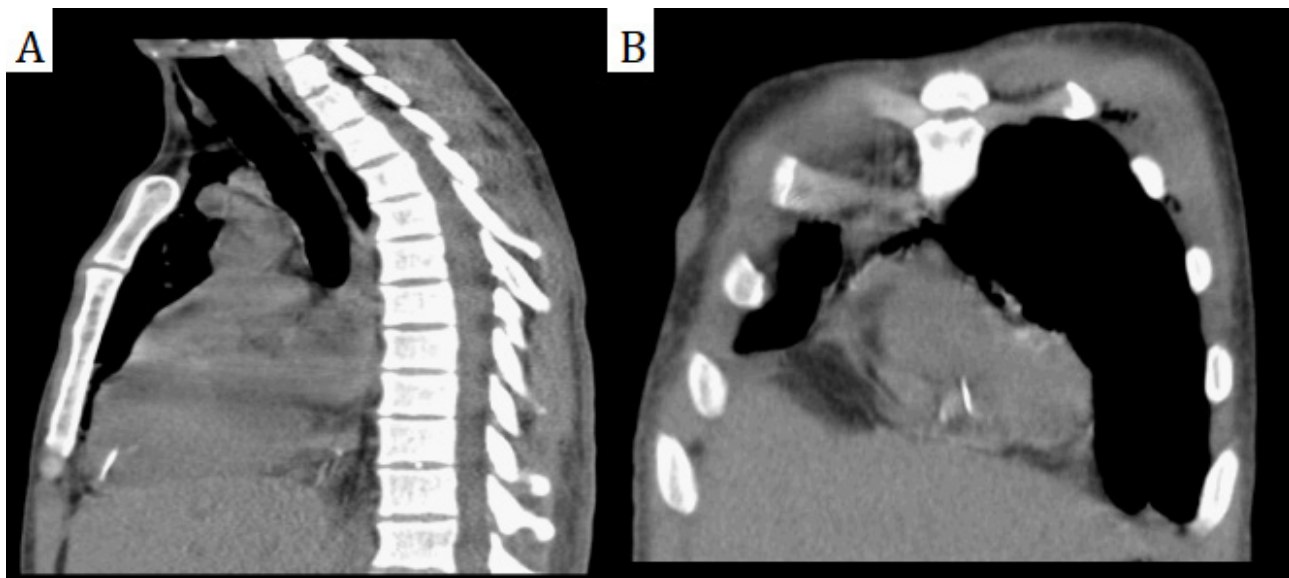


Figure 1 (A) Sagittal view of CT of the chest with metallic fragment in at apex of heart. (B) Coronal view of CT of the chest with metallic fragment seen in right ventricle.

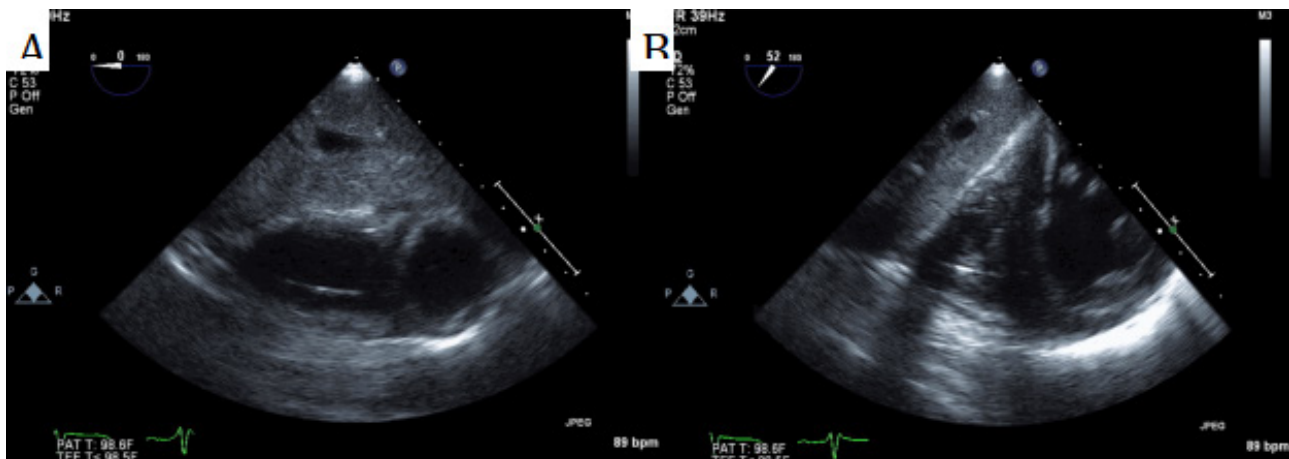


Figure 2 (A) Transesophageal echocardiogram transgastric view of metallic fragment in the right ventricle at the end of diastole. (B) Transesophageal echocardiogram transgastric view of metallic fragment in the right ventricle projecting towards the interventricular septum during systole.

Despite infectious disease management with broad spectrum antibiotics, the patient continued to have persistent fevers and there was ongoing concern for infective endocarditis given the patient's clinical history. A transesophageal echocardiogram (TEE) was performed and revealed a linear metallic echodensity in the inferior aspect of the right ventricle near the apex and extending into the septum and lateral free wall (Figure 2). There were no valvular vegetations identified. Given these significant findings, a cardiothoracic surgery consultation from a tertiary care center was obtained. Due to the location of the retained needle fragment and the risk of migration, a consensus for conservative management was decided. The patient was ultimately discharged from the hospital to an acute rehabilitation facility in stable condition and remained on intravenous antibiotic therapy of cefepime for 6 weeks. He was lost to follow-up after his stay at the rehabilitation facility.

## DISCUSSION

Despite the consistently rising number of intravenous drug abusers worldwide, needle embolism remains an infrequently reported complication<sup>[3]</sup>. Generally, the needle will remain in the skin and subcutaneous tissue causing localized infection. In rare instances, central embolization of the needle fragment can occur which can result in many life threatening complications including but not limited to cardiac perforation, infective endocarditis, pericarditis, arrhythmias, acute or spontaneous pneumothorax, septic pulmonary emboli, and abscess formation<sup>[1]</sup>. Patients often do not recall breaking off a needle fragment, and symptoms may not present themselves for days to weeks to months after the inciting event<sup>[5,11]</sup>. Unfortunately, the true incidence is likely unknown as many of these cases may actually be underdiagnosed as needle fragment localization on traditional chest x-ray and echocardiogram is particularly difficult as demonstrated in this case<sup>[3,7,12]</sup>. A cross-sectional survey was done which reported that 20% of intravenous drug abusers participating in that survey had experienced a broken needle while using drugs<sup>[9]</sup>. This raises the concern that it is possible that central needle embolization occurs more often than is clinically detected.

It is important to consider an intravascular foreign body in patients who present with a history of IVDU with persistent bacteremia, infective endocarditis, or generalized sepsis<sup>[3]</sup>. Intravenous drug abusers with blood culture positive endocarditis typically speciate as staphylococcus aureus and presents with vegetations on right sided heart valves. Given this clinical synopsis, this specific patient population with a retained intracardiac needle fragment is a nidus for recurrent bacterial endocarditis, and infection of the specific retained object<sup>[8]</sup>.

Management of retained cardiac foreign bodies is controversial and no clear guidelines exist to date. However, in anticipation of complications most physicians are inclined to recommend retrieval and removal of the foreign body. Generally, however, after risk stratification a conservative approach is typically favored given the high mortality risk associated with open cardiac surgery for removal of the foreign body<sup>[4,5]</sup>. In a case review of patients with central embolization of foreign bodies, morality associated with untreated foreign bodies was greater than 30% with the highest degree of mortality associated with foreign bodies located in the right heart<sup>[2]</sup>. Furthermore, the potential risk of transmigration through the right ventricular wall has also been reported<sup>[8]</sup>. As evidenced by these findings, the risk versus benefit analysis associated with management of foreign body embolization is a clinical dilemma and more studies should be done to compare short and long term outcomes.

Oftentimes, management is driven by multiple factors including

clinical presentation, findings on echocardiogram such as the foreign body being completely embedded in the myocardium, and risk of potential future complications. Previous case reports have described the use of percutaneous retrieval devices, but these are used when the needle fragments are not embedded in the wall of the myocardium as it described in our patient<sup>[10]</sup>. With the limited data that is available in the literature regarding outcomes for patients with central embolization of needle fragments, most patients were managed conservatively without immediate complications. This is attested by the understanding that follow up is extremely unlikely in this patient population and the long term outcomes of these patients are unknown. Unfortunately, our patient did develop serious complications requiring a wedge resection for cavitory lesions secondary to septic embolization likely from the infected retained needle fragment. Many in this patient population are not able to make it into the hospital to seek medical care and are at risk for sequelae of clinical complications, including death.

## CONCLUSION

IVDU continues to pose significant health risks. Not only is the possibility for localized infection and transmission of disease an issue, but potential for embolization of needle fragments from breakage of needles during use is also cause for concern. As evident in this case, central needle embolization is difficult to diagnose for the clinician without a high index of suspicion. However, missing a diagnosis such as this places the vulnerable patient at risk for serious complications. The possibility of central needle embolization should be on the differential diagnosis list when considering a patient with a history of IVDU and persistent bacteremia. The best management of retained intracardiac needles remains debated, but conservative management has generally been reported after risk-benefit analysis. In the future, short and long term outcomes of conservative management versus retrieval of the foreign body should be investigated as IVDU will unfortunately remain a continuous problem worldwide.

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