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Migrating Needle in Right Ventricle Wall With Purulent Tamponade

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Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
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Patient: **Male, 41-year-old**
Final Diagnosis: **Purulent tamponade, endocarditis, retained intramyocardial needle**
Symptoms: **Chest pain, epigastric pain, hematemesis, tachycardia**
Clinical Procedure: —
Specialty: **Cardiac surgery**

Objective: **Unusual clinical course**


Background: Migration of foreign bodies to the right ventricle is a very rare condition, but may lead to a life-threatening state in the patient. Moreover, the presentation of symptoms in such cases may be deceiving.

Case Report: We report the case of a 41-year-old man with a long-standing history of intravenous drug abuse who was admitted with chest and epigastric pain accompanied by hematemesis. Computed tomography demonstrated a pericardial effusion and a thin metallic foreign body embedded in the right ventricular wall. Further history revealed needle breakage during intravenous injection 2 weeks prior to admission. Transthoracic echocardiography showed signs of cardiac tamponade. Due to elevated inflammatory markers, empiric antibiotic therapy was initiated, and the patient was referred for urgent cardiothoracic surgery. Surgical exploration revealed purulent pericardial tamponade and a 20-mm needle fragment embedded in the right ventricular wall, which was successfully removed. Microbiological cultures confirmed methicillin-sensitive *Staphylococcus aureus* infection. Postoperative recovery was uneventful, and inflammatory markers initially normalized under targeted antibiotic therapy.

Conclusions: The presented case illustrates a rare and unexpected complication of intravenous drug abuse. It highlights a rare dual-mechanism pathophysiology: purulent pericardial effusion occurring in the presence of an intramyocardial needle. To date, only a few similar cases have been reported in the literature. No specific symptoms allow for early diagnosis, and completing a proper anamnesis seems to be the most valuable action in such situations.

Keywords: **Pericardial Effusion • Endocarditis • Needles • Cardiac Tamponade**

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Introduction

Migration of foreign bodies into the right ventricle (RV) is a very rare condition, and very dangerous because it leads to a life-threatening risk for the patient. Moreover, the clinical presentation in such cases may be deceiving. The presented case illustrates a rare, and unexpected complication of intravenous drug abuse involving mechanical myocardial injury and secondary infection leading to purulent tamponade.

Case Report

We report a case of a 41-year-old male patient with a long-term history of intravenous drug abuse who was admitted to the Cardiology Department due to persistent chest and epigastric pain (2 days prior to the hospitalization), associated with 2 episodes of hematemesis. The patient's medical history included: long-term intravenous heroin use, 10 years of methadone therapy, untreated hepatitis C, and active smoking.

At the time of admission, the patient was hemodynamically stable, with no fever and a heart rate of 105 beats per minute and normal blood pressure. Cardiac auscultation revealed normal heart sounds without pathological murmurs. Abdominal examination demonstrated a tense and diffusely tender abdomen with marked muscular guarding across all quadrants; however, no peritoneal signs were elicited. Due to the reported symptoms, an abdominal X-ray was performed in the emergency department following surgical consultation, which revealed no radiological signs of perforation or obstruction. A computed tomography (CT) scan of the abdomen revealed fluid in the pericardial sac; up to 22 mm, with a density of approximately 20-30 Hounsfield units. Additionally, a thin, elongated lesion (~12 mm) was observed in the wall of the RV. Streak artifacts on CT were consistent with a metallic foreign body. A detailed medical history was obtained, and the patient reported an incident 2 weeks prior to admission when a needle broke off during intravenous drug injection into the right femoral vein. At the time, he assumed that the needle must have fallen on the floor. Subsequent transthoracic echocardiography (TTE) did not visualize the foreign body or evidence of active bleeding, but it revealed typical features of cardiac tamponade: systolic right atrial collapse and a plethoric inferior vena cava with minimal respiratory variation.

Contrast-enhanced cardiac CT scan (**Figure 1**) was performed to rule out active blood extravasation into the pericardial sac. Due to elevated inflammatory markers [C-reactive protein (CRP) 113 mg/L; N<5.0], blood cultures were obtained and empiric antibiotic therapy was initiated with cloxacillin and linezolid. The patient was transferred to the Cardiothoracic Surgery Department within 24 hours. After opening the pericardium,

purulent fluid was evacuated. The patient was placed on cardiopulmonary bypass, the heart was arrested, and the RV and tricuspid valve were inspected. A 20-mm needle fragment was found and successfully removed from the RV wall. Blood and pericardial fluid bacterial cultures confirmed methicillin-sensitive *Staphylococcus aureus* infection.

The postoperative course was uneventful, and after 6 days the patient was transferred back to the Cardiology Department, where intravenous antibiotic therapy was continued. Antibiotic therapy was changed to rifampicin, because of its better tissue penetration, in the second week of treatment. Clinical improvement was observed along with a decrease in inflammatory markers (CRP 13 mg/L). In the third week of hospitalization, however, an increase in procalcitonin (4.7 ng/ml; N<2.0) and CRP (65 mg/L) levels without any symptoms of clinical deterioration were observed. Blood cultures were obtained but were negative; also, a CT scan of the thorax and neck in venous phase was performed. A suspicion of thrombus or vegetation on the central venous catheter was raised based on radiological assessment. The intravenous catheter was removed and its tip was sent to the microbiology lab for diagnosis, where *Candida glabrata*, 6 CFU, was identified. Blood inflammatory markers normalized within 1 week of catheter removal. A midline catheter was conducted into his left brachial vein. Control TTE revealed a small pericardial effusion (6-8 mm) and RV systolic dysfunction; however, no further intervention was required. The patient was discharged on his own request before the end of the scheduled medical treatment. Nine months later, the patient was readmitted to the emergency room (ER) due to another instance of intravenous morphine abuse with overdosing. He departed the ER without notifying the personnel.

Discussion

The presented case illustrates a rare and unexpected complication of intravenous drug abuse. To date, there have been only a few cases reported needle embedded in the heart in the literature [1-5]. Although embolized needles can lodge in various cardiac chambers, right-sided involvement is most commonly described, occasionally leading to life-threatening complications [6]. Some cases of needle embolism to the heart resulting in pericardial effusion or cardiac tamponade require surgical intervention for definitive management [7]. Additionally, the presence of purulent effusion with a needle in the heart muscle is extremely rare and to date has been reported only once [8]. No specific symptoms allow for early diagnosis; completing a proper anamnesis seems to be the most valuable course of action in such situations. Once a foreign body in the heart is suspected, 2 main diagnostic tools can be applied: conventional echocardiography, which is a common and simple method

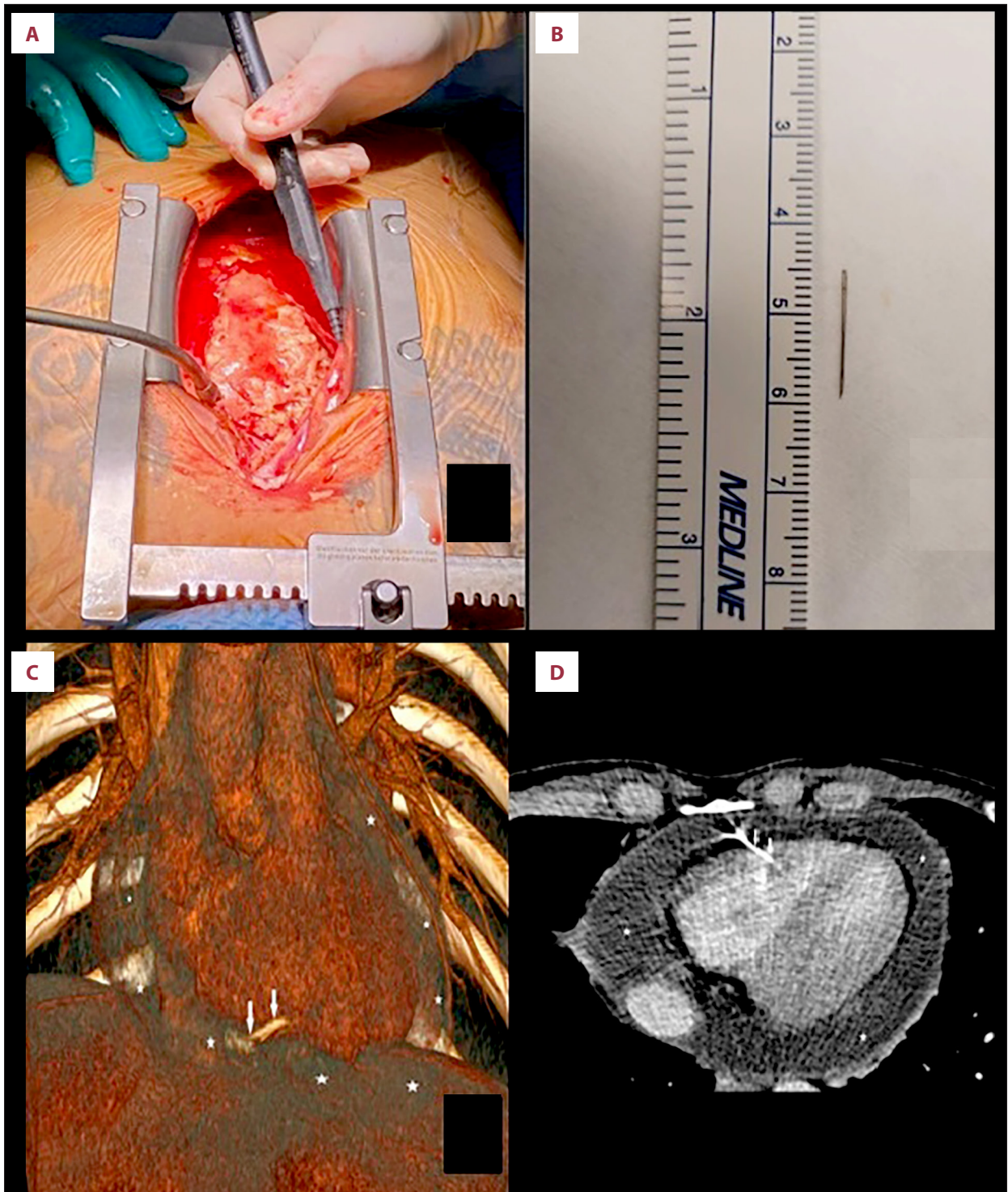


Figure 1. Needle in the wall of the right ventricle. Photograph taken during surgery presenting the purulent pericarditis (A) and the needle after removal (B). Computed tomography of the chest with signs of pericardial effusion (star signs *) and the needle in the right ventricle wall (arrows) (C, D).

that may confirm or rule out cardiac tamponade, and CT, which is more precise and can identify the type and location of the object. Although these modalities are complementary, echocardiography is usually the first-line investigation due to its availability and bedside use. The main disadvantage of TTE is the fact that small objects can be easily missed. Additionally, advanced echocardiographic techniques may provide diagnostic value in the evaluation of intracardiac foreign bodies. In particular, tissue Doppler imaging (TDI) has been shown to facilitate differentiation between intracardiac masses and adjacent myocardial structures by assessing their motion characteristics and velocity profiles. Previous studies have demonstrated that pathological structures exhibit distinct motion patterns compared with normal myocardium, which may improve diagnostic accuracy when conventional echocardiography is inconclusive [9]. Furthermore, recent data suggest that color and pulsed-wave TDI can enhance the characterization of small or mobile intracardiac structures, allowing for better distinction between true pathological findings and artifacts or pseudomasses [10]. Although these techniques were not applied in our case, their potential utility should be acknowledged, particularly in diagnostically challenging scenarios.

The treatment involves the surgical removal of the foreign body, antibiotic therapy, and management of possible complications. The management of intracardiac needle embolism depends on the clinical presentation, which can be highly variable, and the risk of complications such as cardiac perforation, infective endocarditis, tamponade, and cardiac arrhythmias. Surgical removal is generally recommended, especially if the needle is mobile, partially embedded, or associated with infection. Percutaneous retrieval methods have evolved as minimally invasive alternatives when feasible. However, in asymptomatic cases where the needle is completely embedded in the myocardium or pericardium, conservative management may be considered.

An antibacterial drug regimen should be carefully considered and a primary concern is drug activity versus *S. aureus*, although drug-drug interactions were also important in our case, due to concomitant chronic treatment with methadone. Our patient was an active participant of the methadone maintenance treatment program (MMTP) (about 10 years of participation) when the incident happened. After consulting the attending physician of the abovementioned MMTP, methadone in the form of oral solution was continued. Rifampicin is a potent CYP3A4 inductor, that could in turn potentially disrupt settled chronic methadone treatment. In this case no significant changes to dosage and drug schedule were indeed required.

Purulent pericardial tamponade is a rare but life-threatening entity. In our case, the unusual finding of a needle within the

myocardial wall represented both a mechanical and infectious trigger of tamponade. While purulent pericarditis secondary to injection drug use has been described [8], the concomitant presence of a foreign body directly embedded in the cardiac wall is exceptionally uncommon.

Migrating and embolized needles in intravenous drug users have been reported to cause a wide spectrum of cardiac complications, ranging from endocarditis [5] to myocardial perforation [11] and tamponade [12]. Several case reports have highlighted that the needles can migrate unpredictably within the vasculature and eventually lodge in the heart [13-15]. However, their role as the origin for purulent pericarditis has been scarcely documented.

The pathophysiology in our case involved a dual mechanism: (1) direct myocardial injury by the retained foreign body, and (2) bacterial growth in the pericardial space, resulting in purulent effusion. This dual-hit scenario is consistent with previously reported mechanisms, in which foreign bodies act as both physical disruptors and infectious foci [5,14].

Diagnostic evaluation remains challenging. While echocardiography readily identifies hemodynamically significant pericardial effusion, it may not always reveal embedded foreign bodies. Multimodality imaging, including CT, has been described in similar reports as essential to confirm the presence and location of needles within the cardiac structures [13,15].

Therapeutic management requires a tailored approach. Pericardiocentesis alone, although lifesaving in acute tamponade, would not have been sufficient in our case, as the retained needle posed a continuing risk for infection and recurrence. Surgical exploration and removal of the foreign body, combined with antimicrobial therapy, provided definitive treatment.

Conclusions

In conclusion, our case illustrates an extremely rare association between purulent tamponade and a retained intramyocardial needle. Clinicians should maintain a high index of suspicion for foreign body complications in intravenous drug users presenting with pericardial disease. Prompt multimodality imaging, early surgical intervention, and targeted antibiotic therapy are crucial to improve outcomes.

Department and Institution Where Work Was Done

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Patient Permission/Consent Declarations

The authors hereby certify that the patient provided consent for the publication of the article describing his clinical case.

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