

Needle Embolism To The Heart: A Case Report and Review

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Abstract

Needle embolisms in the heart are quite rare and their management is largely based on clinical experience. We describe a patient with chest pain, shortness of breath and EKG demonstrating subtle inferolateral ST elevations found to have a bloody pericardial effusion causing tamponade from a long-ago injected needle.

Introduction

Needle fragment embolization occurs in IV drug users when a piece of the IV needle breaks and escapes into the systemic vasculature. In a retrospective study done by Norfolk et al looking at 70 IV drug users, 20% of the subjects reported a history of broken needle fragments during drug use.(1) Although there are multiple reports of needle embolization related to various etiologies including acupuncture, self-inflicted injury, trauma etc, needle fragment embolization to the heart in the IV drug user population has been rarely reported.(2,3). In this case report, we describe a case of needle embolism to the heart in a 28 year old IV drug user and review the existing literature on similar cases.

Case report:

A 28-year-old male presented with acute pressure-like chest pain and dyspnea that began suddenly the night prior to arrival after using crystal methamphetamine, with no aggravating or alleviating factors and no other associated symptoms. On physical examination patient was afebrile 36.5°C, tachycardic ranging 115-125, with a respiratory rate 18-30, and blood pressure ranging wildly from 131/117 at highest to below 90/60. Patient was anxious, in acute distress, diaphoretic with distant heart sounds, and rapid faint distal pulses. The patient had known history of metabolic syndrome, untreated hepatitis C, and intravenous drug abuse with methamphetamines and heroin. He had two needles break off into his right arm 2 years prior to this event. He was taking suboxone for drug abuse. He had no prior surgeries or other known medical conditions.

Initial troponin was normal (<0.012 ng/mL), Initial CXR was unrevealing. EKG in ED demonstrated subtle ST elevations in the inferolateral leads which led to a concern for STEMI, so a right and left coronary angiogram and left ventriculogram were performed with multiple views taken. **See figures 1-5.** These demonstrated normal coronary anatomy with mild atherosclerosis, an EF of 55%, and mild inferior hypokinesis. It appeared as if there was a foreign body inside the heart and so a stat CT scan was ordered to rule this

out, and an echocardiogram was obtained to rule out tamponade. **See figures 6-8.** CT scan confirmed presence of needle in the right ventricle, and echocardiogram confirmed presence of tamponade with partial right ventricle diastolic collapse.

Given sudden hypotension and tachycardia, the patient was given rapid intravenous fluids to temporize blood pressure while being rushed to the operating room where an emergent median sternotomy was performed. During this procedure 500 ml of fluid was drained from within the pericardial sac. Upon exploration of the mediastinum a needle was found in the fibrous scarring of the right ventricular epicardium (**Figure 9**). The needle had burrowed through the right ventricular cavity to the outer surface of the right ventricular epicardium. A second needle was not found; thus, the pericardial sac was copiously irrigated, three chest tubes were placed, and the sternum was closed. The patient was then placed on cefuroxime for 48 hours for concern for possible endocarditis, but given normal white blood cell count, lack of fever, improving chest pain, and negative blood cultures at 48 hours, infectious disease consult deemed it ok to stop antibiotics. A CT of the RUE and chest were obtained to confirm that there was not a second needle in the heart. RUE CT demonstrated a needle within the antecubital fossa that was stable and not damaging nearby structures, given this it was decided to not remove the needle and observe as outpatient. The three chest tubes drained an additional 500 ml of fluid before being removed and patient was discharged with close follow up on post-operative day 4 after an uneventful post-operative course. Follow up chest x-ray at one week and one month did not show any significant acute findings. Patient followed up in surgery clinic one month after discharge and did not have any acute concerns.

Discussion:

After an extensive literature search, we found 12 case reports describing cardiac embolization of needle fragments in IV drug users between 1988-2019.(3-14) Characteristics of these case reports including chief complaint, cardiac complications and type of interventions performed are noted in Table 1. Considering the number of IV drug users and reported frequency of broken needle fragments by this population, the low number of case reports of needle embolization to the heart in this population is surprising. This could be due to multiple factors, reluctance of this population to get medical attention, misdiagnosis considering the asymptomatic nature in many cases etc. In IV drug users presenting to the health care setting with chest pain, dyspnea etc, special attention must be paid to the possibility of needle embolization to the heart.

Here we have a very rare case of accidental needle loss in a patient's arm which then embolized to his myocardium and pericardium through his venous system. Even more surprising is the fact that this patient did not suffer from cardiac infection after the introduction of the Foreign body. However as noted in other similar case reports in table 1, these needles can be surprisingly well tolerated without symptoms for years, and do not always need to be removed as long as the patient is asymptomatic, there is no ongoing damage to surrounding structures, and with close follow-up and imaging on an as needed basis. There are currently no guidelines for the treatment of such patients, and their lack of removal can lead to complications such as cardiac tamponade, infections, embolisms, or arrhythmias which need to be considered during your medical decision to not operate on these patients. This patient was unstable with signs of cardiac strain, severe angina and dyspnea, thus it was decided the benefits of exploratory sternotomy outweighed the risks and patient tolerated the procedure well with good outcomes and removal of the needle in his heart. Thus, it is the authors opinion that close consideration of risks and benefits of major surgical procedures should be considered in such patients and they should be treated in a multi-disciplinary manner with close follow-up, including: cardiovascular surgery, cardiology, infectious disease, internal medicine, psychiatry, wound care, and drug abuse rehabilitation as necessary.

Conclusions:

This case illustrates the importance to include needle embolization to the heart as a potential differential diagnosis in a patient with past or current drug abuse presenting with angina or dyspnea. It also highlights the lack of guidelines and discusses key considerations in withholding treatment in asymptomatic patients,

as well as treatment considerations in a symptomatic patient (e.g. possible cardiac tamponade, infections, embolisms, or arrhythmias) including sternotomy with exploration of the mediastinal cavity.

Legends

Figure 1: EKG on arrival

Figure 2-4: Angiography showing evidence of needle.

Figure 5: Angiogram showing evidence of pericardial effusion

Figure 6-7: CT scan showing evidence of needle

Figure 8: Echo showing evidence of pericardial effusion

Figure 9: Needle visible during open sternotomy.

Author contribution statement:

Every author listed contributed to our work in a substantial manner. Each author's contribution is as listed.

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3) Final approval of the manuscript submitted: Dr.Mini Sivadasan, Dr.Nikhil Nalluri

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Figure 1: EKG on arrival.

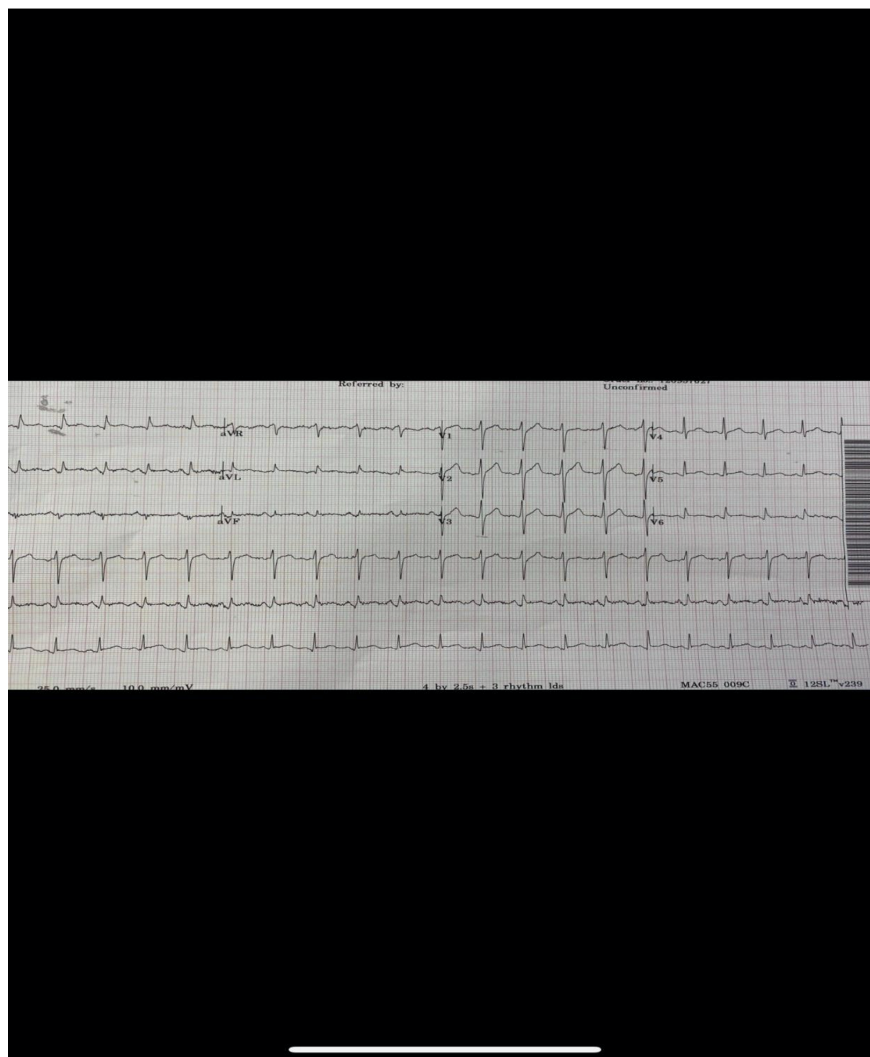


Figure 2.

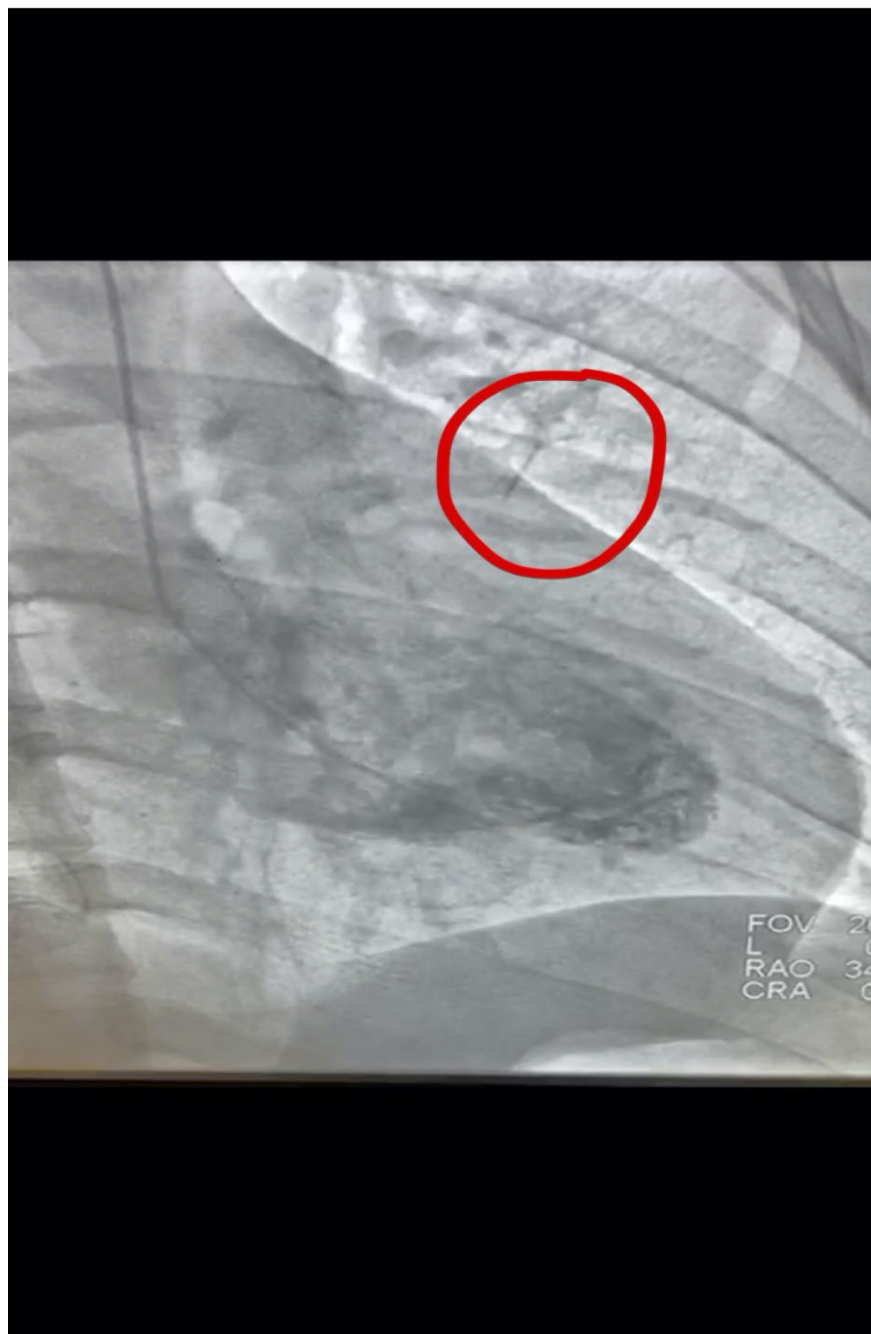


Figure 3.



Figure 4.



Figure 5:

Left ventriculogram showing evidence of pericardial effusion

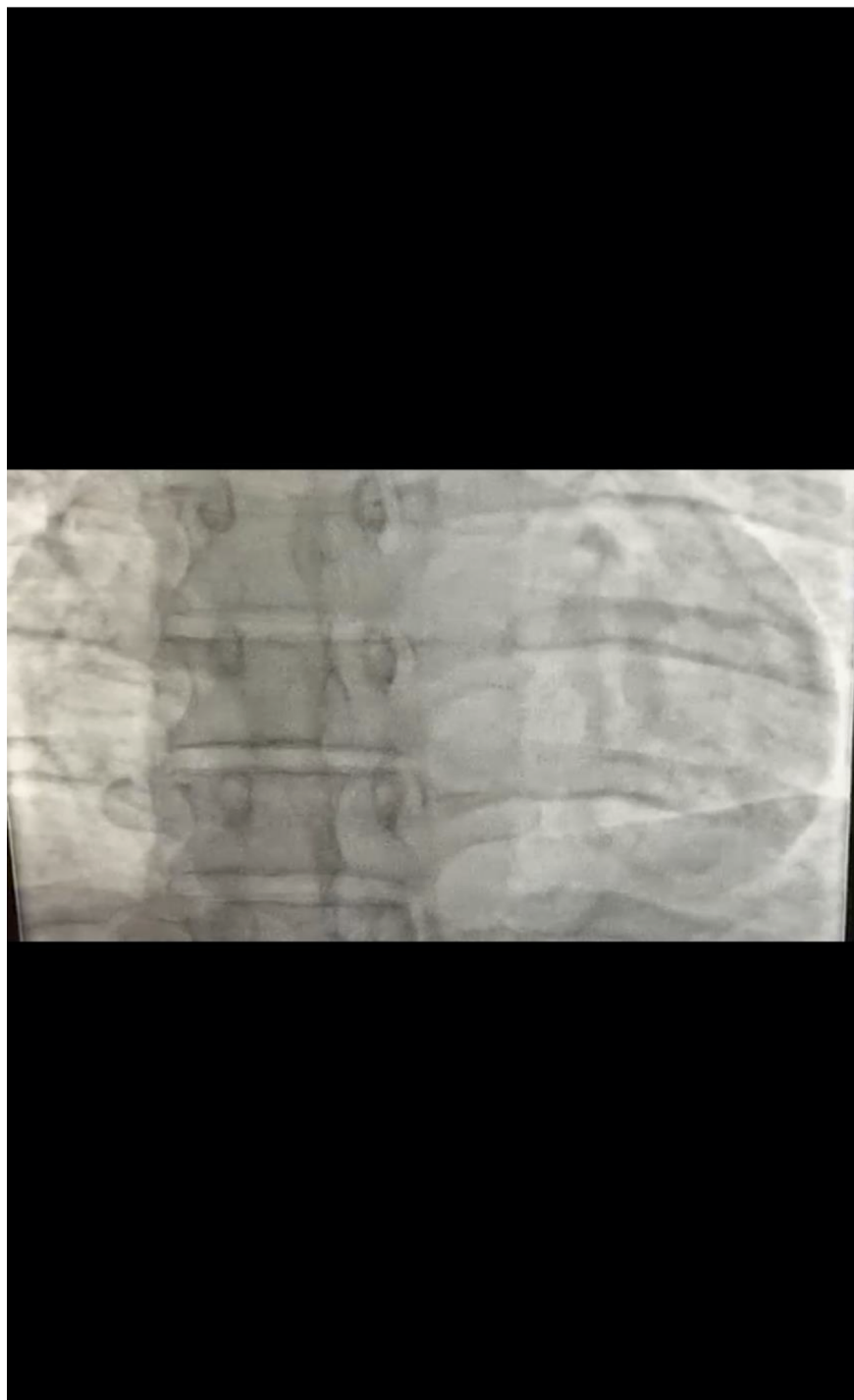


Figure 6

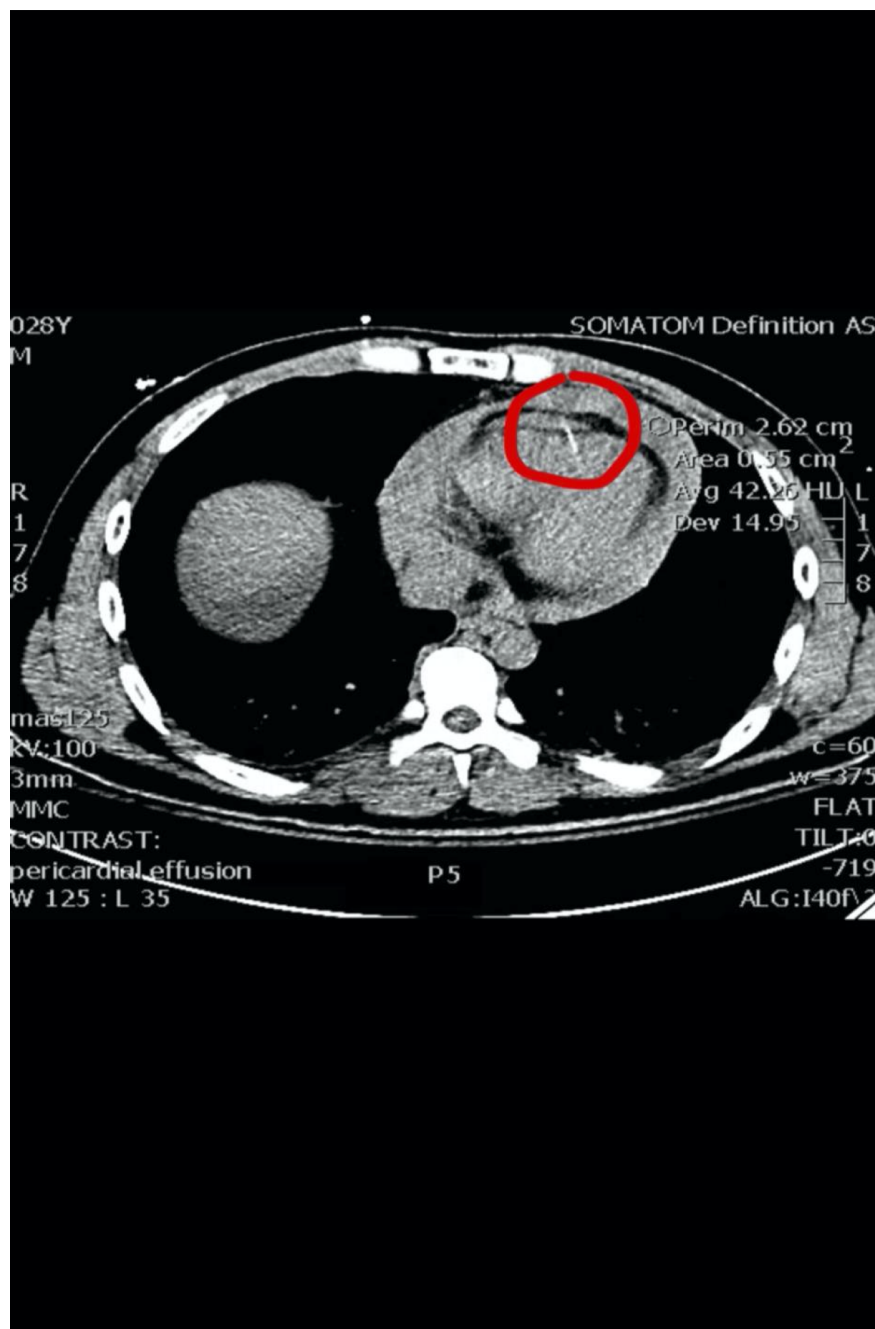


Figure 7.

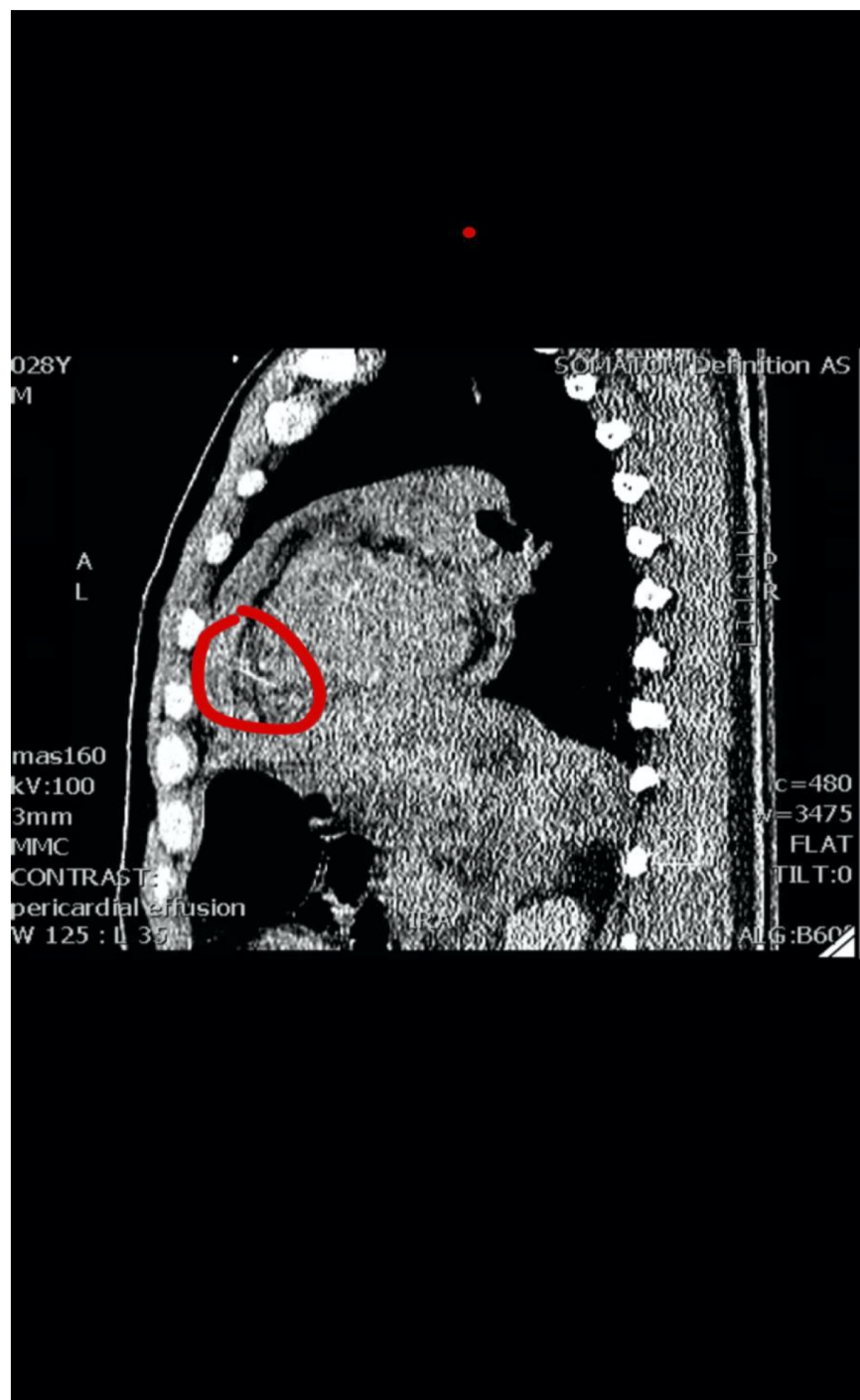


Figure 8: Echocardiogram showing evidence of pericardial effusion.

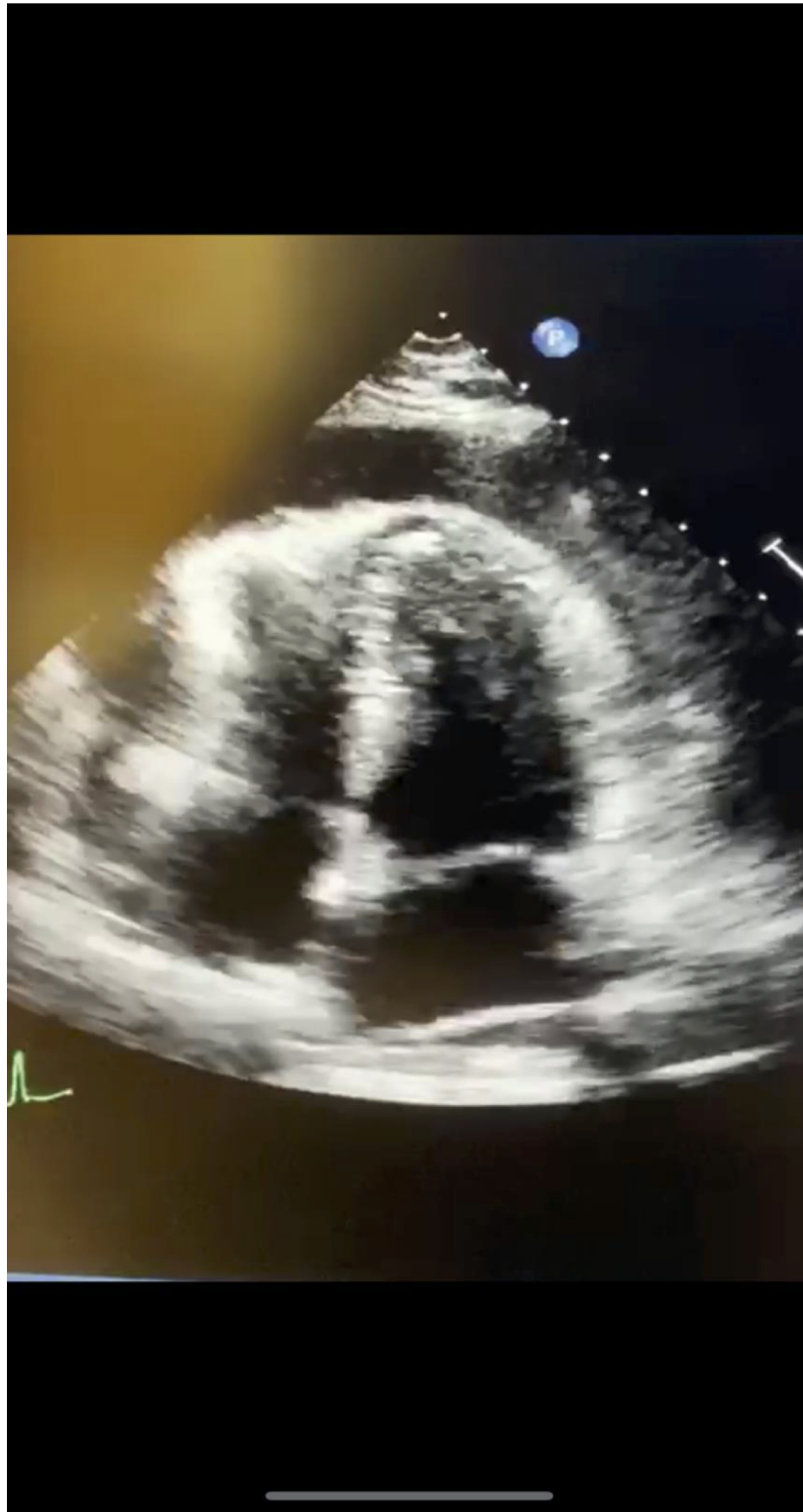
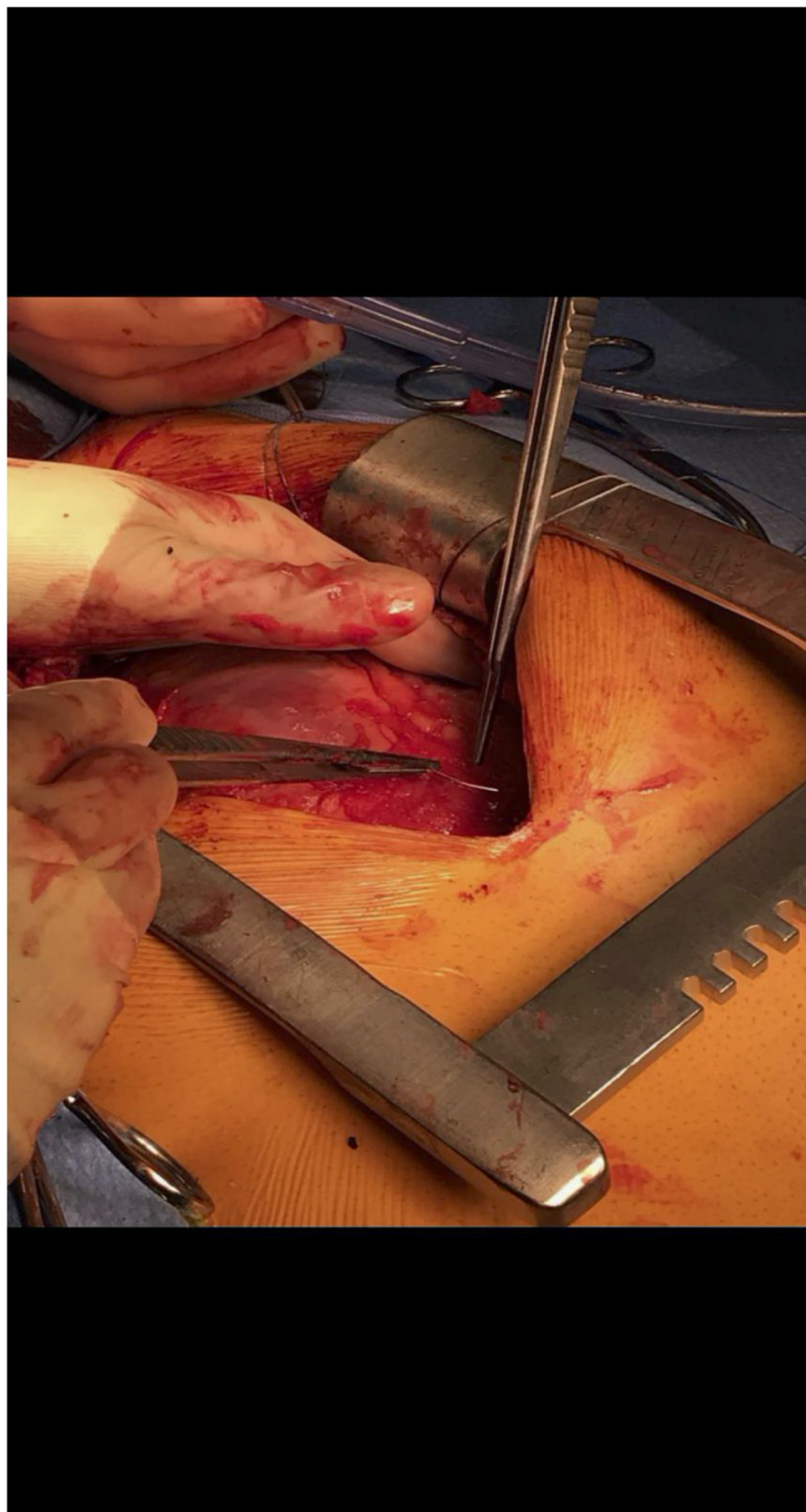


Figure 9: Needle visible during open sternotomy.



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