

CASE REPORT

Leigh B. Thorne,¹ M.D. and Kim A. Collins,¹ M.D.

Speedballing with Needle Embolization: Case Study and Review of the Literature*

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ABSTRACT: Foreign-body embolization is not an uncommon occurrence. However, to our knowledge, there are only ten reported cases of needle embolization associated with intravenous drug use.

We report the sudden death of a 49-year-old white male with a known history of crack cocaine abuse. At autopsy, suspicious needle marks were noted on the right lower extremity. The lungs were of increased weight at 1000 and 1090 g and appeared edematous. The heart weighed 520 g and had a normal red-brown myocardium. Upon sectioning, a broken hypodermic needle of very small caliber was identified in the right ventricular myocardium protruding into the right ventricular chamber. This needle apparently traveled from the injection site to the right ventricle. The right ventricle was dilated and hypertrophied, and microscopic examination showed hyperemic myocardium surrounding the needle. Sections of lung showed numerous foreign-body type giant cells containing polarizable foreign material consistent with intravenous drug use. Toxicological analysis revealed the presence of ethanol (36 mg/dL), cocaine (0.098 mg/L), benzoylecgonine (2.16 mg/L), and morphine (0.841 mg/L). Urine and blood were positive for the presence of 6-monoacetylmorphine. Based on the toxicological analysis, the cause of death was determined to be cocaine and heroin toxicity, and the manner accidental. The needle embolus was considered an incidental finding.

KEYWORDS: forensic science, forensic pathology, heroin, cocaine, needle embolization, embolization, death

Cocaine and heroin are the two most commonly used illegal drugs today. Whether used individually or together (speedballing), there are numerous medical complications potentially affecting all organ systems. An uncommon complication, as we report in this case, is embolization of the hypodermic needle from the site of injection to the heart or lungs.

Case Report

The decedant is a 49-year-old white male with a known history of crack cocaine abuse who was found cool and unresponsive in

¹ Department of Pathology and Laboratory Medicine, Medical University of South Carolina, Charleston, SC 29425.

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his bed by his wife at approximately 2:30 AM. The wife states that her husband went to bed between 10:30 and 11:00 PM and had no complaints at the time. After finding her husband unresponsive, the wife called her father, who then notified the police and paramedics. After arriving at the scene at approximately 3:16 AM, paramedics noted questionable needle marks on the right leg, in the region of the lateral calf.

Autopsy Findings

External examination revealed cyanosis of the neck, shoulder, and face. The sclerae and conjunctivae were hyperemic bilaterally. Dentition was poor. The coroner had drawn blood in the left antecubital fossa, leaving a single puncture wound. On examination of the lower extremities, four small punctate lesions, suspected needle marks, were identified on the right lateral calf. The marks were arranged linearly and perpendicular to the long axis of the leg.

On internal examination the heart was large, weighing 520 g, and had a normal red-brown myocardium. The left anterior descending coronary artery contained an atherosclerotic plaque occluding approximately 75% of the vessel lumen. The remaining coronary arteries were unremarkable. A single atherosclerotic plaque was also noted in the aortic arch. Sectioning of the heart revealed right ventricular dilatation and hypertrophy. A broken hypodermic needle was identified within the lateral (anteseptal) aspect of the right ventricular wall (Fig. 1). The needle was of small caliber, measuring 1.37 cm (0.54 in.) in length and 0.05 cm (0.02 in.) in diameter with a beveled edge at one end, consistent with a 27 gauge, 1.27 cm (one-half-inch) insulin syringe needle. It most likely fractured at the site where the needle arises from the plastic syringe. The surrounding myocardium was slightly hyperemic. Histologic sections of myocardium showed barrel-shaped hyperchromatic nuclei consistent with hypertrophy.

The lungs were hyperemic and edematous weighing 1000 and 1090 g. Histologic sections showed numerous foreign body type giant cells, many of which contained polarizable material consistent with drug abuse. The liver was enlarged weighing 3380 g. Steatosis was seen microscopically. Tissue from the right calf in the area of the punctate lesions was unremarkable. The remaining organs were unremarkable.

Toxicological analysis of blood obtained from the aorta at autopsy showed the presence of ethanol (36 mg/dL), cocaine (0.098 mg/L), benzoylecgonine (2.16 mg/L), morphine (0.841 mg/L), and 6-monoacetylmorphine (not quantitated). In addition to the above

drugs (with the exception of ethanol), acetaminophen, caffeine, nicotine and cimetidine were also detected in urine.

Discussion

The complications associated with drug abuse are numerous and affect the abuser’s physical, mental, and social functioning. The case presented here is not unusual—a polydrug user who died at a relatively young age from accidental overdose. What is unusual is the autopsy finding of a small caliber hypodermic needle fragment lodged in the user’s right ventricle.

In cases of intravenous drug use, peripheral (axilla, antecubital fossa/arm, and groin) injection sites are most commonly used versus central venous access. With repeated use, peripheral veins become sclerotic. The substance abuser then resorts to central venous access sites. In this particular case, punctate lesions, most likely needle marks, were noted on the right lower lateral leg.

Foreign body embolization, particularly to the heart, is not uncommon. Migration of intravenous catheters, bullets, and Greenfield filters, to name a few sources, have been reported in the literature (1–3). To date, there are only ten reported cases of needle embolization associated with intravenous drug use (Table 1). The

time between injection with needle fragmentation and presentation to a hospital varied. In several cases the patient was asymptomatic with the exception of some tenderness or erythema at the injection site but was concerned because the needle broke. Others presented to the emergency room with cellulitis or septic emboli. Needle fragments seen on radiographic examination were essentially incidental findings. Only one patient developed complications secondary to the embolized needle (9). This patient was initially asymptomatic but returned within nine days with pericarditis. The needle fragment was retrieved (by the time of surgery, the needle had migrated from the right ventricle into the pericardial sac) and the patient recovered. With the exception of the latter case, no other patients developed major complications secondary to the embolized needle fragments. However, follow-up was limited. One patient was seen three years later and was doing well.

In our case, the needle fragment discovered in the right ventricle is most likely an incidental finding and did not contribute to death. This is supported by the previously reported cases in which most of the drug abusers fared well without attempts at needle retrieval. Additionally, in our limited case history there was no report of physical complaints by the decedant prior to death.

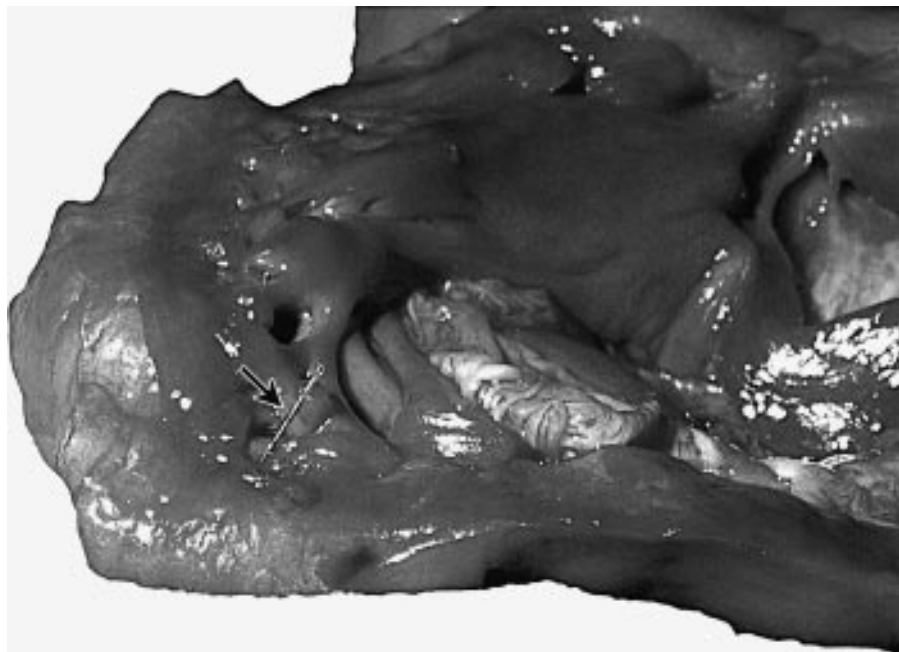


FIG. 1—Needle fragment lodged in right ventricle.

TABLE 1—Needle embolization and patient followup (Adapted from Ref 12).

Reference	Injection Site	Site of Embolus	Needle-related Symptoms	Needle Retrieved	Stable Follow-up
Lewis (4)	AC fossa	R. Lung	None	No	2 yr
Angelos (5)	Femoral Int. Jugular ?AC fossa	R. lung ? L. lung	Septic Emboli	No	1yr
Galdun (6)	Supraclavicular Arms, legs	R. lung	None	No	No follow-up
Horattas (7)	Central venous Axilla Periph. veins	R. lung Heart	None	No	1 month
Brunette (8)	Antecubital	R. lung	None	No	One year
Brunette (8)	Arm	R. lung	Cellulitis	No	2 weeks
Gyrtrup (9)	Groin	R. Ventricle	Pericarditis	Yes	Lost to follow-up
Hart (10)	AC fossa	L. Lung	None	No	2 months
Stern (11)	AC fossa	R. Ventricle	Tender @ site of injection	No	36 months
Kulaylat (12)	AC fossa	R. lung	Pain, erythema @ injection site	No	10 months

Intravenous drug use is associated with a multitude of medical problems. Taking into account the number of substance abusers in the United States, needle embolization may not be as uncommon as it appears. Based on case reports and the fact that many drug abusers probably avoid hospitals unless critically ill, cases of asymptomatic needle embolization may go undiagnosed.

Needle emboli present therapeutic dilemmas for clinicians, with advocates for and against needle retrieval. Although the needle fragment may not cause acute problems, there is concern for later complications.

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Additional information and reprint requests:
 Leigh B. Thorne, M.D.
 Dept. of Pathology
 Medical University of South Carolina
 171 Ashley Avenue
 Charleston, SC 29425