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Case Report

Unusual intravascular complication of right internal jugular vein catheter piercing the SVC into the pericardium: Case report

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ABSTRACT

Iatrogenic superior vena cava pericardial fistula caused by central venous catheterization is rare but can lead to life-threatening condition. Despite the potential risk of pericardial effusion causing pericardial tamponade, a conservative watch and wait management strategy can be safely adopted if such procedural complication is encountered. Herein, we present a case of an incidental finding of a central venous catheter perforating the wall of the superior vena cava into the pericardium, which probably occurred during injection of intravenous contrast agent on computed tomography pulmonary angiogram study.

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Introduction

Central venous catheterization (CVC) of the internal jugular vein, femoral vein, and subclavian are routinely performed for emergency venous access, fluid resuscitation, drug infusions, and central venous pressure monitoring. Physicians must be aware of the risks and prevention of infectious, thrombotic and mechanical complications that may arise from CVC [1–3]. The internal jugular vein approach is commonly utilized due to easy approach and overall lower risk of life-threatening complications [4–7]. Pericardial effusion with potential cardiac tamponade due to myocardial perforation is

a rare but well-documented complication that is associated with high mortality [8–9]. We report a case of superior vena cava (SVC) pericardial fistula as a result of injection of intravenous contrast agent during CT pulmonary angiogram. The fistula healed spontaneously without any surgical intervention. To our knowledge, only a few reports have been described in the English medical literature.

Case report

A 26-year-old man presented to the emergency department with a sharp right upper quadrant pain radiating to his back

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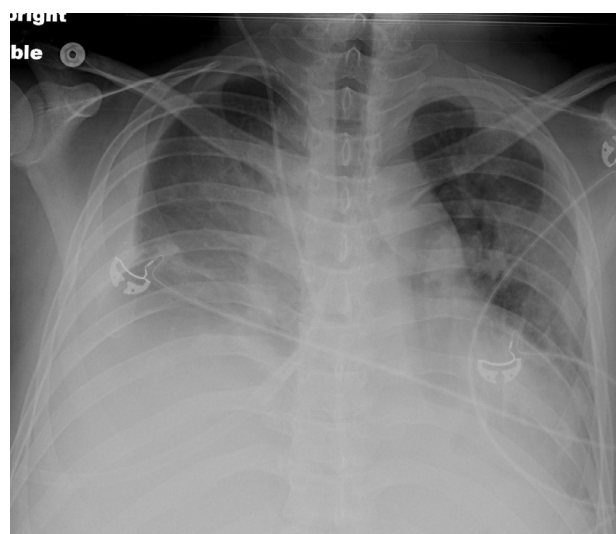


Fig. 1 – Chest radiograph demonstrates right internal jugular central venous catheter terminating in the distal SVC.

that had started the night before his presentation. The patient reported a medical history of short gut syndrome, cholelithiasis, and total parenteral nutrition therapy for last 12 months via right internal jugular central venous catheter. He has had multiple abdominal surgeries including splenectomy, right hemicolectomy, and multiple bowel resection resulting in approximately 50 cm of residual small bowel and colostomy. Physical examination revealed right upper quadrant tenderness with negative Murphy's sign. Chest radiograph was unremarkable, with a right internal jugular central venous catheter in place with its tip projecting over the distal SVC (Fig. 1). An abdominal ultrasound demonstrated gallstones and mild gall bladder wall thickening. After 24 hours of initial presentation the pain was improved on oxycodone and based on normal white count and bilirubin values it was presumed to be a presentation of symptomatic cholelithiasis and not cholecystitis. The patient underwent open cholecystectomy, and the postoperative specimen showed acute cholecystitis with cholelithiasis on biopsy.

The patient developed fever and right upper quadrant (RUQ) pain on postoperative day 6, and he underwent CT abdomen which revealed right hepatic lobe abscess, which was managed by percutaneous drainage. On postoperative day 15 patient developed chest pain and underwent CT pulmonary angiography to rule out pulmonary embolism. 70 cc of Isovue 370 was administered intravenously by a power injector at rate of 4 cc/sec. CT showed the tip of the catheter terminating in the distal SVC. It also revealed a small amount of contrast in the pulmonary artery and aorta, but a large amount of nondiluted contrast present within the pericardial sac including the recesses (Fig. 2a, 2b, 2c). Additionally, there was left upper lobe pneumonia, loculated right hydropneumothorax, and small left pleural effusion. Post processing of the images were performed using Aquarius Intuition software from Terarecon (Fig. 3a, 3b, 3c).

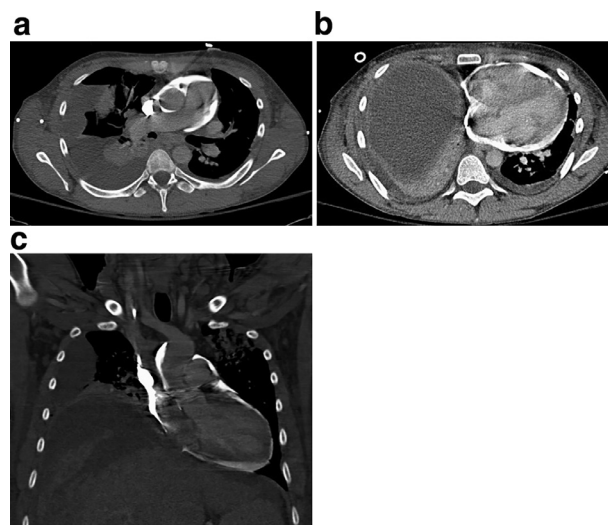


Fig. 2 – CTA chest reveals small amount of contrast in the pulmonary artery and aorta, but a large amount of non-diluted contrast present within the pericardial sac including the recesses.

The patient underwent diagnostic video-assisted thoracoscopic surgery exploration of right chest. Intraoperatively the pericardium was opened, and a significant amount of clear fluid was obtained from the pericardium consistent with intrapericardial injection of contrast material. This was evacuated and a Blake drain was placed in the pericardium. There were multiple pleural adhesions and a loculated pleural effusion. The fluid was evacuated and all loculations were disrupted, circumferentially freeing the patient's right lung. The patient had an uneventful recovery.

Discussion

The incidence and severity of CVC related complications is on the rise due to increased use of central venous lines. Serious complications contribute to morbidity and mortality of sick patients. Mechanical complications of CVC include retained guidewire, arterial injury, and pneumothorax. Duration-associated complications include deep vein thrombosis or pulmonary embolism, and central line-associated bloodstream infections [9–12]. Infectious complications are reported to occur in 5% to 26% of patients, mechanical complications in 5% to 19%, and thrombotic complications in 2% to 26% [1,13]. A recent study by Bell et al. showed no statistically significant difference between internal jugular and subclavian vein approach CVC [12]. A study by Herts et al. demonstrated a 6% complication rate of using power injection of contrast media through central venous catheters for CT examinations [17], without mention of SVC pericardial communication during the injection.

Cardiac complications during catheter placement include arrhythmia and cardiac arrest. Premature atrial and ventricular contractions are the most frequent arrhythmia which

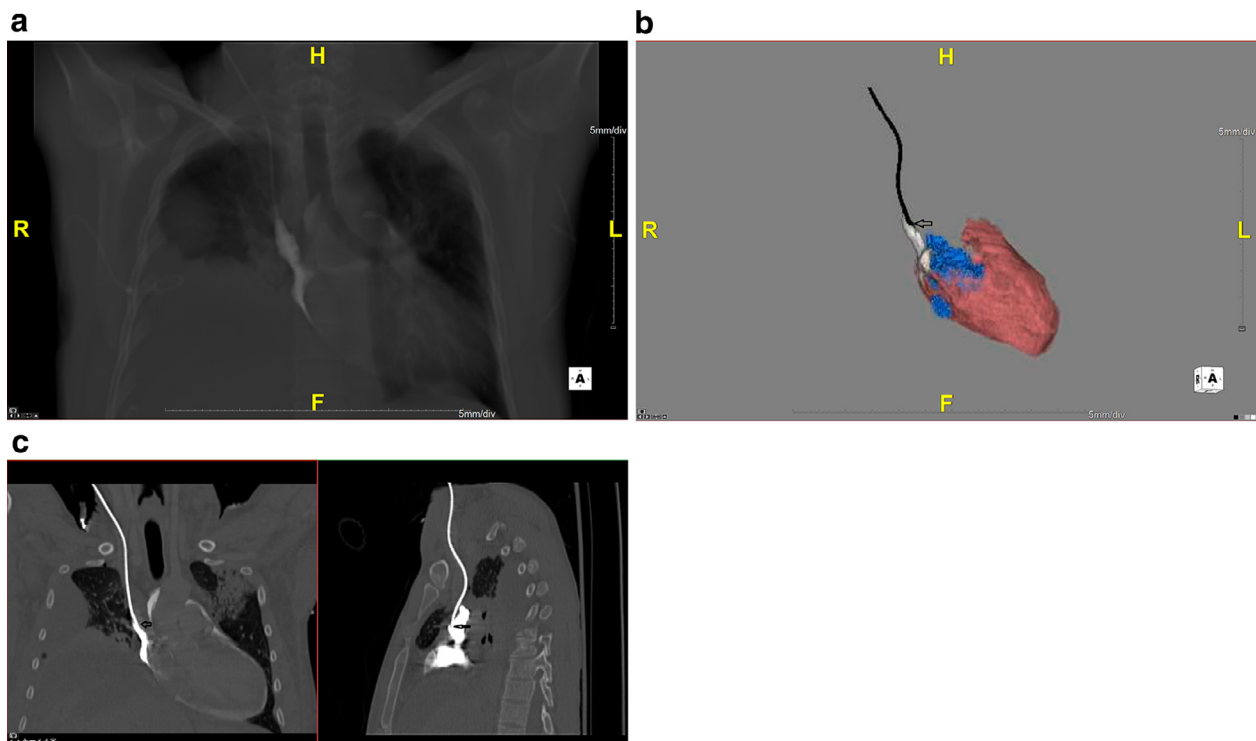


Fig. 3 – Post processed images demonstrate catheter tip terminating in distal SVC.

occur due to contact of guide wire with right atrium. Rare complication of valvular injuries and cardiac arrest has been reported [14]. Another rare but potentially fatal complication is pericardial effusion and cardiac tamponade that occurs due to perforation of the right atrium and right ventricle [8,9,15]. An emergent echocardiogram and life save cardiothoracic surgical intervention is warranted when there is a high clinical suspicion of cardiac tamponade.

Only a few reports of central venous catheter injury resulting in SVC pericardial communication during intravenous contrast agent injection have been described in medical literature. Cathcart-Rake et al. described a case of intrapericardial infusion of 5 fluorouracil caused by a Hickman catheter piercing the SVC wall into the pericardium [16].

In our case, there was a continuous contrast column filling the right internal jugular catheter, distal SVC and the pericardial sac, which is suggestive of communication between the catheter, the SVC, and the pericardial space. However, the distal tip appeared to terminate in the distal SVC. Since the pericardiocentesis revealed clear fluid, it is likely that the communication occurred during intravenous contrast injection during the CTA scan. It is most likely that the right internal jugular catheter has pierced the SVC wall into the pericardium below the level of the pericardial reflection and retracted back; the perforation being partial since some of the contrast is within the vasculature. The intrathoracic infectious process was likely due to hematogenous spread from the gall bladder disease, and not secondary to SVC pericardial communication as there was no evidence of infection in the pericardial space.

Conclusion

We encountered a rare case of central venous catheter perforating the wall of the superior vena cava into the pericardium caused by injection of intravenous contrast agent during a CTA scan. Although in our case it was an incidental finding without contributing to patient's intrathoracic sepsis or causing cardiac compromise, physicians should be aware of potential life-threatening complication of pericardial effusion and pericardial tamponade.

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