

Spontaneous Migration of a Central Line Catheter into the Heart

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Background: Spontaneous migration of central line catheter into the heart is extremely rare complication after initial placement.

Objective: To present two cases with unusual central venous line-related complication.

Design: Retrospective review.

Setting: Surgical and Pediatric Oncology Departments, Salmaniya Medical Complex, Kingdom of Bahrain.

Method: The charts of two patients with spontaneous migration of port-a-cath catheter into the heart presented to the surgical department (between January 2006 to March 2007) were reviewed.

Result: The first patient is 12 years old female, a known case of acute lymphoblastic leukemia (ALL) and Down's syndrome, presented with failure to aspirate the central line after 3 months of port-a-cath catheter insertion. The second patient is 7 years old male, known case of acute lymphoblastic leukemia presented with non-functioning line after 5 months of insertion of port-a-cath catheter. Chest x-rays of both patients confirmed the migration of the catheter into the heart. The catheter in the first case was removed by percutaneous retrieval by loop-snare technique, and in the second case the catheter was removed by open neck surgery.

Conclusion: Spontaneous migration of port-a-cath catheter into the heart is a rare complication. Chest x-ray is essential to provide early detection and management of migrated catheter. Early diagnosis and removal of the catheter is the rule in all cases.

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A central venous access is always necessary for the management of patients with cancer, because it is easier to obtain blood samples and administer chemotherapy drugs, antibiotics, blood products, fluids and nutrition1.

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Central line for chemotherapy could be one of two; one is non-implantable, tunneled, cuffed, catheters such as Hickman-Broviac catheter, and the other is totally implantable central venous access such as port-a-cath catheter^{2,3}.

Port-a-cath systems are widely used for long-term therapy in the treatment of patient with malignancy. Spontaneous migration of port-a-cath catheters after satisfactory initial placement is uncommon and is associated with a number of complications, including neck pain, shoulder pain, ear pain, infection, venous thrombosis, and neurological complications; depending on the location of the detached catheter⁴. Management of migration of the catheter in the heart requires chest x-ray and removal of the catheter⁴. A percutaneous retrieval technique is preferred because it is simple, inexpensive and relatively low-risk.

The aim of this study is to present two cases with migration of port-a-cath catheter into the heart after satisfactory initial placement. We also present a review of the literature for such unusual complication.

CASE ONE

Twelve-year-old girl presented with acute lymphoblastic leukemia (ALL) and Down's syndrome. She underwent surgical placement of port-a-cath catheter via the left internal jugular vein using the open surgical technique. Satisfactory placement of the catheter in the superior vena cava was documented on postoperative chest radiograph (Fig. 1). The patient received courses of chemotherapy following catheter insertion. Three months later and during regular follow-up, the catheter was found not functioning and a chest radiograph showed the injection port chamber was at its original position but the catheter had migrated in the right side of the heart (Fig. 2).



Figure 1: Postoperative chest radiograph shows normal position of port-a-cath catheter in the superior vena cava



Figure 2: Chest radiograph shows the catheter in the right side of the heart as well detachment of the catheter from injection port

Echo study of the heart confirmed the position of the catheter. The patient remained asymptomatic; no further chemotherapeutic agents had been administered. Percutaneous retrieval technique was performed via a right femoral vein puncture and selective catheterization of the right side of the heart via the inferior vena cava was achieved using the loop-snare technique (Fig. 3). The migrated catheter was engaged and removed through the femoral vein. The injection port system was removed under general anesthesia without complication.

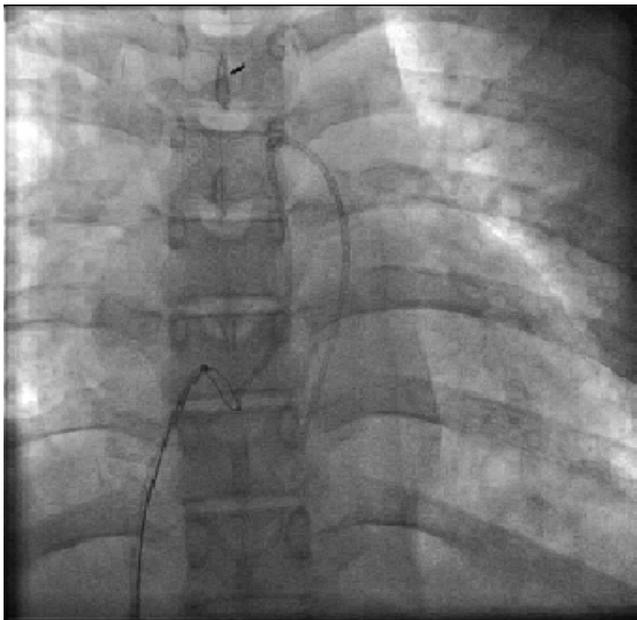


Figure 3: Shows percutaneous retrieval of the migrated catheter by using the loop-snare technique

CASE TWO

Seven-year-old boy presented with ALL. A port-a-cath catheter was inserted via the left cephalic vein using the open surgical technique. A chest radiograph postoperatively confirmed the correct positioning of the catheter. The port-a-cath system was used for courses of chemotherapy. The patient was admitted to the hospital five months after initial insertion for fever, there was withdrawal occlusion and resistance to injection of fluid through the port-a-cath system. A chest radiograph revealed migration of the catheter in the right side of the heart. The patient had been asymptomatic and no further chemotherapeutic agents were infused. The catheter was extracted successfully by open surgery in the neck.

DISCUSSION

The placement of central venous catheter has become an integral part of the management of cancer patients undergoing chemotherapy¹. The possibility of central venous catheter migrating from its position leading to complications, though reported, is still not well recognized by clinicians¹.

The ideal position of the catheter tip is at the superior vena cava at right atrial junction or in the inferior vena cava at the level of the diaphragm⁵. Totally implantable venous devices have been used increasingly in cancer patients since the mid 1980s. However, totally implantable venous devices are not without complications. Early complications include incorrect position, improper anchoring of the reservoir, skin infection, sepsis, vascular perforation with hemothorax or hemorrhagic pericardial effusion and pneumothorax^{1,3}. Late complications include drug extravasation, mechanical malfunction, venous thrombosis, or migration of the catheter^{1,3}. The overall rate of these complications is about 13%^{4,6}. Although rarely reported, catheter fractures and cardiac migration are potentially dangerous complications with estimated frequency of 0.1%⁴. Chia-Lo et al reported three episodes of catheter fractures after implantation of 1000 totally implantable venous devices⁴.

This study reveals the rare complication of port-a-cath central line with an unusual fracture site at the junction of the port chamber and the catheter leading to migration of the catheter into the heart. The two patients were asymptomatic when the catheters were found in the heart on chest radiographs. Both migrated-catheters were uneventfully removed, one by using the percutaneous retrieval technique and the other by using open surgery.

The mechanism of port-a-cath catheter migration is possibly due to improper anchoring of the port chamber at the fixation site near the delto-pectoral groove, or as a result of compression of the catheter with shoulder movements leading to migration of the catheter, which leads to severe cough and vigorous changes of intrathoracic pressure^{4,6}.

The most common symptoms associated with catheter migration include chest wall swelling at the injection port chamber and pain in the shoulder⁷. Other suggestive

features include withdrawal occlusion, resistance to injection of fluid, sudden onset of cough or chest pain, and palpitations^{7,8}. Many patients are asymptomatic probably because the usual site of fragment migration is the right ventricle and pulmonary artery, where there are few sensory endings in the endocardium and vascular endothelium.

The management of catheter fracture includes both prevention and early detection measures^{8,9}. Surgical techniques are important in prevention. The approach using subclavian vein by puncture should be lateral to the midclavicular line as suggested by Cassidy et al¹⁰. The routine open surgery technique for implantation of central line has the advantage that iatrogenic pneumothorax and hemothorax are practically ruled out^{11,12}. Moreover, the injection port chamber should be placed far from shoulder joint and never across the deltopectoral groove¹³. Prevention of fractures may also be accomplished by instructing the patients to minimize heavy physical activities that involve the shoulder. Detection of the migrated catheters is always possible on chest radiographs. Sometimes it is difficult if the catheter is situated within the heart outline. In such cases, two-dimensional echocardiography may play a role in locating the catheter^{14,15}. Once catheter migration has occurred, the fragment should be removed as soon as possible. Subsequent embolization to the right side of the heart or pulmonary artery may result in life-threatening dysrhythmias^{16,17}. To avoid open surgery, the percutaneous retrieval technique is preferred because it is simple, inexpensive and relatively low-risk^{18,19}.

Monitoring with chest radiography helps in early detection. The migrated catheter should be retrieved percutaneously as soon as possible to prevent life-threatening dysrhythmias.

CONCLUSION

Two cases of spontaneous migration of a port-a-cath catheter into the heart had been reviewed and presented. Spontaneous cardiac migration of port-a-cath catheter is a rare complication. The management should be aimed at early detection. Monitoring with chest radiography aids in early detection. The migrated catheter should be retrieved as soon as possible by surgery when it is accessible in the neck or by percutaneous when it is not accessible by neck exposure.

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