

Totally implantable catheter migration and its percutaneous retrieval: case report and review of the literature

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SUMMARY: Totally implantable catheter migration and its percutaneous retrieval: case report and review of the literature.

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Totally subcutaneous intravascular portals have been increasingly used to administer long-term chemotherapy and parental nutrition. The reported complications are rare. Accidental endovascular rupture

of a fragment of catheter is one of the most formidable complications of the central vein catheterization.

The Authors report a case of deployment of a Port-a-Cath catheter and its percutaneous retrieval. The catheter accidentally detached and migrated from the reservoir of the port-a-cath placed in the left subclavian vein to the right heart cavities through the blood stream.

A review of the Literature is also given, focusing on the possible factors responsible for this unusual complication.

KEY WORDS: Catheter dislodgment - Percutaneous catheter's retrieval - Totally implantable catheter.

Introduction

Totally implanted port devices are widely used for infusion of fluids, which must be administered via central vein access, such as parenteral nutrition and chemotherapeutic agents, whose sclerosing action in peripheral vessels is well known.

Totally subcutaneous port system improves the patients' quality of life, by not interfering with their daily activities (1).

There are some possible early and late complications related to the implantation technique, care and maintenance of the port system, which are described in the Literature.

Embolization of central catheter is a rare but potentially serious complication, and when it occurs, an invasive procedure for its prompt removal is needed.

We report a case of distal embolization of a fractured catheter from a Port-a-Cath device into the right car-

diac chambers, and its successful percutaneous retrieval in a patient with advanced gastric cancer.

A review of the Literature is also given, focusing on the possible factors responsible for this unusual complication.

Case report

A 56-year-old female Caucasian patient was admitted to a peripheral hospital for persistent vomiting and pain in the upper abdominal region. A low grade (G3) adenocarcinoma of the stomach with stenosis of the antrum, was diagnosed through endoscopy.

At CT-scan, the disease was defined as stage IV (T3 N2 M1) with massive metastatical invasion of the liver. A Port-a-Cath with a silicone catheter was implanted in the left subclavian vein, and the reservoir was placed in the left infraclavicular region. The patient was admitted at our Institution and a palliative treatment with endoscopic apposition of prosthesis at the gastric antrum was performed, thus permitting oral feeding without vomiting.

Few days later, the patient was addressed to the Oncologist for medical treatment.

After 3 months, the patient was urgently admitted to the Cardiology Unit of our Institution because of new

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onset of non-flushing catheter and a chest X-ray which showed a catheter fracture and distal embolization into the right cardiac atrium and ventricle. The patient was asymptomatic. A prompt removal of the embolized catheter was undertaken under local anesthesia through the femoral vein by an interventional cardiologist using a snare loop.

The patient had uneventful recovery and was addressed to our Institution for removal of the remaining port reservoir under local anesthesia.

Discussion

Totally implantable catheter systems have been used increasingly in Oncology since the mid-1980s (1). They are used to save peripheral veins in patients with chronic medical conditions requiring chemotherapy or parenteral nutrition (2, 3). A reservoir and a catheter compose permanent implanted central catheter systems (e.g. Port-a-Cath). Catheter is placed under local anesthesia in the subclavian vein or, if it is not possible, in the jugular vein, after a short passage along a subcutaneous tunnel. After verifying the correct positioning of the distal catheter's tip in the superior vena cava near the atrium by Roentgenography, the proximal end of the catheter is cut to the required length. The port and the catheter are then connected and locked. The reservoir is fixed under local anesthesia at the pectoral muscle's fascia, generally in the right infraclavicular space. A test puncture is carried out to check flow through the system. Then, the system is filled with heparin solution and perioperative antibiotic prophylaxis is performed. The system receives the therapy by specific needles inserted in the reservoir through the skin.

The use of long term catheters has been associated with early complications, that occur immediately after the implantation, and late complications, related to the use of the catheter. The overall complications rate is about 13% (rare) (4).

Early complications can be related to surgical factors or to clinical conditions of the patient. The former include incorrect positioning of the catheter, improper anchoring of the catheter to the reservoir with early dislocation, skin perforation, vascular perforation with hemothorax or pneumothorax (4). Their incidence reported in the Literature is less than 4,5% (2, 5). The last two complications can be avoided by an ultrasound-guided approach (6). The latter include necrosis of the skin at the port site, infection of the subcutaneous pocket, infection of the port system or of the catheter, catheter thrombosis (7, 8).

Late complications include drug extravasion, mechanical malfunction, venous thrombosis, skin infection, sepsis, catheter disconnection and embolization (8-12).

Migration of the catheter is reported in the Literature in 0,2-8% of the cases (1, 13-17).

The exact etiology of catheter embolization often remains difficult to identify (18). Causes of catheter dislodgment are related to surgical and non-surgical factors. The former include poor connection of the catheter to the port, or inappropriate application of the plastic catheter lock, catheter damage at the site of anastomosis during assembly (18-20), improper catheter positioning (3, 21-23). The latter include forced flushing, upper extremity vigorous movements, neck flexion, congestive heart failure, changing in thoracic pressure with coughing and vomiting, catheter damage by chemotherapeutic drugs, and the so called "pinch-off syndrome" (14, 24-25). Pinch-off syndrome happens when a subclavian catheter passes through a small anatomic space between the first rib and the clavicle, becoming compressed or kinked during arm motion, causing its fracture (18, 19, 26, 27). Pinch-off syndrome may be prevented by insertion of the catheter more laterally into the jugular vein (28).

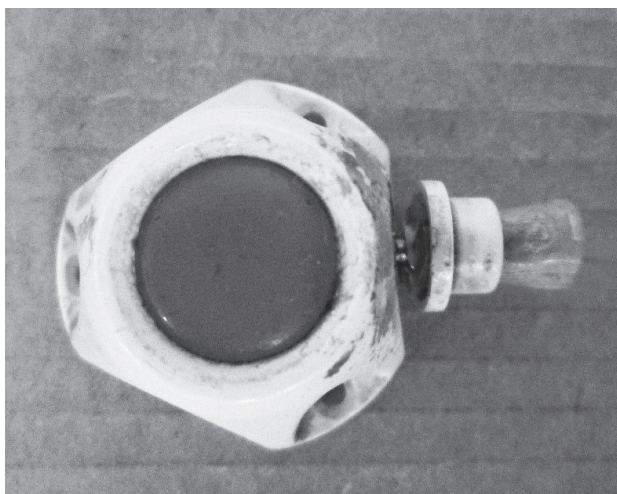
The average port life span reported by Dillon et al. was 1075 days (range 269 – 2657 days) (18, 29-31). Cheng et al. reported that the time from central venous port-catheter implantation to dislodgment ranged from 46 days to 1281 days (mean duration stay 451.6 ± 325.4 days) (32). The disruption happened from 0.5 to 1 year after implantation (32). Therefore, the replacement of old port system is necessary to avoid the risk of late dislocation. A correct maintenance of the system is fundamental for the long duration of the port system and for avoiding complications, such as infections, thrombosis and catheter dislocation (1, 33). A trained nursing staff following a standardized procedure as recommended by the manufacturers, is mandatory for the purpose. The recommendations include: waiting until the wound has healed before using the system for the first time, puncture under sterile conditions with specific needles, using a heparin lock after each access or every 4 weeks if the system is not in use.

Catheter embolization does not seem to be related to any specific port system (18), but some studies in the Literature show that polyurethane catheters ruptured more frequently than silicone catheters with a significant statistical correlation between the two materials (34, 36).

The most common fracture site seems to be at the anastomosis to the reservoir (32).

Catheter seems to be less susceptible to migration when placed at the internal jugular vein (6, 24), and when dislocation occurs, patient presents local swelling and erythema (3).

When catheter migration occurs from subclavian vein, it has the tendency to embolize into the right cardiac chambers and may reach the pulmonary artery or its branches (32, 37).



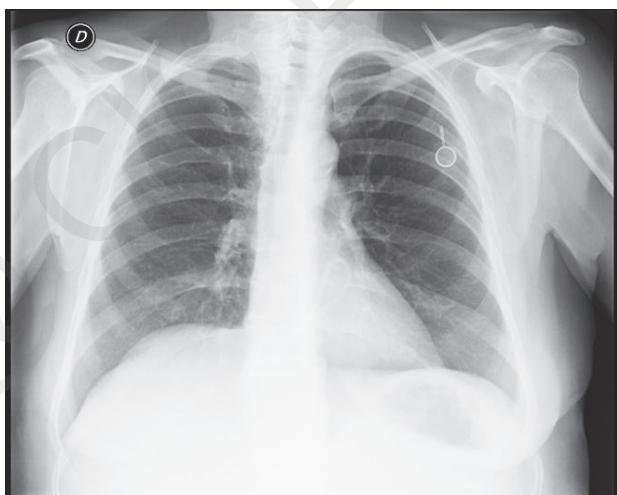
Figures 1 and 2 - Catheter ruptured at the anastomosis with the reservoir.

Patient can be asymptomatic in most cases (3, 32), and often catheter dislocation is diagnosed by means of routine chest radiography or by non-flushing catheter, absence of blood reflux, extravasion, pain or edema around the reservoir during infusion (37). Some patients can show palpitations from ventricular tachycardia (3, 38, 39), thrombosis in the pulmonary artery (38), cough, dyspnea, thoracic pain (3), heart and vessel perforation, endocarditis, cardiac tamponade, cardiac arrest and even death (19). Mortality is reported in the Literature around 1.8% (40).

In our case, catheter ruptured at the anastomosis with the reservoir (Figs 1 and 2). The possible reasons for the consequent dislodgement of the catheter may be a bad management of the catheter at its anastomoses to the reservoir during assembly, or an occluding thrombosis at

the catheter's lumen. Furthermore, our patient suffered from incoercible vomiting also after a short asymptomatic period when the gastric antral prosthesis was placed, because of the dramatic evolution of the tumoral disease. Catheter dislocation was diagnosed by means of a chest X-ray performed because of not flushing port system (Figs 3 and 4). Patient did not reported any symptom referred to catheter dislocation.

Also if asymptomatic, patient must be referred to interventional cardiology or radiology because of the potential morbidity and mortality (18-38). Percutaneous extraction of embolized catheter using femoral venous access is the gold standard (2, 3, 32) and a safe procedure (38) with high success rate (32). It is performed under local anesthesia and fluoroscopy guidance (6, 32). The complication rate reported in the Literature is of



Figures 3 and 4 - Catheter dislocation diagnosed by means of a chest X-ray.

3.3% (32), consisting mainly in transient ventricular tachycardia, flail of tricuspid valve with permanent tricuspid regurgitation, and hematoma over the puncture site of access at the femoral vein (32).

If percutaneous techniques fail, the risk of above mentioned severe and fatal complications is sufficient to justify open thoracotomy retrieval or long term warfarin therapy in defedated patients (3, 32, 37, 38).

Conclusion

It is widely discussed in the Literature that insertion of totally implantable central venous catheters carries the risk of serious and life-threatening complications. However, performing a correct implantation by experienced surgeons and a proper handling by trained nursing staff, decrease the incidence of these complications.

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