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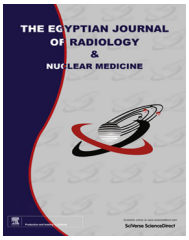

ORIGINAL ARTICLE

Complications of Port A Cath implantation: A single institution experience

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KEYWORDS

Port A Cath;
Cancer patients;
Complications

Abstract *Objectives:* To determine the complications associated with Port A Cath insertion in cancer patients.
Methods: The records 250 patients, who received a subcutaneous port catheter between 2009 and 2013, were analyzed retrospectively with regard to implantation complications and complications in the course of Port A Cath use.
Results: The average duration over which the Port A Cath remained in place was 22 months. Postoperative complications occurred in 29 patients (11.6%); of these, 4 (1.6%) were perioperative and 25 (10%) were long-term complications.
Perioperative complications were in the form of inadvertent arterial rupture. Long-term complications included the following: infection in 10 patients (4%), mechanical failure in 5 patients (2%), thrombosis in 4 patients (1.6%), suture disruption in 3 patients (1.2%), extravasation in 2 patients (0.8%), and catheter migration in one patient (0.4%).
Conclusion: Port A Cath implantation is associated with some risk of serious complications. Care of the catheter and the patient should be maintained to decrease the risk of complications.

1. Introduction

Modern chemotherapeutic management depends upon repeated and safe access to the venous system for the delivery of drugs, fluids and blood products and on the periodic monitoring of the effects of treatment (1). Peripheral veins are rapidly destroyed by repeated venipuncture and by long term chemotherapy (2). The long-term venous access devices (VADs) have helped to overcome the need for repeated peripheral or central venous puncture (3).

One frequently employed type of venous access system is the Port A Cath system. The Port A Cath is a totally implantable venous access device in which a conventional central venous catheter is attached to a subcutaneous injection port usually on the chest wall (4).

The usage of ports for a wide variety of indications has also brought a wide spectrum of complications that are well documented in the existing literature (5–9).

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The purpose of this study is to determine the immediate and long-term complications of Port A Cath insertion and to see whether the complication rate was comparable to what was reported in the literature.

2. Materials and methods

After institutional board approval, the records 250 patients, who received a subcutaneous port catheter between 2009 and 2013, were analyzed retrospectively with regard to the implantation complications and complications in the course of Port A Cath use. The type of devices used, and the indication for placement and the side of implantation were recorded.

2.1. Technique of Port A Cath implantation

All port catheter implantations were performed by interventional radiologists by using a Port A Cath kit Titanium (Medcomp) or polyurethane (B. BRAUN, France).

The procedure was done under local anesthesia using 20 cc of Xylocaine diluted with 10 cc normal saline. The puncture site was anesthetized using 10 cc of the diluted xylocaine.

Puncture of the internal jugular vein (IJV) or subclavian vein (SCV) was done under ultrasound guidance with linear probe 8 MHz (LOGIQ 5, General Electric Health Care Medical Systems, USA). Followed by the insertion of the guide wire under fluoroscopic guidance (Artis Zee Siemens Germany) into the right atrium, a bell-away sheath was inserted over the wire under fluoroscopic guidance.

The catheter was then irrigated with saline and kept closed and then inserted through the bell away sheath to the right atrium level after removal of the guide wire followed by Belling of the sheath under fluoroscopic guidance.

The site of port implantation was anaesthetized with 20 cc diluted xylocaine. A ± 2 cm incision was done two fingers below the mid aspect of the clavicle. A cavity was done in the subcutaneous tissue that could accommodate the port chamber. Tunneling was made in between this cavity and the puncture site to bypass the catheter through it. The tip of the catheter was adjusted to the level of the junction between the SVC and the right atrium under fluoroscopic guidance. The catheter was then connected to the port chamber with a plastic or metallic lock. The port was tested with heparinized saline (aspiration and then injection). The subcutaneous tissue was closed with 02 vicryl suture followed by closure of the skin with 02 silk suture. Post procedure chest X-ray was done to document the port place. The overall procedure time took 15–45 min.

The technique was done under general anesthesia in only two patients due to severe patient anxiety.

2.2. Statistical analysis

Analysis of data was done by IBM computer using SPSS (statistical program for social science version 12) as follows

- Description of quantitative variables as mean and range.
- Description of qualitative variables as number and percentage.

3. Results

Of the 250 implantations, 167 were females (66.8%) and 83 males (33.2%). Mean age was 50 yrs (range 16–73 yrs).

Percutaneous Seldinger method was used in all patients with the insertion of titanium ports in 183 patients (73.2%) and polyurethane types of ports in 67 patients (26.8%). All patients had underlying malignant conditions. Breast cancer was the most common underlying diagnosis (56.4%), followed by gastrointestinal tract malignancies (26%). The port catheter was inserted for chemotherapeutic treatment of the primary disease in 95 patients (38%), and for control of metastatic disease in 155 patients (62%).

The most common site of insertion was the right internal jugular vein (78.8%), followed by the left internal jugular vein. The details are shown in Table 1.

The average duration over which the Port A Cath remained in place was 22 months (range 6–60 months).

Post-operative complications occurred in 29 patients (11.6%) (Table 2); of these, 4 were perioperative and 25 were long-term complications.

4. Discussion

Central venous port catheters are usually set on the purpose of periodic administration of chemotherapy for the treatment of various malignancies.

Placing these devices completely under the skin allows the patient to continue a normal life without special care, other than monthly heparinized serum infusion. The introduction of any foreign object into the body, however, is accompanied by technical difficulties and the risk of developing complications (10). Although the advantages of PVAD use outweigh the disadvantages (11), PVAD-related complications can be very serious.

In this study, the overall incidence of Port A Cath-related complications was 11.6% and two types of complications were distinguished: immediate perioperative (1.6%) and long-term complications (10%).

Immediate perioperative complications were recorded in previous studies (12–14), and their rate was ranging between 1.7% and 20.5%. The complications were in the form of pneumothorax, hemorrhage, catheter malposition and catheter embolization.

In our study, inadvertent arterial rupture with consequent neck hematoma was the only immediate perioperative complication encountered. It occurred in 4 cases. All were managed by conservative measures (intermittent compression and ultrasound follow up).

Table 1 Sites of insertion of Port A Cath.

Site of insertion	Total number of patients
Right internal jugular vein	197
Left internal jugular vein	31
Right subclavian vein	14
Left subclavian vein	8
Total	250

Table 2 Complications associated with the implantation of Port A Cath.

Perioperative complication %	
Inadvertent arterial puncture with neck hematoma	1.6 (n = 4)
Long term complications %	
Infection	4 (n = 10)
Mechanical failure	2 (n = 5)
Venous thrombosis	1.6 (n = 4)
Suture disruption	1.2 (n = 3)
Port separation with extravasation	0.8 (n = 2)
Catheter migration	0.4 (n = 1)

Rates of late complications consisting of infections, thrombosis, extravasation and catheter fracture have been described as 0.0–55.5% in the literature (14).

Our Port A Cath related Late complications were infections, mechanical failure, suture disruption, thrombosis, catheter migration and port separation with extravasation in a rate of 10%.

Catheter related infections were seen in ten patients (4%); of these ten, nine (3.6%) were exit-site infection and one (0.4%) was an isolated pocket infection. The causative microorganism was Staphylococcal species in eight out of ten infections. PVAD-associated infection should not always lead to catheter removal and can be treated with antibiotics specific to the causative organism and local care (15). In our study, because of progressive infection despite antibiotic treatment, the infected PVADs were removed. This is in conformity with other studies which have shown catheter-related infection as the cause of premature removal in 7.1–13.4% of cases (16–18).

Several studies have reported premature removal due to device failure to occur in 2.9–3.4% of VADs (16–18); a nearly similar incidence was seen in our patients (2%). There are some reports that the use of continuous prophylactic anticoagulant therapy reduces the incidence of VAD failure (19–21).

In four patients (1.6%), catheter thrombosis occurred and was successfully treated by heparin and oral anticoagulant drugs and catheter function restoration was achieved.

Suture disruption was found in three patients (1.2%) and was managed by trimining of the edges followed by resuturing (Fig. 1).

Extravasation occurred in two patients (0.8%) and comprised subcutaneous leakage of the cytostatics (or cytotoxic) at the port site. Local symptoms included erythema and edema, without ulceration or necrosis. All were treated conservatively and infusion was restarted successfully. The extravasation rate of 0.8% found in our study is comparable with that in the literature (0.9–6.5%) (14,22).

Port A Catheter fracture with fragment dislodgement occurs in approximately 0.2–1% of port catheter implantation (23–25). The dislocated catheter fragments have been found mainly in central veins, including subclavian vein, superior vena cava, inferior vena cava, right atrium, right ventricle, and pulmonary artery. Port A Catheter fracture is often asymptomatic (24). However, serious complications such as infection, pulmonary embolism, arrhythmia, cardiac arrest and cardiac perforation occasionally pursue (26–28).

The prevalence of Catheter fragmentation at the time of placement has decreased after the introduction of the change

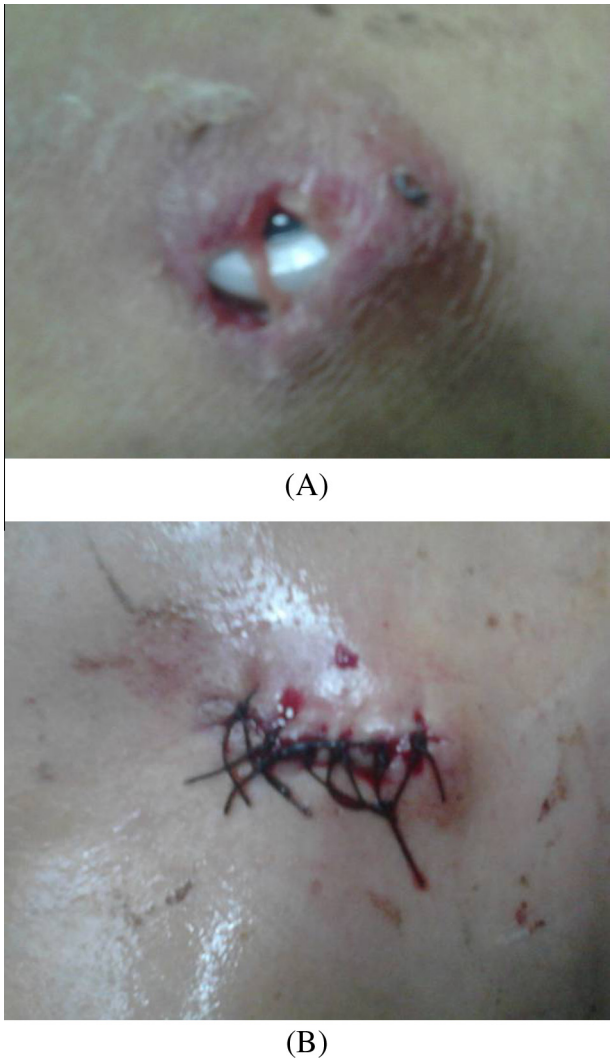

Fig. 1 Suture disruption after local inflammation (A), treated by AB therapy, trimining of the edge and resuturing (B).

from a needle to a sheath and guide wire usage (21). Delayed fragmentation with or without embolization can be caused by too medial positioning, angulation or distortion of the anastomosis between port and catheter, severing of the catheter during insertion procedure, and fatigue of the catheter (29). The ''pinch off syndrome'' is the most common cause due to the catheter wear secondary to tearing and scissoring effect between the clavicle and first rib during shoulder movement (30).

In our study, delayed catheter fracture occurred in one patient (0.4%). It was suspected by the failure to aspire blood and detection on a chest X-ray. The broken catheter segment migrated to the pulmonary artery 175 days after implantation.

The fragment was removed with the Amplatz snare device by catheterization under local anesthesia via the femoral vein (Fig. 2).

In conclusion, the implantation and use of PVADs is a reliable and valuable method for long-term intravenous therapy, with a complication rate of 11.6% in our study which is largely comparable to the published data. However, there is a need to reduce the catheter related complications. Sufficient

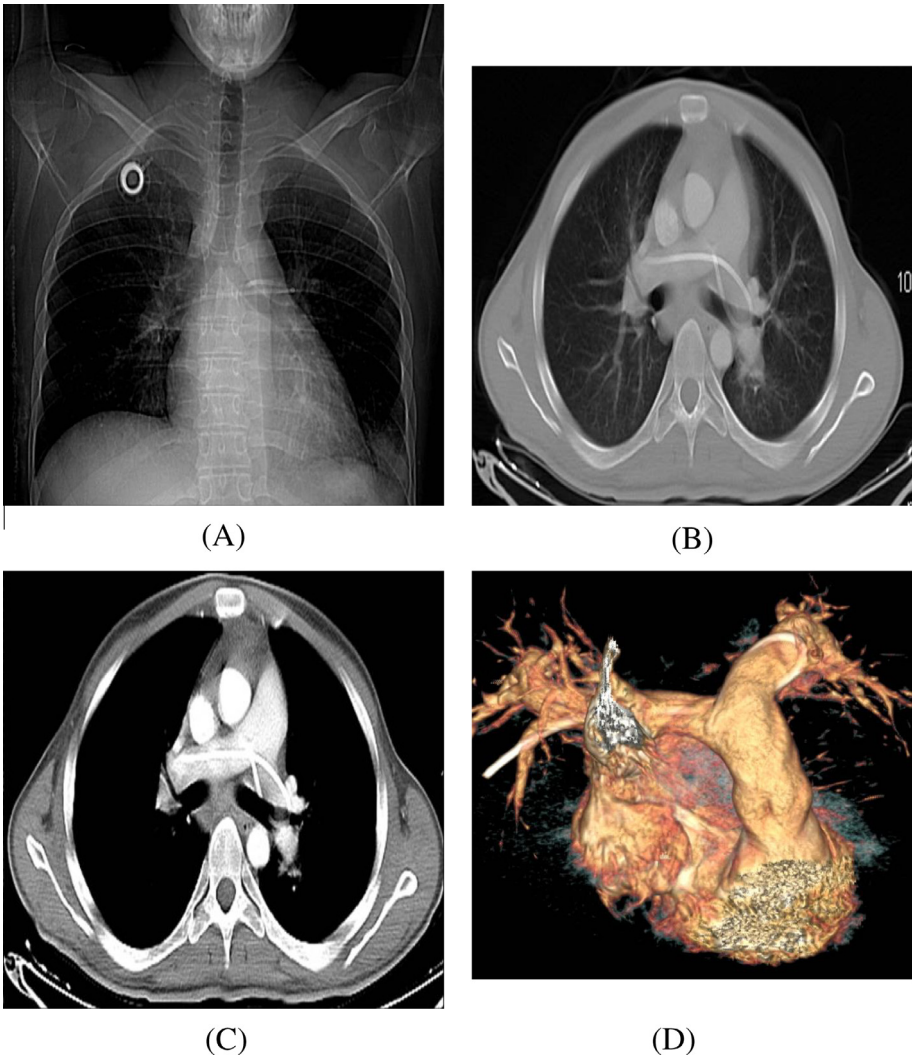

Fig. 2 Chest radiography (A), CT chest in lung (B) and mediastinal (C) window settings with 3D reconstruction (D), showing the migrated catheter lodged in the pulmonary artery.

information prior to implantation should be given and with appropriate follow up after implantation for patient satisfaction and the early recognition of complications.

Conflict of interest

We have no conflict of interest to declare.

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