



Infectious complications of Permanent Central Venous Catheters

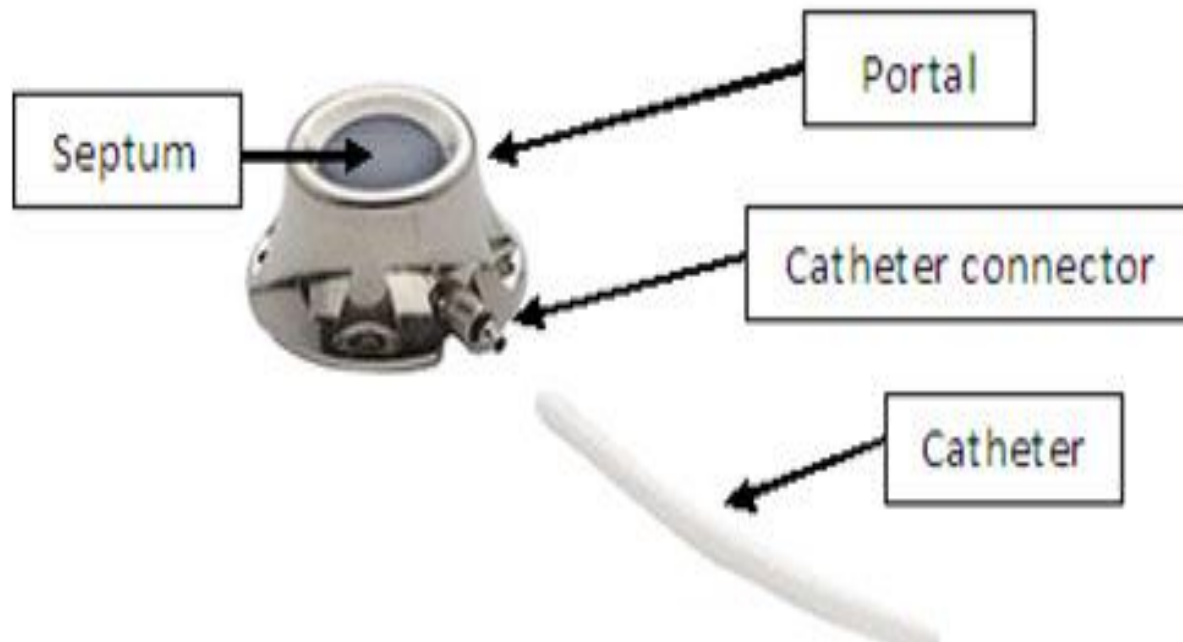
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❖ During the past 25 years, enormous progress has been made in diagnosis and treatment of childhood cancer.

❖ To improve comfort of treatment, totally implantable venous access systems such as Port-a-Cath have been introduced.

Image of porth a cath





Benefits of Port-a-Cath

- ❖ frequent blood sampling
- ❖ prolonged administration of fluids
- ❖ long-term chemotherapy
- ❖ transfusion of blood products
- ❖ Administration of antibiotics
- ❖ parenteral nutrition

❖ External catheters such as the **Hickman** or **Broviac** have a higher rate of venous access device related infections than totally implanted devices such as the **Port-a-Cath**.

Location of Port

- ❖ Implantation of **Port-a-Cath** was achieved mainly via cannulation of left or right subclavian vein.
- ❖ The catheter was inserted into the superior vena cava.
- ❖ often ports were placed on the anterior chest wall on the pectoralis major muscle.

Complications of porth a cath

- ✓ infections
- ✓ hematoma
- ✓ malpositioning
- ✓ pneumothorax
- ✓ thrombosis/blockage
- ✓ embolization
- ✓ catheter fracture

Infectious complications

- ❖ systemic and local infections
- ❖ Sometimes generalized septicemia
- ❖ often late complication
- ❖ frequencies ranging from 2 to 43%
- ❖ recurrent fevers after drug or fluid injections into the port is suggestive
- ❖ Both peripheral and central venous blood cultures must be done

Diagnosis of infectious complications

- ❖ (1) at least one of the following signs or symptoms—fever ($>38^{\circ}\text{C}$), chills or hypotension
- ❖ (2) tunnelled CVC in use during the 48-h period before development of the infection
- ❖ (3) recognized pathogen cultured from one or more peripheral or central venous blood cultures

❑ **Tunnel infection** was defined as tenderness, erythema or site induration >2 cm from the catheter site along the subcutaneous tract of a tunnelled catheter.

❑ **Pocket infection** was defined as erythema or induration of the skin overlying the implantable port.

“early” catheter-related infection

- ❖ during the 30 days after the insertion
- ❖ mostly by organisms from the skin insertion site
- ❖ catheter hub becomes an important source of infection
- ❖ risk factors:
 - patient age <10 years
 - difficulties during the insertion procedure
 - duration of use
 - blood product administration,
 - parenteral nutrition

Other risk factors for port infection

- ❖ high-risk ALL (Patients with AML have the highest infection density)
- ❖ low ANC
- ❖ nutritional status
- ❖ fever on the day of surgery
- ❖ induction of chemotherapy
- ❖ use of steroids at the time of induction

Care of catheter

- ❖ flushing the catheter every other day with 3 mL of heparin/normal saline solution (100 U/mL)
- ❖ changing the needles every 7 days
- ❖ renewing tubes every 3 days

Etiology:

- ❖ staphylococci (coagulase-negative&coagulase-positive)
- ❖ viridans streptococcal species
- ❖ enterococcal spp
- ❖ enteric Gram-negative organisms
- ❖ *P. aeruginosa*
- ❖ mycobacteria
- ❖ *Candida* spp :*C. albicans*, *C. parapsilosis*

Hospital-onset vs Outpatients infections

- ❖ **Hospital-onset** infections are most frequently caused by Gram-positive bacteria
- ❖ Prolonged immuno suppression and treatment with broad-spectrum antimicrobials and TPN may also place some hospitalized patients at risk of fungal infections
- ❖ **Outpatients** infections are caused by non-enteric Gram-negative organisms

Important microorganism

- ❑ **Staphylococcus aureus** remains a leading cause of catheter related infection in critically ill patients associated with serious complications and high mortality.

- ❖ **Catheter-associated bacteremia** : positive peripheral and central blood cultures
- ❖ **Bacteremia unrelated to catheter** : a negative catheter culture but a positive peripheral culture
- ❖ **Catheter-related local infection** : inflammation (redness, edema, warmth, tenderness, discharge) around the site or along the catheter tunnel

anticoagulation

- ❖ prophylactic low-dose anti-coagulation is not used routinely
- ❖ if there was no forward or backflow, thrombolytic therapy is recommended
- ❖ if still there was no free flow, then the catheter was considered blocked and was removed

Signs of Port contamination

- ❖ multiple episodes of bloodstream infection with detection of the same microorganism
- ❖ repeated detection of the same microorganism for more than 3 days despite appropriate antibiotic therapy



Treatment

Systemic antibiotics

- ❖ **In neutropenic patients:**

- ❖ piperacillin-tazobactam and amikacin

- ❖ **In patients without neutropenia:**

- ❖ ceftriaxone or piperacillin-tazobactam

- ❖ **Vancomycin** was added in febrile patients with:

- tunnel infection

- severe mucositis

- haemodynamically unstable patients

- ✓ In severe *S. aureus* infections :
- ✓ rifampin and a fluoroquinolone
- ✓ antifungal therapy should be initiated:
 - ✓ when yeast is isolated from a blood culture
 - ✓ or when suspicion of fungemia is high

Indications of removal of port-a-cath

- mechanical complications
- successful completion of chemotherapy
- tunnel or pocket infections
- persistence of fever and positive blood cultures obtained later than 48 h after the initiation of appropriate antimicrobial therapy

Indications of removal of port-a-cath

- septic emboli
- persistent obstruction
- thrombosis of a large vein refractory to thrombolysis
- Endocarditis
- Majority of fungal infections or mycobacteria

- ❖ Patients with complicated device infections, such as **tunnel infection** or **port abscess**, require removal of port and 7–10 days of antibiotic therapy
- ❖ patients with **septic thrombosis** or **endocarditis** require removal of port and antibiotic treatment for 4–6 weeks

