

# Retrospective review of incidence and complications relating to implantable central venous catheters (CVC) by interventional radiologists and surgeons: A single institution review within the South Australian Health network.

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## Abstract

Implantable central venous catheters (CVC), such as; Port-a-Cath®, Infusaports®, allow patients requiring frequent or ongoing medication administration long-term venous access. This minimizes potential patient trauma, anxiety and infection-risk from repeated attempts at peripheral venous access.

This study reviewed deployment of n=200 consecutive implantable CVCs and related complications which were categorized into early (<30days), and long term (>30 days).

This review was confined to a single Institution within the South Australian Health Network. Most common line complication warranting removal was infection. Slight, but not statistically significant difference between line catheters deployed by interventional radiologist when compared to under surgical team.

**Keywords:** CVC; Implantable central venous catheter; line-related infection

## Introduction

Implantable CVCs (such as; Port-a-Cath®, Infusaports®) allow patients requiring frequent or ongoing medication administration long-term venous access. This minimizes potential patient trauma, anxiety and infection-risk from repeated attempts at peripheral venous access.

These complications may be classified at early or late:

- Early (<30days): Pneumothorax, hemorrhage, malposition.
- Long term (>30days):

Catheter-associated – malposition, line fracture, kink, rupture. Fibrin sheath formation, thrombosis, infection (including access site suture breakdown).

Implications of complications may range from infection or pneumothoraces – leading to prolonged hospital admission to potential death from catheter fracture and embolism [1].

CVCs are implanted at our network utilizing a combination of fluoroscopy and/or ultrasound by radiologists (interventional) or surgeons. Interventional radiologists usually place CVCs in an interventional radiology suite with patient under conscious sedation [2].

In contrast, surgeons usually place CVCs in an operating theatre with anesthetic support. Any potential differences in complications between these two groups will provide insight in optimizing CVC placement, and minimization of complications. This ultimately improved patient outcomes through reduced morbidity and mortality [3].

Prior published literature pertaining to CVC placement by the two groups has predominantly focused up the financial impact rather a view to minimize complication outcome [4].

### 1.1 Aims

Defining and outlining key radiological findings of major CVC complications. This would provide knowledge to assist in prompt identification of complications, thereby initiating prompt intervention to minimize patient impact.

Determining incidence and stratifying complications associated with CVC implantations in a South Australian cohort.

We compared the complication rates of placement by the main service providers – namely, interventional radiologists and surgeons. Any discernible difference in outcome between these groups would provide invaluable data in optimizing CVC placement protocols, and hopefully mitigate adverse patient outcomes due to complications.

### 1.2 Target audience

Anyone involved in care of patients with implantable CVCs. In particular, radiologists, surgeons, physicians and oncologists.

## Methodology

Retrospective review of patients with implantable CVCs who have been referred to a major radiology imaging network (Flinders Medical Centre or Flinders Medical Centre Medical

Imaging) for assessment. This will provide a mix inpatient/outpatient surgeon-placed and interventional radiology-placed CVCs.

## Results

### Data collection

Utilizing Inteleviewer diagnostic software viewer platform®, an electronic database search of all instances where an implantable CVC has been imaged specifically for assessment of catheter integrity will be performed. This will include keyword searches with wildcard identifiers to maximize data capture.

In order to achieve a sample size of  $n = 200$  patients, retrospective collation of patients from prior two to three years enabled the adequate number of patients for this data-collection. This was the most time consuming component of the study project.

The Data set is provided as a supplementary file (please see attached file)

With each unique CVC case, the plain radiograph and contrast-enhanced “portogram” will be assessed by myself, noting: Implantation in interventional radiology or by surgeon.

Demographics – age, gender. Left vs. right sided placement.

Catheter tip position: Each complication radiographically demonstrated complication will be categorized into the appropriate type/subtype.

For example: Line integrity – further subdivided into; fracture/split/leak, kink, loop, malposition and fibrin sheath.

Statistical data analysis will include Student's T test and Chi-squared for assessment of potential differences depending on

whether interventional radiologist or surgeon placed CVC. Additionally, analysis of parameters such as catheter tip position, age and gender will also be performed to determine if there is any correlation with CVC complication.

### Ethical Consideration

This is a retrospective study utilizing a cohort derived from a medical database. No patient identifiers will be recorded. Hence, ethical approval has not been sought.

### Declaration of interest

The authors declare that they have no competing interests.

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