



# Complications of Central Venous Catheters in Cystic Fibrosis

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## Introduction

Patients with cystic fibrosis (CF) often require intravenous antibiotics for treatment of acute pulmonary exacerbations. Patients often receive peripherally inserted central catheter (PICC) lines or totally implantable venous access devices (TIVADs) for venous access. Few studies have examined complications of TIVAD implantation and little data exists concerning PICC line complication rates in CF patients. This study sought to assess the long term complication rates of both TIVAD and PICC lines as well as identify possible patient risk factors for developing complications.

## Methods

This was a retrospective study, which included patients from 3 CF centers in northern New England. For the time period 1/103-6/106, data was obtained from review of each patient's medical record, Port CF, inpatient medical record, and patient interviews. Demographic data was recorded for all patients. For each TIVAD or PICC line, the following information was recorded: the type of line placed, history of prior line placement during the study period, patient age, history of line use for blood draws, method of line flushing, and status of the line at the end of the study (if still in use). Complications were defined as catheter occlusion, deep venous thrombosis (DVT), infection, or other localized complications.

## Results

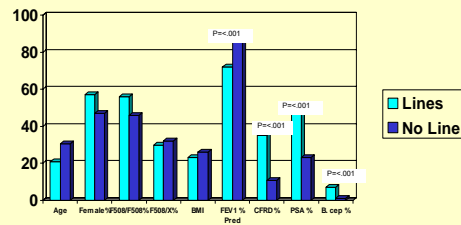
Data was collected for 237 pediatric and 155 adult CF patients during the defined study period. Seventy-two TIVADs and 356 PICC lines were placed during the study period in 202 patients. The TIVAD and PICC line complication rates were 32% (23/72) and 6.5% (23/356), respectively. In pediatric patients, 27% (6 of 22) of TIVADs and 6.3% (13/205) of PICC lines had a complication. Of the 6 TIVAD complications, there were 3 systemic infections and 3 catheter occlusions. Of the 13 PICC line complications, there were 2 DVT's, 1 line occlusion, 2 systemic infections, and 9 minor incidents of localized phlebitis. In adults, complications were recorded in 34% (17/50) of TIVADs and 6.6% (10/151) of PICC lines. Of the 17 TIVAD complications, there were 7 systemic infections, 6 catheter occlusions, 2 venous thromboses, and 2 other. Of the 10 PICC line complications there were 3 DVT's, 3 line occlusions, and 4 minor incidents of localized phlebitis. Both adult patients who developed a DVT associated with TIVAD implantation were homozygous for the ΔF508 mutation. The presence of diabetes and Burkholderia cepacia complex (BCC) lung infection were both associated with DVT as well, with odds ratios of 5.00 and 6.10, respectively.

## References

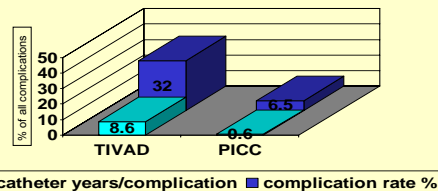
- Kariyawasam H. et al, Experience of totally implantable venous access devices (TIVADs) in adults with cystic fibrosis over a 13-year period. Respiratory Medicine, 2000; 94: 1161-1165.
- Munck, A. et al, Follow-up of 452 totally implantable vascular devices in cystic fibrosis patients. Eur Resp Journal, 2004; 23: 430-434.
- Atiken M and Tonelli M, Complications of indwelling catheters in cystic fibrosis: A 10-year review. Chest, 2000; 118: 1598-1602
- Rodgers H et al, Totally implantable venous access devices in cystic fibrosis: Complication and patients' opinions. Eur Resp Journal, 1998; 12: 217-220.
- Burdon J. et al, Five years experience of PAS Port intravenous access system in adult cystic fibrosis. Eur Resp Journal, 1998; 12: 212-216
- Barker M. et al, Prevalence of thrombophilia and catheter-related thrombosis in cystic fibrosis. Pediatric Pulm, 2005; 39: 156-161

## Results

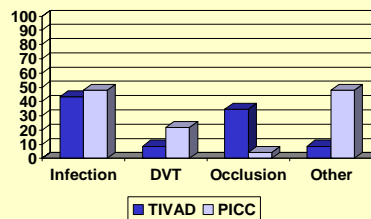
### Demographic Characteristics



### Complications of TIVAD and PICC Devices

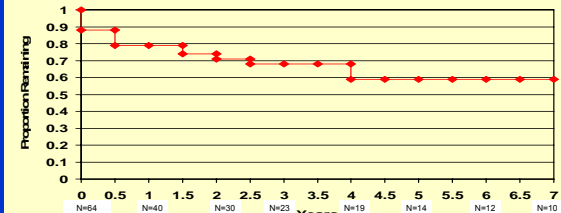


### Causes of Complications



## Results

### Kaplan-Meier TIVAD Complications



The original date of insertion of the TIVAD was used to calculate KM survival curve even if insertion date occurred prior to study period

### Possible Complication Risk Factors

Exposure	Outcome	Total N	Odds Ratio (95% CI)
ΔF508/ ΔF508 Genotype	Complication	195	1.21 (0.57-2.59)
	DVT	194	3.87 (0.44-33.75)
	Infection	195	0.84 (0.27-2.59)
Presence of CFRD	Complication	202	1.76 (0.84-3.69)
	DVT	202	5.00 (0.62-40.47)
	Infection	202	4.72 (1.80-13.94)
Female Sex	Complication	202	1.06 (0.51-2.21)
	DVT	202	1.03 (0.32-3.26)
	Infection	202	0.91 (0.3-2.62)
Culture (+) for BCC	Complication	202	2.99 (0.62-14.54)
	DVT	202	6.10 (1.07-34.78)
	Infection	202	7.96 (2.09-30.35)
Culture (+) for Pseudomonas	Complication	202	0.85 (0.41-1.77)
	DVT	202	0.41 (0.08-2.18)
	Infection	202	0.29 (0.08-1.09)
Use of line for Lab draw	Complication	149	0.73 (0.26-2.06)
	DVT	149	0.44 (0.05-4.04)
	Infection	149	0.64 (0.14-3.96)
	TIVD complication	71	1.17 (0.38-3.57)

Study population n=202; Lab draw risk assessment was based on total number of lines placed n=360

The odds ratio compares risk of each complication between exposed and non-exposed patients within each cohort.

## Conclusions

Complications of PICC lines were uncommon and usually minor. The rate of TIVAD complication observed was more common over the lifetime of the catheter and was similar to previously published reports. We identified potential risk factors for the development of DVT and infection associated with TIVADs and PICC lines, namely CFRD and BCC infection. The mechanism by which these factors are associated with catheter complications is unclear and warrants further investigation.