

RESEARCH ARTICLE

Intravenous catheter complications in hemodialysis

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ABSTRACT

Background: Vascular access, still is a problem for hemodialysis. Venous catheters are commonly used for acute angioaccess during maintenance hemodialysis in acute renal failure and end-stage renal failure patients. However, the catheters are often complicated by mechanical or infectious complications which may result in morbidity and or premature removal of the catheter. Even though, there are various studies on central venous catheters used in hemodialysis in western countries less is documented in India. **Aims and Objectives:** Complications of intravenous catheter used during hemodialysis in our set up. **Materials and Methods:** This prospective study was conducted on 110 patients selected by random sampling in dialysis units of a government district hospital from October 2014 to September 2015. Patient age, sex, history, type of kidney disease, and associated conditions were also noted according to the pro forma. Date of intravenous catheter insertion, site of insertion, and insertion complications were noted. All patients were followed up until the day of catheter removal. Date of catheter removal, reason for catheter removal, and duration of catheter days were noted. Data were collected and tabulated. **Result:** Only 47.8% of patients suspected with infections showed bacterial growth in catheter tip culture. However, blood culture showed bacterial growth only in 19.6% of infection suspected patients. Blood culture reported 55.6% *Staphylococcus aureus* growth followed by *Pseudomonas* (22.2%), *Escherichia coli*, and *Acinetobacter* (11.15%) growth in samples collected from infection suspected dialysis patients. **Conclusion:** Fever due to infections is the most common cause for catheter removal.

KEY WORDS: Catheter Tip Culture; Blood Culture; Bacterial Growth; Hemodialysis; *Staphylococcus Aureus*


INTRODUCTION

Hemodialysis is a method of extracorporeal removal of waste products from blood and maintaining a regulation of the body fluids and chemical balances. Vascular access, still is a problem for hemodialysis. Except for a small number of patients who may have planned for End-stage renal diseases care earlier, almost all end-stage renal diseases patients require immediate/urgent dialysis, necessitating central venous catheterization for emergency vascular access.^[1]

It can be achieved by temporary venous access or a permanent AV fistula. Hemodialysis access of <3 weeks duration should be obtained using a noncuffed or a cuffed double-lumen percutaneously inserted catheter.^[2] Venous catheters are commonly used for acute angioaccess during maintenance hemodialysis in acute renal failure and end-stage renal failure patients. Temporary access is established by the percutaneous insertion of a catheter into a large vein.^[3] Internal jugular, femoral or less desirable, and subclavian ^[4] are the most commonly selected ones.

It is recommended that temporary femoral catheters remain in place for a maximum of 7 days and that internal jugular vein/subclavian vein catheters remain in place for a maximum of 3 weeks.^[4]

However, the catheters are often complicated by mechanical or infectious complications which may result in morbidity

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and or premature removal of the catheter. Vascular access complications remain responsible for considerable cost, morbidity, and mortality in the maintenance hemodialysis patient population. Indeed, vascular access continues to be referred to as the “Achilles heel” of the hemodialysis procedure. Hemodialysis is one form of renal replacement therapy and is most commonly used in India. Even though, there are various studies on central venous catheters used in hemodialysis in western countries less is documented in India. Hence, we carried out a study on complications of intravenous catheter in our set up.

MATERIALS AND METHODS

This prospective study was conducted in dialysis units of our government district hospital from October 2014 to September 2015. 110 patients were selected by convenient random sampling.

Study Subjects

Inclusion criteria

The patients who required hemodialysis through venous catheters irrespective of cause for renal failure above 18 and below 75 years were included in the study.

Exclusion criteria

Patients below 18 and above 75 years were excluded. Patients who had central venous catheter not for dialysis also were excluded from our study.

Informed consent from patient or bystanders was obtained and then catheter was inserted after taking all sterile precautions. Patient age, sex, history, type of kidney disease, and associated conditions were also noted according to the pro forma. Date of catheter insertion, site of insertion, and insertion complications were noted. All patients were followed up until the day of catheter removal. Date of catheter removal, reason for catheter removal, and duration of catheter days were noted. Data were collected and tabulated.

RESULT

As shown in table patients on hemodialysis were 76 males and 35 females. Mean age of patients were 44 years. 48 patients had acute renal diseases and 63 patients had chronic kidney diseases. The majority of them had diabetes followed by infectious diseases and hypertension. As shown in table, while inserting the intravenous catheter arterial rupture was the most common complications. Bleeding, hematoma formations were the other complications. Pneumothorax was seen in only two cases. Fever is the commonest cause for removal. A.V fistula, swelling, pain are the other reasons for removal of catheters. Only 47.8% of patients suspected with

infections showed bacterial growth in catheter tip culture (Table 1). However, blood culture showed bacterial growth only in 19.6% of infection suspected patients. Blood culture reported 55.6% *Staphylococcus aureus* growth followed by *Pseudomonas* (22.2%), *Escherichia coli*, and *Acinetobacter* (11.15%) growth in samples collected from infection suspected dialysis patients.

DISCUSSION

In our study, the majority of patients on hemodialysis had diabetes followed by infectious diseases and hypertension. Only 47.8% of patients suspected with infections showed bacterial growth in catheter tip culture in our study. Blood culture reported 55.6% *S. aureus* growth followed by *Pseudomonas* (22.2%), *E. coli*, and *Acinetobacter* (11.15%) growth in samples collected from infections suspected dialysis patients.

Uncontrolled glycemic control leads to progressive of diabetes mellitus with an earlier decline in GFR in patients with type 2 diabetes. Improvement in glycemic control, particularly early

Table 1: Characteristic features of cases studied

Parameters	Number of cases (%)
Males	76 (68.5)
Females	35 (31.5)
Age (in years)	44 (43.2)
Acute renal failure cases	48 (43.25)
Chronic renal failure cases	63 (56.8)
Diabetes	44 (39.6)
Hypertension	22 (19.8)
Infectious conditions	29 (26.1)
Renal diseases	7 (6.3)
Poisonings	9 (8.1)
Arterial complications	7 (6.3)
Bleeding	4 (3.6)
Hematoma	1 (0.9)
Pneumothorax	1 (0.9)
AV fistula	16 (14.4)
Fever	44 (39.6)
Elective removal	40 (36)
Hematoma	1 (9)
Pain	2 (1.8)
Pneumothorax	1 (0.9)
Swelling	7 (6.3)
Catheter tip culture	22 (47.8)
Blood culture growth	9 (19.6)
<i>Acinetobacter</i> growth	1 (11.1)
<i>E. coli</i> growth	1 (11.1)
<i>Pseudomonas</i> growth	2 (22.2)
<i>S. aureus</i> growth	5 (56.6)

S. aureus: *Staphylococcus aureus*, *E. coli:* *Escherichia coli*

in the treatment is associated with reductions in the incidence of microvascular complications, including chronic kidney disease.^[5]

However, a study carried out in hemodialysis patients showed the relative risk of tunneled central venous catheters causing bacteremia in patients is approximately 10 times higher than the risk of bacteremia in patients with AV fistula.^[6] Studies showed that *S. aureus* as the most frequent causative organism followed by *E. coli* in hemodialysis patients.^[7,8] It is stated that significant risk factors for bacteremic episodes in hemodialysis patients with long-term tunneled catheters include diabetes and peripheral atherosclerosis.^[8] Poor hygiene has been associated with the development of vascular access infections in hemodialysis patients.^[9] The key role of nurse training in the management of the dialysis catheter dressing and its manipulation has been stressed.^[10] In fact, health-care providers should adhere to existing recommendations including use of maximal barrier precautions during catheter insertion and use of skilled personal to insert and maintain these catheters.^[11] Similar to our study, patients receiving dialysis with long duration of temporary catheter placement resulted in a high incidence of catheter-related complications in a study carried out in China.^[12]

This study includes a small group of patients. But still, these findings show us that vascular access still represents a problem for hemodialysis patients. Therefore, the healthcare administration should develop policies to assess patients early, ideally before dialysis is required to allow permanent vascular access to be established in advance as soon as possible.^[12]

CONCLUSION

Catheter-related infections remain a significant cause of morbidity and mortality in dialysis patients. Measures to prevent and adequately treat these infections in dialysis patients are important in decreasing costs and complications.

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