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ORIGINAL ARTICLE

Outcome of all Tunneled Catheters for Dialysis Access: a Single Center Study

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ABSTRACT

Renal failure affects up to 18% of hospitalized patients and is associated with significant morbidity, mortality, and resource utilization. Hemodialysis is used mostly as renal replacement therapy method all over the world. Maintaining a functioning upper extremity vascular access for a prolonged duration continues to remain a challenge for dialysis providers.

Objective: The objective of this study was to determine the outcome of all tunneled catheters placed in a single center for dialysis access over a period of six months.

Study Design: Descriptive case series study

Setting: Study was conducted in Dialysis Department, Combined Military Hospital, Lahore.

Duration of Study: Present research was conducted from 6th May 2019 to 5th Nov 2019.

Methodlogy: A total of 145 patients were enrolled after informed consent. Demographic information with duration of hemodialysis was also noted. In all patients tunneled catheter was placed for dialysis, by primary investigator. Then patients were followed-up for 2 months and were assessed for catheter in next visit. If there was redness, pain, and pus present then infection labeled. On assessment of catheter condition, if it was found damaged, fell out, exposed cuff, or fractures, blocked then catheter failure was noted. All this information was recorded through proforma.

Results: Mean age was 45.72 ± 15.31 years; Mean duration of dialysis was 7.66 ± 2.93 months. Male were 53.8% and female were 46.2%. Placement of catheter was at internal jugular 116 (80%) patients, at subclavian 21 (14.5%) and at femoral 8 (5.5%). Infection was present in 13.1% patients while it was absent in 86.9% patients. Catheter failure was seen in 4.1% patients, there was no significant association between presence of catheter failure and age group, gender, BMI, duration of dialysis and site of catheter having p-value = 0.322, 0.849, 0.741, 0.716 and 0.457 respectively. Significant association was not found between presence of infection and age group, gender, BMI, duration of dialysis and site of catheter having p-value = 0.591, 0.380, 0.081, 0.538 and 0.540 respectively.

Conclusion: Presence of Infection was observed in 13.1% patients and catheter failure was present in 4.1% patients with chronic kidney disease on maintenance hemodialysis. Effect modifiers like age group, gender, BMI, duration of dialysis and site of catheter did not show significant association.

Keywords: Chronic Kidney Disease, Infection, Catheter Failure, Hemodialysis.

INTRODUCTION

Chronic kidney disease (CKD) or chronic renal failure (CRF), as it was previously termed, is a term that refers to all levels of renal impairment, from damaged at risk through mild, moderate, and extreme chronic failure. CKD is an internationally public health concern. Incidents of regular kidney failure in the United States are increasing day by day, which is causing very bad outcomes and extreme costs. The elderly are more likely to have CKD. While younger patients with CKD often have increasing loss of renal function, 30% of people over the age of 65 with CKD have stable illness[1].

Cardiovascular disease and end-stage renal disease are both increased by CKD (ESRD). In United states the ninth principal cause of death is kidney disease. The National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) created a description and categorization of CKD in 2002[2].

These guidelines were later amended by the KDOQI and the worldwide guideline organization Kidney Disease Improving Global Outcomes (KDIGO)[3]. These recommendations have improved communication among clinicians and facilitated action at various phases of the disease. CKD is defined as renal impairment or a glomerular filtration rate (GFR) of less than 60mL/min/1.73m2 for at least three months, according to the guidelines. Whatever the source, once the loss of nephrons and reduction in functional renal mass reaches a certain point, the remaining nephrons begin an irreversible sclerosis process that results in a steady decrease in GFR. One of the pathologic symptoms of CKD is hyperparathyroidism.

Stage 1 and stage 2 CKD can not only be differentiated using GFR measurement, because in some patients the quantity of GFR measurement is standard or at low level. One or numerous kidney damage indicators can be utilized from the following diagnosis: Imaging is used to

detect urine sediment abnormalities, electrolyte and other abnormalities similar to tubular diseases, histologic abnormalities and structural abnormalities; Albuminuria (excretion of more than 30 mg of albumin per 24 hours or albumin: creatinine ratio greater than 30 mg/g [> 3 mg/mmol]); Albuminuria (excretion of more than 30 mg of albumin per 24 hours or albumin: creatinine ratio greater than 30 mg/g.

Although hypertension is a typical symptom of CKD, it should not be taken as an indication in and of itself because high blood pressure is prevalent in persons without the disease. There is a suggestion by NKF that GFR and albuminuria records can be used together preferably as compared to separately to maximize accuracy rate in the inspection of CKD in an update of their CKD grading system. According to the guidelines the predicted GFR and albuminuria levels must be evaluated for overall mortality, cardiovascular disease, last-stage renal failure, severe kidney and injuries and CKD progression. Patients with minimum GFR (15ml/min/1.73m2) or acute albuminuria (>300mg/24h) must be directed to medical specialists. [3]

MATERIAL AND METHODS

This study was conducted in Dialysis Department, Combined Military Hospital, Lahore, six months after approval from the hospital ethical review committee. Patients aged 20-70 years, either gender, presenting with CKD and placed on dialysis through tunneled catheter (as per operational definition).

CKD5D: It is defined as patients have serum creatinine >5mg/dl and advised maintenance hemodialysis through tunneled catheter.

Outcome: It was assessed in terms of following:

- Infection: It was labeled if there was redness, pain, swelling at catheter site and patient have fever >100oF, and pus present at catheter site within 2 months of placement.
- Catheter failure: It was labeled if catheter was damaged, fell out, exposed cuff, or fractures, or blocked within 2 months of placement.

Patients with infection or sepsis before catheter and taking antibiotics (as seen on medical record); patients who had a faulty catheter that needed to be replaced were excluded from the research.

145 patients who fulfill the selection criteria were enrolled from Department of Nephrology, Combined Military Hospital, Lahore. Informed consent was taken from each patient. Demographic information (name, age, sex, BMI, duration of hemodialysis) was also noted. Then in all patients tunneled catheter was placed and dialysis was done.

All procedures were done by the primary investigator himself. Site of catheter placement was noted. Then patients were followed-up for 2 months and were assessed for catheter in next visit. If there was redness, pain, and pus present then infection labeled (as per operational definition). Then patients underwent assessment of catheter condition. If it was damaged, fell out, exposed cuff, or fractures, blocked then catheter failure was noted (as per operational definition).

All of this data was entered into a preforma (attached). SPSS version 20 was used to enter and evaluate the data. Quantitative information such as age, BMI, and dialysis duration was reported as a mean and standard deviation. Qualitative data like gender, site of catheter placement, infection and catheter failure was presented as frequency and percentage. Age, gender, BMI, catheter implantation site, and dialysis time were all used to stratify the data. The outcome of stratified groups was compared using the chi-square test after stratification. P-values less than 0.05 were considered significant.

RESULTS

In this study conducted in Dialysis Department, Combined Military Hospital, Lahore from 145 patients, The minimum and highest ages were found to be 20 and 70 years, respectively, with a mean and standard deviation of 45.72 and 15.31 years. The minimum BMI was 26kg/m2 and maximum was 34kg/m^2. The minimum duration of dialysis was 3 months and maximum was 12 months with mean and standard deviation was 7.66 ± 2.93 months.

Table 1: Detailed statistics (n = 145)

	Minimal	Maximal	Average	Std. Deviation
Patients Age	20	70	45.72	15.31
BMI	26	34	30.04	2.674
Duration of dialysis	3	12	7.66	2.93

Males were 78/145 (53.8%) while females were 67/145 (46.2%). Placement of catheter at internal jugular was present in 116 (80%) patients, placement at subclavian 21 (14.5%) and placement at femoral was 8 (5.5%).Infection was present in 19/145 (13.1%) patients while it was absent in 126/145 (86.9%) patients. Catheter failure was present in 6/145 (4.1%) patients while it was absent in 139/145 (95.9%) patients.

Table 2: details of site of catheter, presence of infection and catheter failure among the patients (n=145)

Site of catheter	Frequency	%
Internal Jugular	116	80.0
Sub-clavian	21	14.5
Femoral	8	5.5
Infection		
Yes	19	13.1
No	126	86.9
Catheter failure		
Yes	6	4.1
No	139	95.9

Presence of Infection was observed in 13.1% patients and catheter failure was present in 4.1% patients with chronic kidney disease on maintenance hemodialysis. Effect modifiers like age group, gender, BMI, duration of dialysis and site of catheter did not show significant association.

Using the chi-square test, it was discovered that there is no comparable relationship between age and catheter failure, with a p-value of 0.322. There was no relationship between age group and infection presence, as shown by a p-value of 0.591.

With a p-value of 0.849, no significant connection was discovered between gender and the presence of Catheter

failure. Gender and the presence of infection were not shown to have a significant relationship (p-value 0.380). There was no relationship between BMI and catheter failure, as shown by a p-value of 0.741. Similarly, a p-value of 0.081 indicated that there was no significant connection between BMI and infection.

With a p-value of 0.716, no significant relationship was discovered between dialysis time and the presence of catheter failure. Similarly, with a p-value of 0.538, no significant relationship was established between the duration of dialysis and the presence of infection. Significant association was not found between Site of catheter and Infection with p-value 0.540 and catheter failure with p-value 0.457.

DISCUSSION

The purpose of the research was to find the outcome of all tunneled catheter placed for dialysis of the patients suffering from chronic kidney disease. In this regard the detailed research was administered in Dialysis Department, Combined Military Hospital, and Lahore. So, one hundred and forty five cases of chronic kidney disease were added by satisfying the inclusion criteria of non-probability consecutive sampling.

From 145 patients, it was noticed that the maximum age was 70 years with mean and standard deviation 45.72 ± 15.31 years and minimum age was found to be 20 years. The minimum BMI was 26kg/m2 and maximum was 34kg/m2. The minimum duration of dialysis was 3 months and maximum duration was 12 months with mean and standard deviation was 7.66 ± 2.93 months.

In previous study, the experiment success ratio was 100%. Average duration of catheter used for hemodialysis was 86 days (1-652 days) while average period for infusion catheter was for 60 days (2-686 days).Few Catheter were removed after the completion of therapy and for resolution need of dialysis. About 95 infusion catheter (45%) and 107 hemodialysis, (47%) were removed. Alterations were performed with 0.22 ratio per 100 catheter in hemodialysis and with 0.11 ratio per 100 catheter for infusion groups. Total infection ratio was found out to be 0.10 per 100 catheter days, and necessary catheter removal rate was found at to be 0.05 per 100 catheter days in hemodialysis which was lower as compared to other big series. Although necessary catheter removal rate was 0.28 per 100 catheter days for infusion group[4].4

Male patients were 53.8% female patients were 46.2%. Placement of catheter at internal jugular was present in 116 (80%) patients, placement at subclavian 21 (14.5%) and placement at femoral was 8 (5.5%).Infection was present in 13.1% patients while it was absent in 86.9% patients. Catheter failure was present in 4.1% patients while it was absent in 95.9% patients.

According to the available literature, 21 (100%) attempted catheter insertions resulted in effective vascular access, with 13 (61.9%) remaining for the needed period and 8 (38.1%) removed due to mortality, intractable blood or tunnel infections, catheter thrombosis, or malposition. Overall, there were 7.3, 23.4, and 3.4 occurrences of catheter-related infections, thrombosis, and malposition per 1000 catheter days, respectively. Pediatric patients with ESRD may benefit from the use of cuffed-tunneled hemodialysis catheters to maintain hemodialysis vascular access. To ensure the long-term patency of cuffed-tunneled catheters, a variety of surveillance procedures should be implemented[5].

By using chi-square test it was found that there was no significant association between presence of catheter failure and age group, gender, BMI, duration of dialysis and site of catheter having p-value = 0.322, 0.849, 0.741, 0.716 and 0.457 respectively. Significant association was not found between presence of infection and age group, gender, BMI, duration of dialysis and site of catheter having p-value = 0.591, 0.380, 0.081, 0.538 and 0.540 respectively.

Previous studies have shown that patients that who were discharged with a TDC dialysis catheter had survival rate of 86.4% in one-year as compared to those who were treated with simple AVF, 97.1 % of the surveyors (p=0.002).Male sex aging were shown to be badly linked with HD patient survival but less vintage HD prior to the development of acute VA hypertensive renal disease and glomerulonephritis were discover preferably to survival in a multivariate cox regression study. It was found that TDC was independent indicator of HD patients exist (HR 23.0, 95% confidence area 6.2-85.3). For HD patient's existence TDC could be a risk factor[6].

CONCLUSION

Presence of infection was observed in 13.1% patients and catheter failure was present in 4.1% patients with chronic kidney disease on maintenance hemodialysis. Effect modifiers like age group, gender, BMI, duration of dialysis and site of catheter did not show significant association.

Conlict of Interest: Authors have declared that no conflict of interest exist between the authors.

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