FREQUENCY OF DOUBLE LUMEN CATHETER RELATED INFECTIONS IN HEMODIALYSIS PATIENTS

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ABSTRACT

OBJECTIVE: To determine the frequency of catheter associated infections in cases of hemodialysis using double lumen hemodialysis catheters. **STUDY DESIGN**: Descriptive cross-sectional study. **PLACE AND DURATION OF STUDY**: Department of Nephrology (Dialysis Unit), Liaquat University of Medical & Health Sciences Jamshoro from 3rd June 2019 to 2nd December 2019. **METHODOLOGY**: One hundred and nineteen cases with end stage renal disease on maintenance hemodialysis having age 16 to 70 years of either gender who met inclusion criterion were included in the study. All hemodialysis patients who treated with double lumen hemodialysis catheters were assessed for catheter related infections. All the collected data were recorded. **RESULTS**: The average age was 55.8±10.34 years, mean duration on catheter insertion was 27.4±6.05 days, 70 (58.8%) patients were male and 49 (41.2%) were female. Catheters related infection was found in 61 (51.3%) patients. **CONCLUSION:** The catheter associated infections are alarmingly high and a major contributing factor for morbidity and mortality in patients undergoing hemodialysis using double lumen hemodialysis catheters.

KEYWORDS: Infections, Chronic kidney disease, Double-Lumen catheters, Hemodialysis

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INTRODUCTION

Chronic kidney disease (CKD) comprises of abnormalities in the structure or functional capacity of the kidneys, which have been determined for over a quarter of a year.[1] It is the reformist and for the most part irreversible condition of renal glomerular filtration work described by decay of the biochemical and physiological elements of all organ systems secondary to the accumulation of uremic toxins.[2,3] Vascular access for hemodialysis could be transitory or permanent. For brief vascular access, a double lumen percutaneous venous cannula is set into enormous veins like subclavian, internal jugular or femoral vein. They are anything but easy to be put by experienced hands, can be utilized following arrangement for hemodialysis and give amazing extracorporeal blood stream rates.[3,4] Infection is the main source of morbidity and the subsequently driving reason for mortality among patients on renal substitution treatment.[5] Microorganisms can acquire passage into dialysis catheters. These incorporate direct passage of microorganisms at the catheter entry site during insertion, secondary tainting of infuscate and seeding of microorganisms during bacteremia. A study conducted by Wang et al[6] found catheter related infections in 56.65% patients. Ferreira et al[7] reported catheter related infections in 10.4% of the patients. While a study conducted in Pakistan by Qureshi et al[8] found catheter related infections in only 31.66% patients. Because infections are leading causes of morbidity and mortality in patients of regular hemodialysis and currently there is no proper epidemiological data from Pakistan regarding catheter associated complications and patient factors. It is imperative to know the weight of this condition as it gives an extraordinary financial trouble on the patient and on the general medical care framework bit as far as cost and clinic bed inhabitance. By deciding the recurrence of catheter related infections, it tends to be underscored that legitimate preventive measures can be taken and better conventions can be created to forestall this exceptionally expensive complexities as instruction and prevention was practical instead of treating. This will assist with creating successful interventions

and general public health policies for the most proficient treatment of patients with ESRD going through dialysis utilizing catheters.

MATERIALS AND METHODS

This Descriptive Cross-Sectional study was done at Department of Nephrology, Liaquat University of Medical and Health Sciences Jamshoro from 3rd June 2019 to 2nd December 2019 and comprised 119 end stage renal disease patients. Adult patients had age 16-70years of either gender on maintenance hemodialysis with double lumen catheters, with duration of catheter insertion >2 weeks were included in the study, while Patients with alternative source of infections were excluded from the study. In all patients catheter related infections were diagnosed according to the standard criteria. All relevant information like name, age, gender, residence, history of diabetes, hypertension, and time since commencement of hemodialysis was noted. Data analysis was done by using SPSS version 21. Mean and standard deviation were calculated for age, duration of ESRD, duration on hemodialysis, and duration of catheter insertion. Frequency and percentage were calculated for gender, living area, diabetes, hypertension and catheter related infections. Effect modifiers such as age, gender, living area, hypertension, diabetes, duration of ESRD, duration on hemodialysis and duration of insertion were controlled through stratification. Post stratification chi-square test was applied to determine the difference of these effect modifiers on frequency of catheter related infections. P-value ≤0.05 was taken as significant.

RESULTS

The mean age was 55.8±10.34 years and mean duration on ESRD was 2.7±1.83 months. The mean duration on hemodialysis was 4.8±2.56 months and mean duration on catheter insertion was 27.4±6.05 days (Table 1). 70 (58.8%) patients were male and 49 (41.2%) were female. Diabetes mellitus was documented to be in 45 (37.8%) patients. Living area shows that 38 (31.9%) patients were live in rural areas while 81 (68.1%) were in urban area. Hypertension was noted in 75 (63%) patients. Catheters related infection was found in 61 (51.3%) patients. Stratification of age group, gender, diabetes mellitus, hypertension, living area, duration ESRD, duration on hemodialysis and duration on catheters insertion had been done with respect to catheters related infection as shown in Table 2.

Table 1: Descriptive statistics of the patients

Variable	Mean±SD
Age (range 16-70 years)	55.8±10.34
Duration on ESRD (range 1-12 months)	2.7±1.83
Duration of hemodialysis (range 2-15 months)	4.8±2.56
Duration of catheter (range 12-71 days)	27.4±6.05

Table 2: Stratification of variables with catheter related infection (n=119)

Variable	Catheter related infection		P value
	Yes	No	
Age (years)			
16-40	23 (19.3%)	35 (29.4%)	0.014
>40	38 (31.9%)	23 (19.3%)	
Gender			
Male	40 (33.6%)	30 (25.2%)	0.125
Female	21 (17.6%)	28 (23.5%)	
Residence			
Rural	18 (15.1%)	20 (16.8%)	0.125
Urban	43 (36.1%)	38 (31.9%)	
Hypertension			
Yes	36 (30.3%)	39 (32.8%)	0.353
No	25 (21.0%)	19 (16.0%)	
Diabetes			
Yes	21 (17.6%)	24 (20.2%)	0.434
No	40 (33.6%)	34 (28.6%)	
Duration of ESR (months			
1- 3	27 (22.7%)	39 (32.8%)	0.012
> 3	34 (28.6%)	19 (16.0%)	
Duration of hemodialysis (months)			
2 – 6	29 (24.4%)	40 (33.6%)	0.018
> 6	32 (26.9%)	18 (15.1%)	
Duration of catheter (days)			
12 – 30	37 (31.1%)	33 (27.7%)	0.677
> 30	24 (20.2%)	25 (21.0%)	

DISCUSSION

The prevention of bacterial contaminations in patients with acute kidney injury (AKI) or chronic kidney disease (ACKD) who hospitalized and accepting hemodialysis through a tunneled double lumen catheter (TDLC) is a worry for health experts. In spite of the fact that the TDLC is a significant segment in the treatment of these patients, these catheters additionally essentially add to blood stream infections.[9] Danger factors identified with catheters have been portrayed in numerous studies. We found a high danger of infectious complexities after tunneled double lumen catheter for hemodialysis.

In the current study, 55.5% of cases were guys which uphold the public and global literature revealing the majority of men.[10] With respect to, a few investigations have indicated that more aged patients are susceptible to complicate that progress to AKI[11-13] once they will in general be immunologically crippled, and regularly have coexisting chronically diseases, for example, hypertension and diabetes mellitus. Infection was the most widely recognized reason for patients' hospitalizations. These information show that 33% of patients admitted to the ICU because of infectious illnesses created AKI during the time of hospitalization and were related with a more terrible result.[12,13] Reasons for Acute kidney insult in this research had renal cause for 55.5% of patients, like a past data. The improvement of AKI was related with expanded mortality, longer medical clinic stays, and expanded expenses and assets. Vascular access for all cases was the tunneled double lumen catheter (TDLC), which was done by a cut in the femoral vein in 56.2%. Be that as it may, different studies have not exhibited an expanded danger of disease with the utilization of this procedure.[14,15] These information are like information from Parienti

et al[14], despite the fact that Mesiano et al[16] utilized the femoral vein in just 1.4% of their cases. The length of catheterization went from one to 30 days, patients utilized them for one to 10 days. With respect to the length of catheter term, there was no conflict among literature, which requires the temporary use for a limit of three weeks.[10,17] In national and global published guidelines, TDLC ought to be kept as long as five days in the femoral vein, and 21 days in the internal jugular and subclavian veins. In view of certain studies, the span of catheter use is the essential deciding variable for development of blood stream infection.[18] Most patients were going through one to six hemodialysis, which is comparable to different studies.[19] These patients had the most unfortunate outcome, arriving at 24 expires, yet we were unable to clarify it. Insertion site was infected in 10.4% of patients, which was lower than the research by Ferreira et al[17] 26 percent of swab cultures demonstrated microorganisms with a majority of gram-positive microscopic organisms, proposing a colonization of the skin flora before antisepsis.[8] Different studies in literature have demonstrated a relationship between microorganisms distinguished on the skin around the catheter and those got from the catheter tip. The presence of similar microorganisms in the tunneled double lumen catheter tip and the vein blood culture was affirmed by the research facility, supporting the BSI hypothesis identified with the catheter. Comparative information was found by Mesiano et al[16] and the data is lined up with different studies that recognized the addition of central venous catheters as one of the contributing factor for BSIs. The results of our study are comparable with multiple studies done locally and internally by various researchers. Some of them are discussed below. In our study, the mean age was found as 58.6±10.34 years. In a study conducted by Ali et al[20], the mean age of the cases was 42.69±6.86years. Qureshi et al[8], in his study reported that 37 (62%) patients were male and 23 (38%) were female. In the present study, the mean duration on ESRD, hemodialysis and catheter insertion were noted as 2.7±1.83, 4.8±2.56 months and 27.4±6.05 days, respectively. In current study, 119 patients were evaluated, out of which 70 (58.8%) patients were male and 49 (41.2%) were female. The study of Ali et al[20] also reported the gender distribution as 54 (41.90%) males and 75 (58.10%) females. Ferreira et al[17] stated that 60 (62.5%) patients were male and 36 (37.5%) were female in his study. In our study, diabetes mellitus was present in 45 (37.8%) patients. In the study of Parameswaran et al[21], diabetes was found in 29 (34.9%) patients. Alirezaei et al[22] reported that 26 (52%) patients were diabetic. In this study, living area shows that 38 (31.9%) patients lived in rural areas while 81 (68.1%) were from urban areas. In current study, hypertension was noted in 75 (63%) patients. Alirezaei et al[22] also noted hypertension in 42 (84%). In present study, catheters related infection was found in 61 (51.3%) patients. Parameswaran et al[21], reported that 83 (40%) patients had catheters related infection. However different results were shown by a study of Ali et al[20] which showed the prevalence of catheter related infection to 19 (14.7%). In the present study, there were catheter contaminations in 51.3% of patients, with a majority of gram-negative rods; of those, 14.3% blood stream infection was associated with tunneled double lumen catheter. The most generally discovered microorganism was Pseudomonas aeruginosa (10.4%), comparable to data of Qureshi et al.[8] The gram-negative microorganism's dominance might be related with patients' past contaminations. Staphylococcus aureus is the mostly reported microorganism in the literature and contamination in patients on hemodialysis is identified with high mortality. As indicated by Wong et al[23], bacteremia is related with rise of temperature in body, albeit sometimes, hyperthermia is just an aftereffect of an infection not identified with clinical bacteremia. Catheter tips were colonized in 40% of patients, and this happened most much of the time in catheters that stayed in for over 10 days, which was comparable to different studies. Bacteremia is normal in patients going through hemodialysis, and CVCs are the most widely recognized source of the infection. The tunneled double lumen catheter withdrawal in one third of patients was done after the patient's demise, as witnessed in different studies, in which infection was the primary cause.[12] Infectious illnesses related with AKI in patients admitted to the ICU are high and this is the main source of death among patients (62.5%).[24]

CONCLUSION

The catheter associated infections are alarmingly high and a major cause of morbidity and mortality in patients undergoing hemodialysis using double lumen hemodialysis catheters. Future imminent, there is a need to lead randomized controlled trials utilizing huge sample size with various investigation centers in Pakistan are expected to affirm the discoveries of the current investigation.

ETHICS APPROVAL: The ERC gave ethical review approval

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin

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CONFLICT OF INTEREST: No competing interest declared.

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