

COMPARISON OF FREQUENCY OF INFECTION BETWEEN INTERNAL JUGULAR AND FEMORAL VEIN DOUBLE LUMEN HEMODIALYSIS CATHETER IN CHRONIC KIDNEY DISEASE (CKD) PATIENTS

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ABSTRACT

Objective: To compare the frequency of infection between internal jugular and femoral vein double lumen haemodialysis catheter in chronic kidney disease (CKD) patients.

Study Design: Comparative prospective study.

Place and Duration of Study: Department of Medicine, Combined Military Hospital, Peshawar, from Jan to Jun 2018.

Methodology: A total of 400 patients (200 patients in each group) were included in this study. After insertion of catheter the patients were divided into 2 groups, group-A (jugular) and group-B (femoral) by lottery method and followed for development of catheter related blood stream infection (CRBI) within two weeks after its insertion.

Results: Mean age of the patients was 51.68 ± 13.29 and 50.89 ± 14.31 years in group-a and b, respectively. In group-A 193 (96.5%) and in group-B 196 (98%) patients presented with chronic kidney disease duration of <4 years, in group-A 7 (3.5%) and in group-B 4 (2%) patients presented with chronic kidney disease duration of >5 years. In both groups, 65 (32.5%) were diabetic. Catheter related blood stream infection (CRBSI) was found in 13 (6.5%) and 8 (14%) in group-A & B, respectively.

Conclusion: Infection frequently complicates double lumen catheters used for haemodialysis and infections are more frequent in patients with femoral vein catheter as compared to internal jugular vein.

Keywords: Catheter related blood stream infection, Chronic kidney disease, Femoral vein double lumen haemodialysis catheter, Internal jugular catheter.

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INTRODUCTION

Chronic kidney disease (CKD) is defined by irreversible deterioration in renal functioning as evident by decrease estimated glomerular filtration rate (eGFR) or parameters of renal dysfunction, generally established by elevated proteinuria. The severity of CKD is graded by level of eGFR¹. CKD is a global health burden with prevalence between 11-13% and majority of patients in stage 3 diseases². Epidemiology and risk factors of CKD are not extensively studied in Pakistan but diabetes mellitus (DM) and hypertension (HTN) were studied as major risk factors in urban population whereas glomerulonephritis, renal stones and CKD of unknown etiology are main factors in rural population³. According to various studies, highest prevalence of CKD was reported to be 29.9% and lowest being 12.5% with an overall prevalence of 21.2% in Pakistani adults⁴. There are various renal replacement therapy (RRT) modalities available to CKD patients including renal transplant, peritoneal dialysis and hemodialysis,

each having different features⁵. Haemodialysis is a basic modality of renal replacement therapy. Its efficacy and duration is dependent upon well-functioning vascular access⁶. The cornerstone of dialysis is gaining vascular access, while creating an arteriovenous fistula (AVF) remains the ultimate aim in the maintenance haemodialysis⁷. Short-term or long-term catheters are used for this purpose. Due to less stenotic and thrombotic complications, internal jugular vein is recommended as the first choice vascular access for haemodialysis⁸. As per recommendations, the right internal jugular vein is the first choice for vascular access followed by left internal jugular, femoral and subclavian vein respectively⁶. Catheters are not suited for long-term haemodialysis but in acute settings they offer number of advantages, acting as a bridge to permanent vascular access and useful for those who are ineligible for arteriovenous fistula⁹. There are many complications associated with centrally placed catheters but the two most common complications are catheter related blood stream infections (CRBI) and thrombosis. Occurrence of thrombosis limits utilizing vessels of arms on the side of catheterization for making arteriovenous fistulas (AVF) or grafts in future¹⁰.

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The aim of this study was to compare frequency of infection between internal jugular and femoral vein double lumen catheters in CKD pts on hemodialysis.

METHODOLOGY

It was a comparative prospective study conducted in outpatient, inpatient and emergency department of Medicine at Combine Military Hospital Peshawar, from January to June 2018. A total of 400 patients fulfilling inclusion criteria were included in study which were divided into two equal groups by lottery method. Group A patients had double lumen catheter placed in internal jugular vein while group B patients had catheter placed in femoral vein for hemodialysis. Sample size was calculated with the help of WHO calculator, level of significance was 5%, power of test was 80%, anticipated population proportion was 1.80% and anticipated population proportion was 6.94%. Sampling was done by non-probability consecutive sampling. Study was approved by ethics review committee of the hospital vide certificate no A/28/DEC-2018 dated 1st December 2018. Written informed consent was taken from patients involved in the study.

CKD patients of both genders, aged 16-80 years on maintenance hemodialysis with serum creatinine of >700 $\mu\text{mol/L}$, haemoglobin >8 gm/dl, serum potassium >6.5 mmol/L were included in study. Patients having INR >1.4, non-catheter related infections, platelets count <50,000, subclavian vein catheter, age <14, catheters placed for non-dialysis purposes were excluded from study.

Patients fulfilling inclusion criteria were admitted in ward both from emergency and OPD, were evaluated for hemodialysis by performing, complete blood profile (for haemoglobin and platelets), renal function test/electrolytes (for creatinine and potassium), coagulation profile (for INR), chest X-ray and Urine RE (for excluding non-catheter related infections). Double lumen insertion was performed under ultrasound guidance. After insertion of catheter the patients were followed for development of catheter related blood stream infection (CRBI) by clinically evident fever of >99°F and/or discharge from catheter site within two weeks after insertion of catheter. Data was analyzed in SPSS-17. The mean standard deviation was calculated for quantitative variables i.e. age and duration of CKD. The frequency and percentage were calculated for qualitative variable i.e. catheter related blood stream infection, gender and DM. Comparison of infection between two groups was made by chi square test, p -value ≤ 0.05 was taken as significant.

RESULTS

A total of 400 patients were divided into two groups, group-A (jugular) and group-B (femoral) by lottery method. Mean age of the patients was 51.68 ± 13.29 and 50.89 ± 14.31 years in group-A and B, respectively (table-I). In group-A 148 patients (74%) and in group-B 141 patients (70.5%) were males while 52 patients (26.0%) in group-A and 59 patients (29.5%) were females (table-I). In group-A 193 (96.5%) and in group-B 196 (98%) patients presented with CKD duration of <4 years, in group-A 7 (3.5%) and in group-B 4 (2.0%) patients presented with CKD duration of >5 years (table-I). In both groups, 65 (32.5%) were diabetic (table-I). Catheter related blood stream infection was found in 13 (6.5%) and 28 (14%) in group-A and B, respectively. Statistically significant difference was observed between two groups with p -value 0.013 (table-II).

Table-I: Clinical characteristics of the patients.

Variables	Group A (Internal Jugular Vein)	Group B (Femoral Vein)
Age		
Mean \pm SD	51.68 \pm 13.29	50.89 \pm 14.31
Gender		
Male	148 (74%)	141 (70.5%)
Female	52 (26%)	59 (29.5%)
Duration of Chronic Kidney Disease		
≤ 4 Years	193 (96.5%)	196 (98%)
≥ 5 Years	7 (3.5%)	4 (2%)
Mean \pm SD	2.07 \pm 1.7	2.04 \pm 1.08
Diabetes Mellitus		
Yes	65 (32.5%)	65 (32.5%)
No	135 (67.5%)	135 (67.5%)

Table-II: Catheter related blood stream infection.

Catheter Related Blood Stream Infections	Group A (Internal Jugular Catheter)	Group B (Femoral Vein Catheter)	p -value
Yes	13 (6.5%)	28 (14%)	0.013
No	187 (93.5%)	172 (86%)	

DISCUSSION

Blood stream infection or bacteremia is most common complication noted after insertion of double lumen catheter (DLC) and studies conducted in Turkey and Netherlands concluded that the complication of bacteremia or blood stream infection after double lumen catheter insertion reached up to 22% and 23.9% respectively¹¹. Study conducted at Jinnah Postgraduate Medical Centre Karachi by Ali *et al* reported that 14.7% patients developed catheter related infections¹². Various types of infections including exit site infections, localized infections, blood stream infections and poc-

ket infections can occur due to double lumen catheters. There is almost 10 folds increased risk of bacteremia with catheters as compared to arteriovenous (AV) fistulas¹³.

History of bacteremia and bacteruria, previous catheter related infection, MRSA carriage in previous 3 months before implantation of catheter were identified as prominent risk factors for CRBSI in study conducted by Delistefani *et al*¹⁴. Duration of catheter insertion was also determined as infection risk factor in a study and risk of infection increases after 2 weeks of insertion so these must be removed and replaced at different site within 2 weeks to prevent infections¹⁵. Catheter insertion site is also important determinant of infection and femoral vein is associated with higher infection and thrombosis rate as compared to subclavian vein¹⁶.

Study conducted in 2018 revealed 51% of catheters had microbiological colonization, catheter related bloodstream infection was found in 14.3% of patients and catheter insertion site infection was observed in 10.4% patients. Results of our study are in congruence with study conducted by Viviane Ferriera which concluded that 32.9% cases with femoral vein catheters developed bloodstream infections in comparison to 18.75% patients with jugular vein catheters¹⁷. Another study concluded that there is remarkably lower risk of infections in internal jugular vein catheterization (22.2%) in comparison to femoral (33.3%)¹⁸. Catheter related bloodstream infections can be reduced by using ethanol locks and strictly adhering to insertion and maintenance bundles and usage of single lumens when appropriate¹⁹.

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CONCLUSION

Infection frequently complicates double lumen catheters used for haemodialysis. Although double lumen catheters provide satisfactory means for haemodialysis, they are frequently complicated by infections and infections are higher in femoral vein double lumen catheters as compared to internal jugular vein catheters.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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