

## Infections and Malfunctions of Temporary Femoral Catheters - Hospital vs Ambulatory Patients

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### Introduction

The use of central venous catheters as a temporary or permanent vascular access (VA) for hemodialysis (HD) patients has increased greatly over the last two decades. Percutaneously inserted double-lumen central venous HD catheters in femoral, subclavian or jugular vein provide the nephrologist with an excellent temporary access for an immediate HD treatment(1). Although femoral catheterization (FC) is fast, simple and associated with a low risk of complications, it is not recommended by most of the authors. According to the literature, femoral catheterization is restricted to a few days - NKF- K/DOQI (2), and should not be allowed as an ambulatory access (3). Our experience differs, FC is used as a temporary VA in patients (pts) going on regular HD, for longer period. We have twenty seven years experience with femoral catheterisation ( we have inserted about 7000 FC), and in previous years annually we have made about 350 femoral catheterisations (4).

### Material and methods

The study prospectively examined the outcome of a group of 460 patients(pts) receiving HD treatment via 501 FC. Femoral catheters were inserted at the Vascular Access Unit at the Department of Nephrology , Clinical center in Skopje, for the time period of 3 years. Dual-lumen polyurethane non-cuffed HD catheters were inserted and maintained by the same trained medical team consisting of experienced nephrologists and specially trained nurses. Catheters were removed when no longer required (a permanent vascular access was provided), or significant complications occurred (malfunction or suspected catheter - related infection). We took blood culture from peripheral vein (BCP) and from catheter (BCC) at the same time when we suspected infection (high temperature, chills) connected with HD and when we removed the catheter. BCP and BCC were correlated with semi-quantative cultures of the catheter tip (CT). Catheter swab (CS) was taken when we have a suspicion of local infection. Catheter -related infection (CRI) was defined by the association of fever (>38 C) and the isolation of an identical microorganism from cultures of blood and the CT in an absence of an alternative source (5). After each HD the catheter exit site was reviewed, and at home pts usually took temperature, in the morning and in the evening, and reported if they have had high temperature or chills.

The study population was composed of pts with end stage disease treated with hemodialysis and they were divided into two groups. Group A (hospitalized pts) consisted of 341 pts with 364 FC started with with HD ( 195 male and

165 female, average age 51,07 years ), and group B (ambulatory pts) consisted of 119 pts with 137 FC who were on regular ambulatory HD and had a problem with permanent VA (71 male and 66 female, average age 52,46 years. In group B FC were inserted ambulatory and pts were sent home with FC. Univariate and multivariable analysis were conducted to examine association of hospital/ambulatory placed FC with : sex, comorbidity of diabetes/malignancy, number of previous catheters, number of previous thrombosed AVF, catheters swab (positive/negative), microbiological analysis of catheter tip (positive/negative), blood culture (positive/negative) as a risk factors.

### Results and discussion

Duration of FC were: Group A 5-120 days (median 32d) with cumulative total of 11 818 days; Group B 6-199d (mediana 45 d) with cumulative total of 6132days. Mostly of the femoral catheters were electively removed: Group A-320 (88%), Group B -130 (95%). The percentage of malfunction of FC was small: Group A-18(4,9%), Group B -5(3,6%); suspected catheter-related infection (CRI) Group A -18 (4,9%), Group B -2(1,4%). Infection rate (number of infective episodes/1000 catheter days): Group A -1,52 episodes/1000 cath.days, Group B -0,81 episodes/1000cath. days. In our study the incidence of bacteraemia in ambulatory pts undergoing hemodialysis was 0,81 episodes/1000 catheter days; compared with hospitalised pts (with 1,52 episodes/1000 catheter days) they have less incidence of bacteraemia. In group B pts have 2 (53,3%) or 3 (25,3%) previous femoral catheters, and 1 (54,6%) or 2(24,5%) previous thrombosed AVF. Kaplan-Meier curve of survival show significant statistical difference between 60 and 80 catheter day of survival between two groups (log-rank test p=0,00001).

Univariate analysis do not reveal significant risk factors in both groups for sex, comorbidity of diabetes/malignancy, number of previous catheters, number of previous thrombosed AVF, catheters swab (positive/negative), microbiological analysis of catheter tip (positive/negative), blood culture (positive/negative). Univariate analysis shows that none of the analyzed parameters can be used as a prognostic risk factor in Group A and in Group B.

With multivariate analysis in Group A we found two prognostic risk factors: sex (p=0,002905) and blood culture (p=0,006883); and in Group B risk factors were:- number of previous thrombosed AVF (p=0,049508) and comorbidity of diabetes/malignancy (p=0,009928). The infection and malfunction free survival time was not affected by other analyzed risk factors.

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### Conclusion

Most catheters were removed because of provided permanent VA and not due to complications.

Average time of 45 days of duration of FC in group of ambulatory pts shows that catheters can be used long time in ambulatory conditions too, and if they are treated well they do not have complications.

Recognizing and knowing the risk factors that are associated with infection and malfunction of the catheters can prevent complications. We concluded that FC can be used for a longer period of time for ambulatory HD without any problem (6,7). If educated and well trained nurses take care of inserted femoral catheters and if doctors instruct patients how to take care of their FC, we can save a lot of money, as the need for hospitalization of these patients is very low. With careful follow up, patients could be sent home with FC without a high risk of complication.

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