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INTRODUCTION

Native arteriovenous fistula (AVF) is regarded as the best access for hemodialysis (HD). Patients accepted for dialysis are increasingly elderly and with comorbidities, in whom creation of an AVF may neither be possible nor appropriate. Frequent HD is possibly associated with an increased risk of vascular access complications. Central venous catheter is considered a secondary vascular access option to conventional thrice-weekly HD, but there have been no studies comparing different vascular access types in a frequent hemodialysis setting.

AIMS

This study aims to determine frequency and outcomes of AVF and tunneled hemodialysis catheter (THC) on incident in-center short daily hemodialysis (SDHD) patients over a 12-year period.

METHODS

Data were collected on the type of access used for first HD, including AVF, THC, temporary central venous catheter (tCVC) or arteriovenous graft (AVG) from January 2006 to December 2017. Comparative outcomes between AVF and THC were analyzed, such as absence of access dysfunction, access-related infection and access-related hospitalization. Information were also gathered on cumulative transplantation rate and 5-year actuarial survival of 117 consecutive unselected private-insured patients (63M/54F; mean age at dialysis initiation was 57.8±20.7 yrs, range 8-92) receiving in-center short daily hemodialysis treatments (6-7 times/week; lasting 118±18.7 min, range 90-180; ultrapure dialysate and single-use high-flux dialyzer). All vascular procedures were done by an associated vascular surgeon with extensive experience in determining eligibility for hemodialysis access type and location, as well as placement and follow up care. Buttonhole cannulation was the standard technique for AVF punctures, while THC use protocol included dedicated nursing team, transparent dressing, closed connector device and use of antibiotic lock and thrombolytic drugs whenever needed.

RESULTS

A total of 117 incident short daily hemodialysis patients were enrolled in the study. Thirty-three percent (39/117) were first dialyzed through a mature arteriovenous fistula (AVF), while 67% (78/117) required an internal jugular catheter for starting HD - 40% THC and 27% tCVC. Throughout follow-up 71% (22/31) of tCVC switched to THC, while 29% (9/31) converted to AVF (p=0.001). No patients used AVG. There was a trend of THC users at dialysis initiation to be older (63.8±22.9 vs 55.4±18.1 yrs, p=0.069), diabetic (38% vs 28%, p=0.334) and less likely to get transplanted (15% vs 32% cumulative kidney transplantation rate, p=0.064), whilst having a significantly lower cumulative 5-year survival (45% vs 74%, p=0.007) when compared to AVF users. Over the 12-year study period 53% of AVF and 47% of THC needed no repair, replacement or modality shift (p=0.585). Access local or exit site infection rates were 0.49 and 0.81 events per 1,000 patient- and catheter-days in AVF and THC users (p=0.077) and bacteremia rates were 0.27 and 0.47 events per 1,000 patient- and catheter-days, respectively (p=0.130). Access-related medical hospitalization occurred only once in a THC user (endocarditis).

DISCUSSION

Our pre-dialysis interdisciplinary care modulates the primary vascular access option for all patients commencing in-center SDHD. Overall, 73% initiated their first dialysis treatment with a permanent vascular access (33% AVF, 40% THC). On intensive maintenance hemodialysis, the mean prevalence rate over the years has been around 50% of both AVF and THC. Although the preferential use of AVF for patients undergoing conventional thrice-weekly hemodialysis is based on better patient and access survival, there is uncertainty about the comparative effectiveness of different vascular access types in intensive hemodialysis. Daily hemodialysis, a growing intensive dialysis modality, increases the number of AVF cannulations per week and overall stress on the access and has been associated with higher incidence of complications when compared with thrice-weekly schedule. While daily punctures may be harmful to AVF structure and function, THC outcomes may be benefited by daily inspection, rinse and lock renewal. In consistency with this assertion, our 12-year in-center SDHD experience, under strict protocols for nursing care and proper management, shows no differences in access outcomes between AVF and THC users. THUS, THC may represent a suitable dialysis access option for intensive hemodialysis treatment.

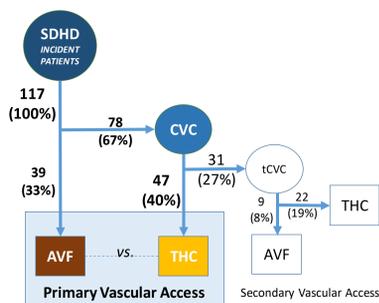
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117 INCIDENT IN-CENTER SHORT DAILY HEMODIALYSIS PATIENTS

OUTCOMES BASED ON THE PRIMARY VASCULAR ACCESS TYPE

FLOWCHART OF STUDY POPULATION



* Chi-squared test

PATIENT CHARACTERISTICS AND OUTCOMES

	AVF	THC	Significance
Mean Age at Dialysis Initiation	55.4 +/- 18.1 (years)	63.8 +/- 22.9 (years)	p = 0.069
Diabetes	28 (%)	38 (%)	p = 0.332
Cumulative Kidney Transplantation Rate	32 (%)	15 (%)	p = 0.064
Cumulative 5-year Survival Rate	74 (%)	45 (%)	p = 0.007

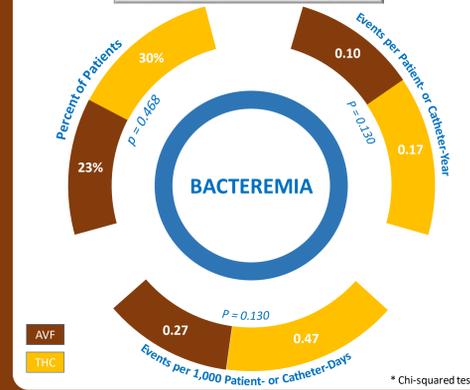
* Chi-squared test

VASCULAR ACCESS OUTCOMES

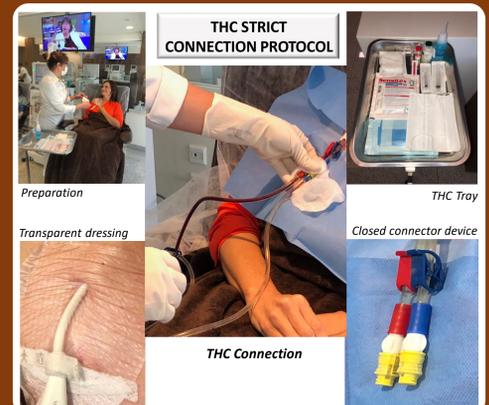
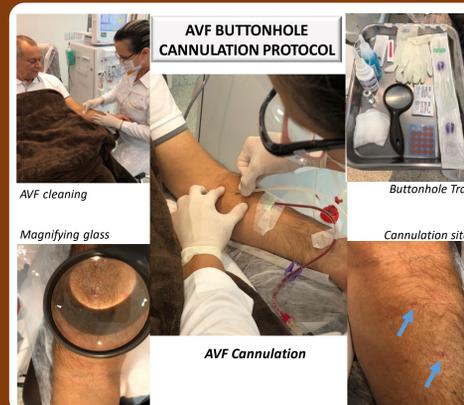
	AVF	THC	Significance
No Repair, Replacement or Shift Rate	53 (%)	47 (%)	p = 0.585
Local/Exit Site Infection Rate	0.49 (events per 1000 patient-days)	0.81 (events per 1000 catheter-days)	p = 0.077
Bacteremia Rate	0.27 (events per 1000 patient-days)	0.47 (events per 1000 catheter-days)	p = 0.130

* Chi-squared test

VASCULAR ACCESS BACTEREMIA RATE



* Chi-squared test



CONCLUSIONS

In our in-center short daily hemodialysis program using the vascular access up to twice as often, in spite of adverse inherent patient characteristics starting hemodialysis with THC, under strict placement and maintenance protocols, has provided long-term access outcomes similar to AVF. Vascular access may no longer be a barrier for enhancing universal adoption of intensive HD.

AVF vs THC FOR DAILY MAINTENANCE HEMODIALYSIS Daily Routine as Compared to Thrice-Weekly Routine

AVF Challenges

- Daily Cannulation
- Overall Stress
- Exposure to Pathogens



THC Benefits

- Daily Inspection
- Daily Rinse
- Daily Lock Renewal

Challenges and Benefits for a Balanced Decision