

Atherosclerotic Renovascular Disease (ARVD) in Older US Patients Starting Dialysis, 1996-2001

Haifeng Guo MS¹, Philip A. Kalra MB², David T. Gilbertson PhD¹, Jiannong Liu PhD¹, Shu-Cheng Chen MS¹, Areef Ishani MD³, Allan J. Collins MD FACP¹, Robert N. Foley MB¹
¹United States Renal Data System, Minneapolis, Minnesota, USA, ²Department of Renal Medicine, Hope Hospital, Salford, UK, ³Department of Medicine, Minneapolis Veterans Affairs Medical Center, Minneapolis, Minnesota, USA

Introduction

- End-stage renal disease (ESRD) and atherosclerotic renovascular disease (ARVD) are both associated with older age.
- Although the number of older incident dialysis patients and their associated comorbidity continue to grow, the burden of ARVD in current dialysis populations is unknown.
- Temporal trends regarding the epidemiology of ARVD are poorly defined.

Methods

- Patients:**
 - Aged 67 years or older at initiation of maintenance dialysis therapy.
 - Initiation of dialysis therapy in years 1996 through 2001.
 - Medicare as primary payor for at least two years prior to the initiation of dialysis therapy.
- Coding:**
 - ARVD is defined by one or more ICD-9-CM diagnosis codes 440.1 and 593.81.
 - Renal revascularization is defined by one or more ICD-9-CM procedure codes or CPT codes.

- Cardiovascular events were defined as the presence of one inpatient hospitalization, skilled nursing facility, or home health agency code, two outpatient or more physician/supplier codes, or one outpatient and one physician/supplier codes, less than one year apart.
- Analysis:**
 - Logistic regression was used for multivariable comparisons of patients with and without ARVD and ARVD patients with and without revascularization.
 - Patients were followed until December 31, 2002 for death and cardiovascular events outcome, with censoring at renal transplant.
 - Multivariable Cox proportional hazard models were used to test associations between ARVD and outcome events, with adjustment for baseline characteristics.

Results

- 146,973 patients were studied.
- Although the proportion with prior ARVD rose from 7.1% in 1996 to 11.2% in 2001 (AOR 1.68), the proportion with renovascular disease listed as the cause of ESRD remained constant at approximately 5% in each annual cohort.
- Hypertension (AOR 2.21 compared to diabetes mellitus as reference category) and dialysis network (AOR varying from 0.44 in Network 17 to 1 in Network 1 [ref.]) were the most notable association of ARVD.
- Other associations included peripheral vascular disease (AOR 1.65), Black race (AOR 0.44), urologic cause of ESRD (AOR 0.57), age > 85 (AOR 0.58), substance dependency (AOR 0.62), and inability to ambulate or transfer (AOR 0.67).
- 16.2% of patients with ARVD underwent renal revascularization before dialysis initiation. The proportion rose from 14.6% to 16.7% between 1996 and 2001 (AOR 1.27).
- Other associations of revascularization included hypertension as the cause of ESRD (AOR 2.10), dialysis network (AOR varying from 2.07 for Network 13 to 1.00 for Network 1 [ref.]), peripheral vascular disease (AOR 1.36), age > 85 (AOR 0.53) and Black race (AOR 0.54).

Figure 1

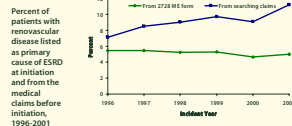


Table 1

Prognostic associations of ARVD and revascularization ARVD, and revascularization	Death		ASHD		CHF		CVA/TIA		PVD	
	HR	p-value	HR	p-value	HR	p-value	HR	p-value	HR	p-value
Event Rate (per 1,000 pt. years)										
ARVD										
No (ref)	1		1		1		1		1	
ARVD	0.94 (0.92, 0.96)	<0.0001	1.28 (1.26, 1.31)	<0.0001	1.12 (1.10, 1.14)	<0.0001	1.28 (1.26, 1.29)	<0.0001	1.26 (1.23, 1.29)	<0.0001
No revascularization	0.95 (0.93, 0.96)	<0.0001	1.27 (1.24, 1.29)	<0.0001	1.11 (1.09, 1.14)	<0.0001	1.18 (1.14, 1.21)	<0.0001	1.48 (1.44, 1.51)	<0.0001
Revascularization	0.88 (0.85, 0.93)	<0.0001	1.38 (1.32, 1.45)	<0.0001	1.17 (1.11, 1.23)	<0.0001	1.30 (1.23, 1.38)	<0.0001	2.11 (2.01, 2.21)	<0.0001
Revascularization as primary cause of ESRD										
No (ref)	1		1		1		1		1	
Yes	0.92 (0.89, 0.95)	<0.0001	1.24 (1.21, 1.27)	<0.0001	1.07 (1.04, 1.10)	<0.0001	1.21 (1.17, 1.26)	<0.0001	1.81 (1.76, 1.86)	<0.0001

HR, adjusted hazard ratio; ESRD, end-stage renal disease; CHF, congestive heart failure; CVA/TIA, cerebrovascular accident or transient ischemic attack; PVD, peripheral vascular disease.

- 5.2% of patients had renovascular disease listed as their primary cause of ESRD and 21.6% of these ARVD patients underwent renal revascularization.
- ARVD was associated with a greater likelihood of atherosclerotic heart disease (AHR 1.28, P < 0.0001), congestive heart failure (AHR 1.12, P < 0.0001), stroke (AHR 1.20) and peripheral vascular disease (AHR 1.56, P < 0.0001), but not with mortality (0.94, P < 0.0001).

Conclusions

- ARVD, and revascularization for ARVD, have become more common recently in older dialysis patients.
- The primary cause of ESRD listed on the Medical Evidence Form (2728) underestimates the increasing burden of ARVD in latter day dialysis patients.
- Demographic factors, such as age, race and geographic residence are associated with diagnostic and therapeutic triage, suggesting that barriers to care may exist.