The Elbow Brachial Arteriovenous Fistula is the First Choice

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Disclosures

None



KDOQI Guidelines

- The fistula first initiative

 Led to rise in AVF prevalence: 32% to 61%

 Less mentioned guidelines

 < 10% dialysis of HD via catheter
 - Catheter should be used < 90 days</p>



Problems with Fistula First at All Cost Approach

- A high proportion of new AVF do not mature
- Up to 60% AVF unsuitable even after 4-5 months
- Attempting AVF that is unlikely to work has consequences
 - Indwelling catheter
 - Catheter related infections
 - Central vein stenosis
 - Veins in arm may be thrombosed precluding subsequent graft placement

Dember et al. JAMA May 14, 2008 Vol 299 No 18 2164-2171

Trends in vascular access type at hemodialysis initiation according to the U.S. Renal Data System.



Charmaine E. Lok, and Robert Foley CJASN 2013;8:1213-1219



Lok and Foley, CJASN 2013

- Nearly 80% of US population initiate HD via central catheter
- 1 year HD mortality higher with catheter
- mortality is reduced when convert catheters to AVF or AVF within the first year of dialysis

Lok and Foley, CJASN 2013

- Most of dialysis patient mortality occurs in the first year of HD
- Death due to cardiovascular disease and infection peak in 2nd month after HD initiation

Special Article

Fistula First Breakthrough Initiative: Targeting Catheter Last in Fistula First

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- Rather than thinking of Fistula First, we should think: Catheter for Shortest Time
- Choose Access site that will lead to shortest catheter time
- And will limit catheter to < 90 days

Brachial artery-Cephalic vein AVF at Elbow

Advantages over wrist radiocephalic

- Has higher blood flow
- Easy to cannulate
- Cosmetic benefit
- Better functional patency
- Fewer tributaries
- Less likely to have been damaged by phlebotomy

THE RADIOCEPHALIC NOT IDEAL in MANY INSTANCES

- Women
- Black race
- Elderly (> 75 years)
- Diabetics with extensive calcification

Women have smaller radial arteries

- Mean diameter of radial artery in women was only 1.9 mm
 - Racial and Gender Differences in Arterial Anatomy of the Arm, Pham et al Am Surg 2016
- Small radial arteries predict AVF failure
 - Pre-operative radial arterial diameter predicts early failure of arteriovenous fistula (AVF) for haemodialysis Eur J Vasc Endovasc Surg 2007

Ethnic differences in arm vein diameter and arteriovenous fistula creation rates in men undergoing hemodialysis access Ishaque et al JVS 2012

CEPHALIC VEIN LOCATION	Black race	Non-Black race	P value	
Proximal upper arm	2.6	2.8	0.1	
Distal upper arm	2.4	3.0	0.02	
Proximal forearm	2.0	2.5	0.03	
Distal forearm	1.7	2.1	0.05	

Radiocephalic patency affected by intimal/medial disease Korean J Intern Med 2017



Worse AVF and Radiocephalic Outcomes in Elderly

- Patients > 65 have increased risk of AVF maturation failure (RR of 1.7)
- Brachiocephalic AVFs have superior patency at 12 months (72.7%) vs radiocephalic (65.1%)



Journal of Vascular Surgery

Volume 62, Issue 2, August 2015, Pages 442-447



Clinical research study

From the Western Vascular Society

Increased use of brachiocephalic arteriovenous fistulas improves functional primary patency

Presented at the Twenty-ninth Annual Meeting of the Western Vascular Society, San Diego, Calif, September 20-23, 2014.

Jerry J. Kim MD ^a, Edward Gifford MD ^a, Virginia Nguyen BS ^a, Amy H. Kaji MD, PhD ^{b, c}, Patrick Chisum BS ^a, Annie Zeng ^a, Ramanath Dukkipati MD ^{b, c}, Christian de Virgilio MD ^{a, c} A 🖾

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Technique

- Below elbow incision
 Small transverse
- Local anesthesia
- Footplate
- 5-6 mm arteriotomy
- Ligate lateral cephalic



Background

- We observed
 - Higher failure rates with radiocephalic
 - Majority of pts presented with central catheter
 - Couldn't risk repeat AVF failures
- Moved to brachiocephalic as primary site for AVF
 - Concerned we might see more steal



Methods

- Period 2 implementations:
 - Favor brachiocephalic location if:
 - Patient already on hemodialysis, with marginal wrist cephalic vein
 - Diminished radial pulse, concern for distal calcification
 - Too numerous tributaries in cephalic
 - Female, black race, elderly
 - Arteriotomy 6 7mm
 - Venous footplate at brachiocephalic location whenever possible



Operative findings

	Period 1 (94)	(%)	Period 2 (97)	(%)	OR	P-value
Type of fistula						
- Radiocephalic	34	36	22	23		0.06
- Brachiocephalic	35	37	54	56	2.1	0.01
- Brachiobasilic	17	18	15	16		0.7
- Brachial - brachial	8	9	2	2		0.06
- Snuffbox	0	0	4	4		0.1
Intraoperative thrill	92	98	95	98		1
Artery size (mm)	2.7		3.4			0.01
Vein size (mm)	3.7		4.5			<0.001
Arteriotomy (mm)	5.2		6.5			<0.001

Maturation outcomes and complication rates

	Period 1 (94)	(%)	Period 2 (97)	(%)	OR	P value
Early failure	1	1	0			1
Failure to mature	9	10	2	2	0.2	0.03
Maturation time (days)	69		56			0.3
Required second stage	25	27	20	21		0.3
Steal	3	3	4	4		1
Catheter infection	7	7	0		NA	0.006
Death	1	1.1	2	2.1		1

Conclusion

- Elbow (brachiocephalic) preferred location for AVF
 - Patients on dialysis via CC (60-80% in US)
 - Elderly
 - Women
 - Black race
 - Severe disease in radial artery



Thank you

