2018 MID-ATLANTIC
CONFERENCE

8th ANNUAL CURRENT CONCEPTS IN
VASCULAR THERAPIES

2018

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April 28th 2018

# Dialysis Access Review: Understanding the Access Options our Patients Face

# Disclosures

# Outline

- Dialysis Background
  - Why is it important?
- National Kidney Foundation (NKF)
  - Kidney Disease Outcome Quality Initiative (KDOQI)
- AV Access Options

# Dialysis Background

- More than 661,000 Americans have ESRD
  - 468,000 individuals are on dialysis
  - 193,000 live with a functioning kidney transplant
- Incidence (newly reported cases) of ESRD in US is approximately 117,000 per year
- Hemodialysis treatment costs an average of $89,000 per patient annually in the United States
- Math: 468,000 x $89,000 = $41,652,000,000.00

# Dialysis Background

- Total annual hemodialysis cost in the United States is **$42 Billion**
  - Porn industry in US is only 10 billion
- **$34 Billion** of this is absorbed through the Medicare budget
  - Who pays the difference?

# Dialysis Background

- Life expectancy on dialysis can vary depending on your other medical conditions
  - **Average life expectancy on dialysis is 5-10 years**
  - In the past average life expectancy was only 2 years
  - Patients have lived well on dialysis for 20 or even 30 years.

# Dialysis Background

- There are 6,479 dialysis facilities in the U.S.
  - Only 617 are hospital based (inpatient dialysis units)
  - There are 5,604 Taco Bell restaurants in the United States
- Compared to Caucasians, ESRD prevalence is
  - 3.7 times greater in African Americans
  - 1.4 times greater in Native Americans
  - 1.5 times greater in Asian Americans

# Dialysis Background

- Primary cause of ESRD
  - 37.4% Diabetes
  - 25.1% Hypertension
- As of December 31st 2013
  - 63.7% were receiving hemodialysis therapy
  - 6.8% were receiving peritoneal dialysis
  - 29.2% had a functioning kidney transplant

# Outline

- ~~Dialysis Background~~
  - ~~Why is it important?~~
- National Kidney Foundation (NKF)
  - Kidney Disease Outcome Quality Initiative (KDOQI)
- AV Access Options

# National Kidney Foundation (NKF)

- The National Kidney Foundation is the leading organization in the U.S. dedicated to the awareness, prevention and treatment of kidney disease
- Initially started as a committee in November 1950
  - Harry and Ada Debold formed committee for nephrosis research in a desperate attempt to save their child
- Founded in 1964
- *https://www.kidney.org*

# National Kidney Foundation (NKF)

- Contributions
  - 1997 published the Kidney Disease Outcome Quality Initiative (KOQI) Practice Guidelines
  - 1997 Kidney Early Evaluation Program (KEEP)
  - 2002 CKD Practice Guidelines
  - 2003 Kidney Disease Improving Global Outcomes (KDIGO)
  - 2007 Take Action Network

# KDOQI

- What is KDOQI?
- Clinical practice guidelines are intended to assist practitioners caring for patients in preparation for and during hemodialysis
  - First established in 1997
  - Latest update in 2015
  - 12 practice guidelines
  - 47 page document (Yes, I read all 47 pages!)

# KDOQI

- Guideline 1: Timing of Dialysis Initiation
  - Patients who reach CKD stage 4 (GFR , 30 mL/min/1.73 m2), should receive education about kidney failure and options for its treatment - kidney transplantation, PD, HD in the home or in-center

| Stages of Chronic Kidney Disease of all Types | | |
|---|---|---|
| **Stage** | **Qualitative Description** | **Renal Function (mL/min/1.73 m²)** |
| 1 | Kidney damage-normal GFR | ≥90 |
| 2 | Kidney damage-mild ↓ GFR | 60-89 |
| 3 | Moderate ↓ GFR | 30-59 |
| 4 | Severe ↓ GFR | 15-29 |
| 5 | End-stage renal disease | <15 (or dialysis) |

# KDOQI

- Guideline 2: Initiating Maintenance Dialysis
  - The decision to initiate maintenance dialysis should be based primarily upon an assessment of signs/symptoms
    - Uremia
      - Loss of appetite, fatigue, nausea, vomiting, AMS
    - Protein-energy wasting
      - Proteinuria
    - Metabolic abnormalities (Hyperkalemia)
    - Volume overload (leg edema, CHF)

# KDOQI

- Guideline 3: Selection and Placement of Hemodialysis Access
  - Access should be placed distally and in the upper extremities when possible
  - Options for fistula placement should be considered first, followed by prosthetic grafts if fistula placement is not possible
  - Catheters should be avoided and used only when other options are not available

# KDOQI

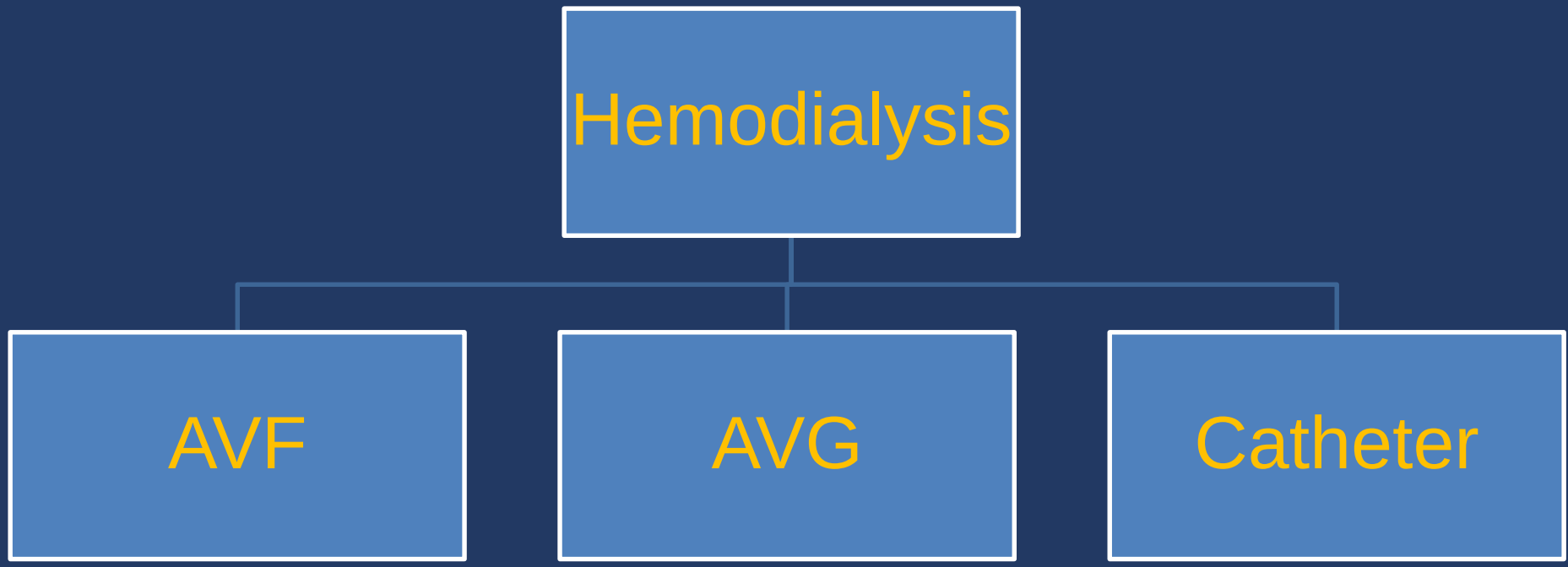
- Guideline 4: Fistula First Initiative
  - In 2003 the CMS and NKF jointly formed and implemented a National Vascular Access Improvement Initiative called the Fistula First Initiative (FFI)
  - The primary goal of this continuous quality improvement (CQI) project was to increase the appropriate use of AVF for HD access
  - **The current goal is to have 65% of patients using an AVF for hemodialysis**
    - **Sentara Vascular Specialists - 84% using AVF**

# Outline

- ~~Dialysis Background~~
  - ~~Why is it important?~~
- ~~National Kidney Foundation (NKF)~~
  - ~~Kidney Disease Outcome Quality Initiative (KDOQI)~~
- AV Access Options

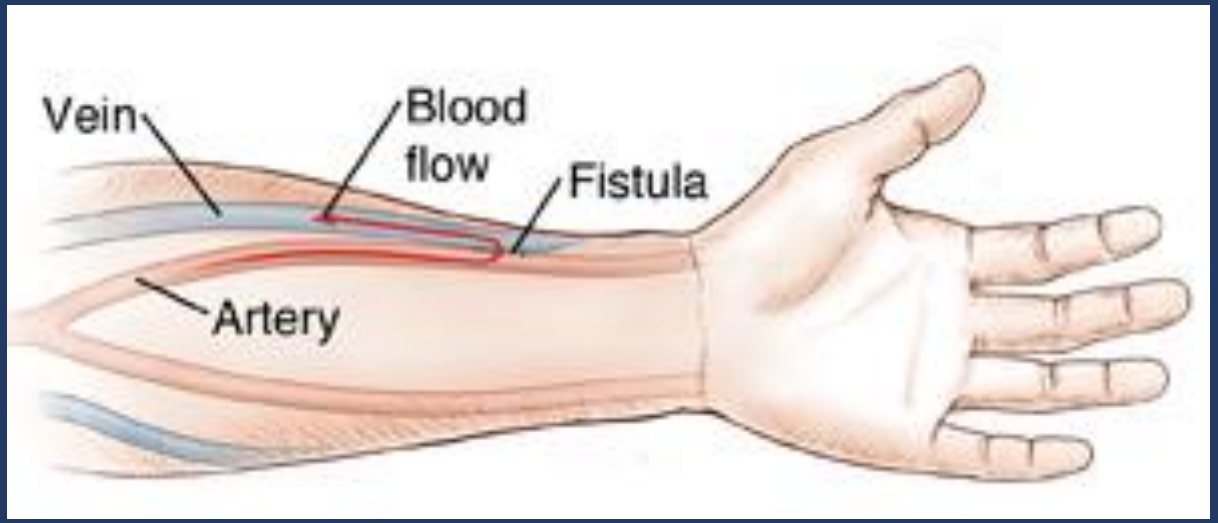
# AV Access Options

What are the options for Hemodialysis?




# AV Access Options

- ArterioVenous Fistula (AVF)
  - Surgically created **Direct Connection** of an artery to a vein




# AV Access Options

- ArterioVenous Fistula (AVF)
  - Fistulas are the **GOLD STANDARD** for AV access
    - It has a lower risk of infection
    - It has a lower tendency to thrombose
    - It allows for greater blood flow and reduces treatment time
    - It stays functional longer than other access types
    - It's usually less expensive to maintain
  - Disadvantage
    - Lengthy maturation time (8-12 weeks) or never maturing at all

# AV Access Options

- ArterioVenous Fistula (AVF)
  - Maturation rate – 70%
    - 50% will need assistance to mature - BAM, surgical revision, branch ligation or embolization, superficialization
  - Failure rate – 30%
  - **Important to find a good caliber vein ( ≥ 3mm) and a good caliber artery (noncalcified)**
  - **Vein mapping is typically used to identify the arm vessels**

# AV Access Options

- ArterioVenous Fistula (AVF)
  - When is an AVF considered mature – Rule of 6's

# AV Access Options

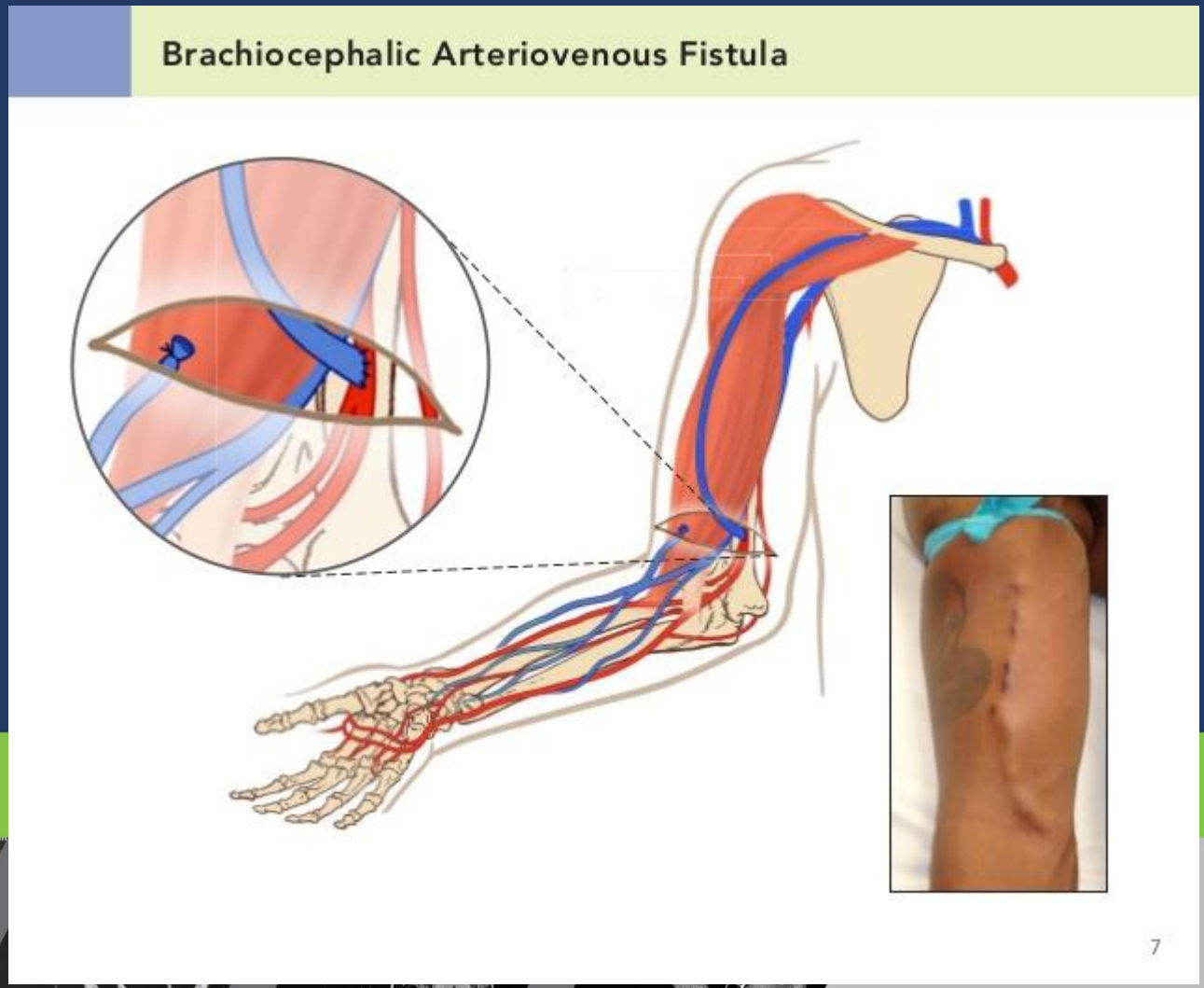
- ArterioVenous Fistula (AVF)
  - Different Types of fistula
    - Radiocephalic (Brescia-Cimino)
    - Radiobasilic
    - Brachiocephalic (Kaufman)
    - Brachiobasilic (BVT)

# AV Access Options

- Radiocephalic AVF (Cimino)

# AV Access Options

- Brachiocephalic AVF (Kaufman)



# AV Access Options

- Brachiobasilic AVF (BVT)

# AV Access Options

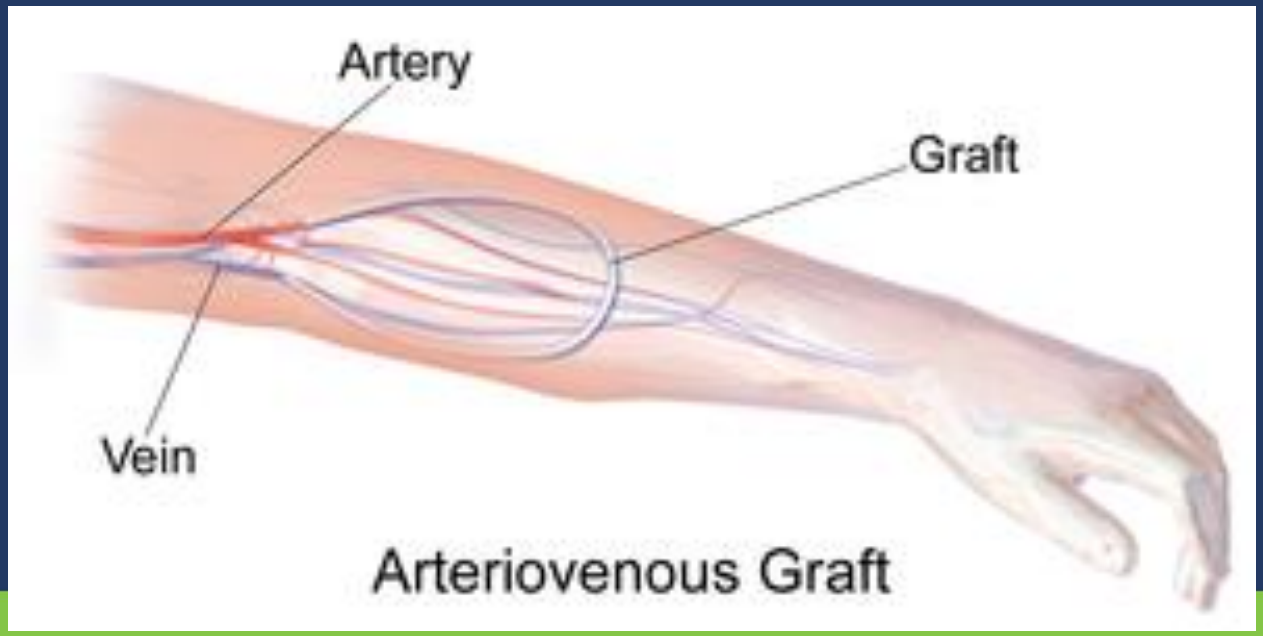
- General Principles when creating dialysis access
  - Fistula over Graft
    - Only if good caliber arteries and veins
  - Arm access rather than leg access
  - Nondominant arm is preferable
  - Start distally then move proximally

# AV Access Options

- Hemodialysis
  - ~~AVF~~
  - AVG
  - Catheter

# AV Access Options

- ArterioVenous Graft (AVG)
  - Surgically inserted **Indirect Connection** between a vein and an artery using a soft plastic tube




# AV Access Options

# AV Access Options

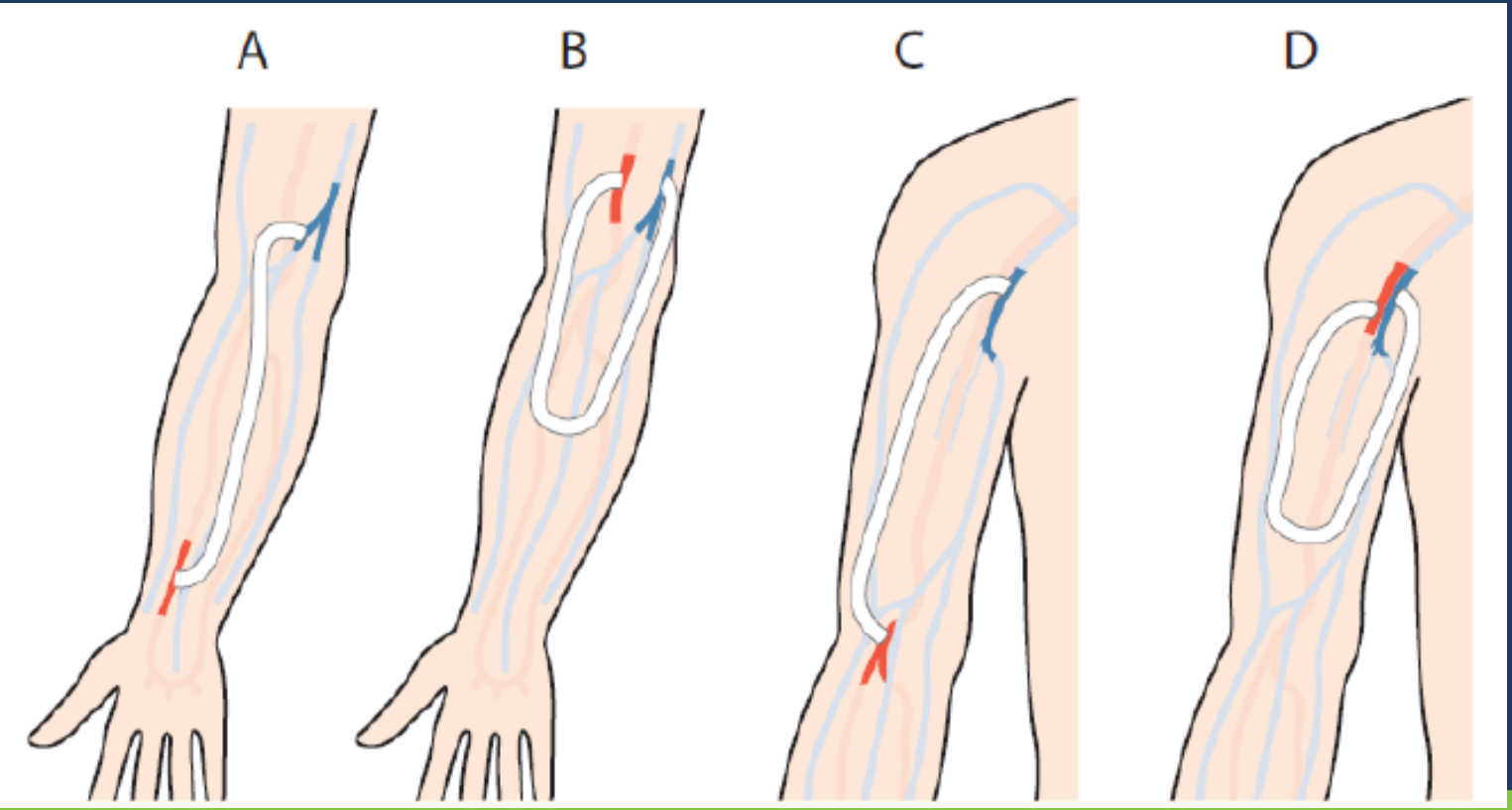
- ArterioVenous Graft (AVG)
  - Advantages
    - AV graft provides a solution for patients with poor caliber veins
    - AV graft can be used as soon as 4 weeks after placement
  - Disadvantages
    - Increased risk of infection
    - Higher risk of thrombosis
    - Requires secondary procedures to maintain patency
    - Poor longevity

# AV Access Options

- ArterioVenous Graft (AVG)
  - Different types of AVG
    - Radiobasilic
    - Forearm loop graft (Brachiobasilic or Brachiocephalic)
    - Brachial artery to Axillary vein
    - Axillary loop graft
    - Chest wall loop graft
    - Axillary artery to Axillary vein graft (Necklace)
    - Axillary artery to Femoral vein

# AV Access Options

- ArterioVenous Graft (AVG)



# AV Access Options

- Radiobasilic AVG

# AV Access Options

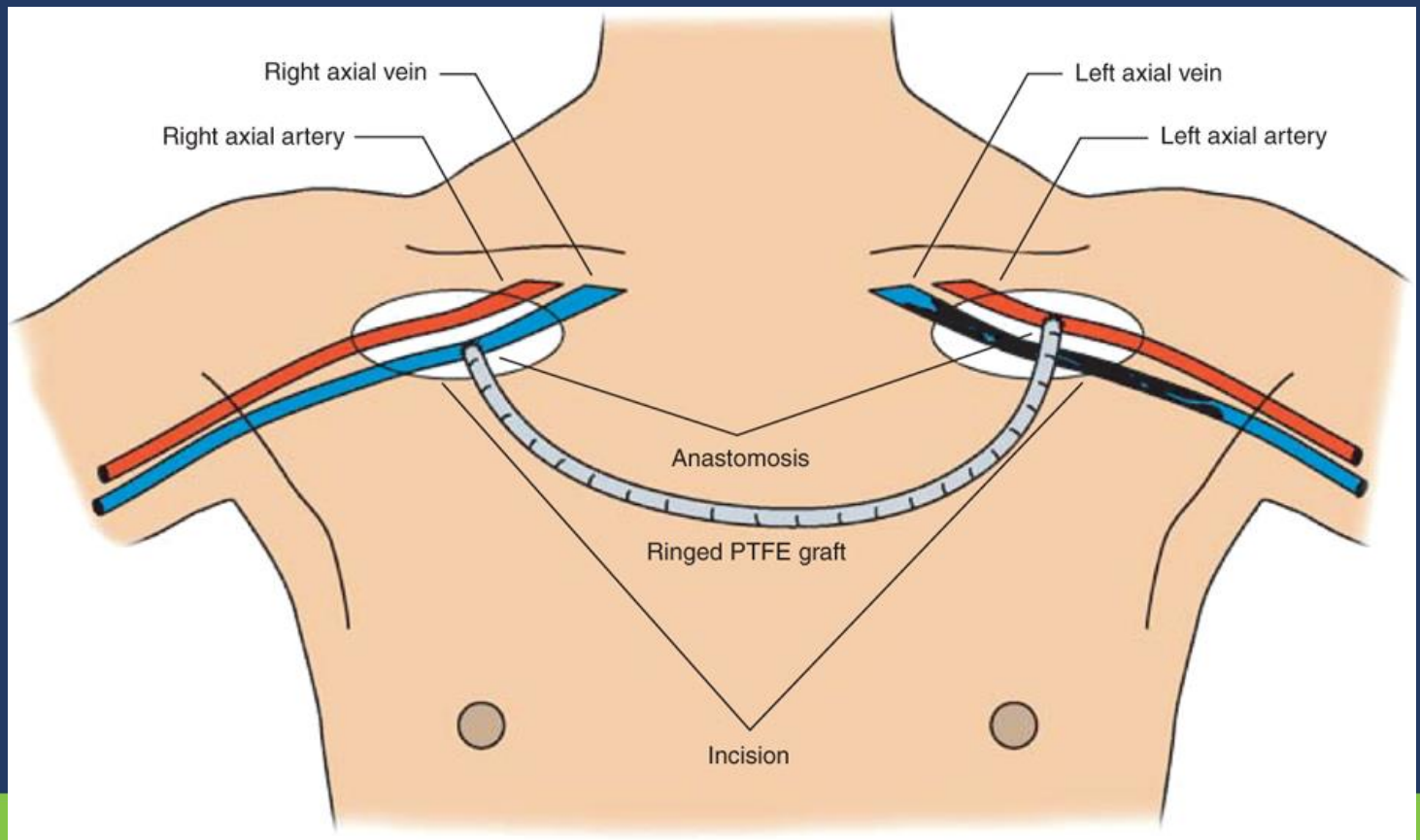
- Forearm Loop AVG

# AV Access Options

- Chest Wall Loop Graft

# AV Access Options

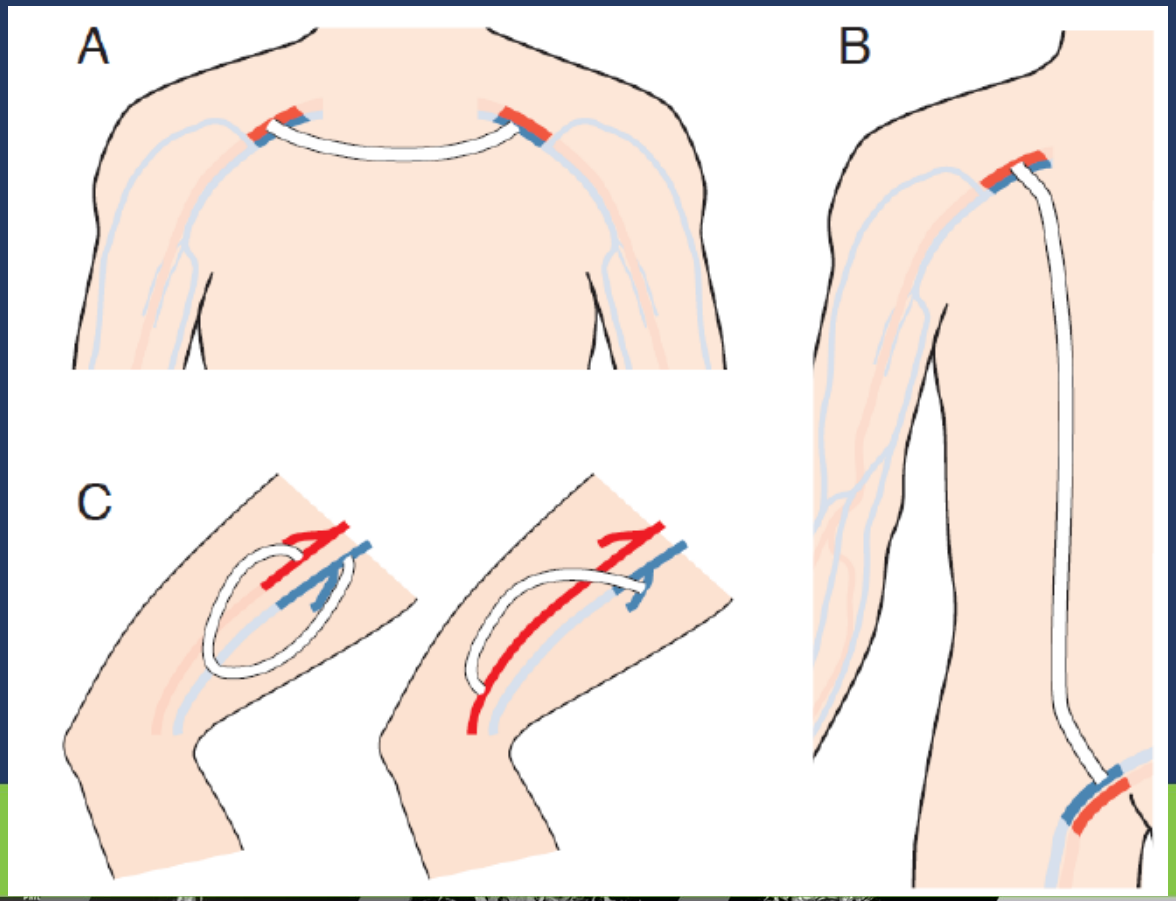
- Necklace Graft




Source: R.S. Dieter, R.A. Dieter Jr., R.A. Dieter III:
Peripheral Arterial Disease, www.cardiology.mhmedical.com

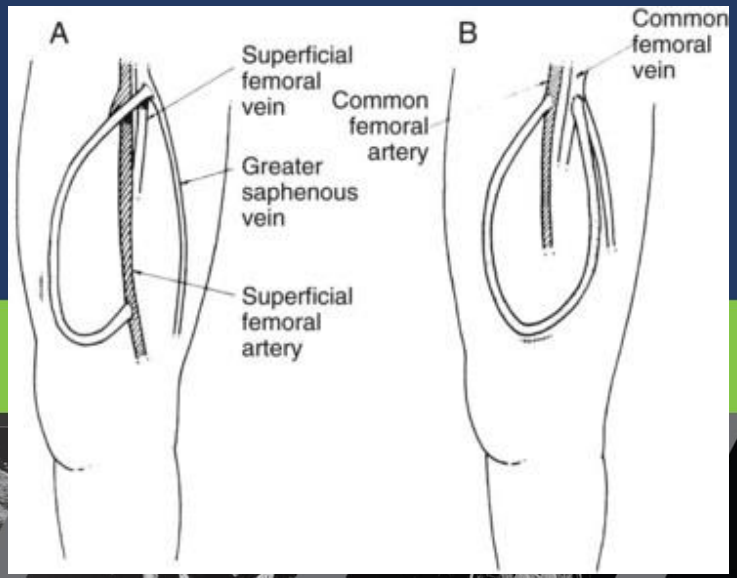

# AV Access Options

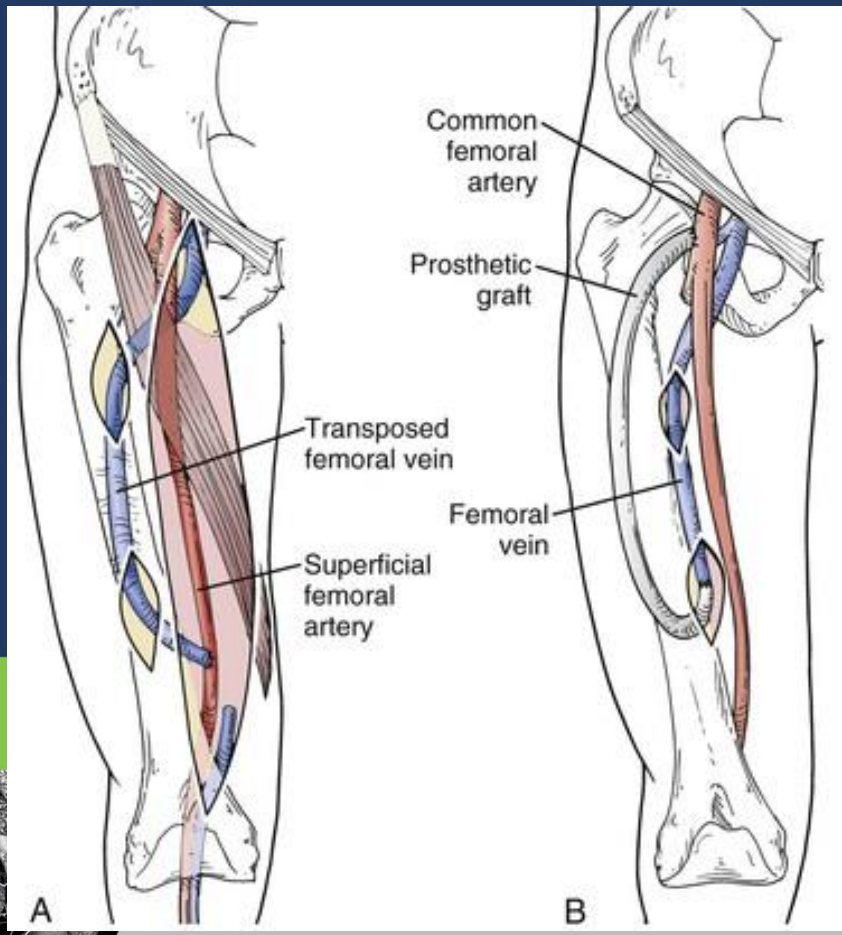
- Rt Axillary artery to Femoral Vein



# AV Access Options

- If patient has exhausted all arm options ONLY then investigate legs
  - Leg Fistula
    - Femoral Vein Transposition
  - Leg Graft
    - Thigh loop Graft



# AV Access Options

- Hemodialysis
  - ~~AVF~~
  - ~~AVG~~
  - Catheter

# AV Access Options

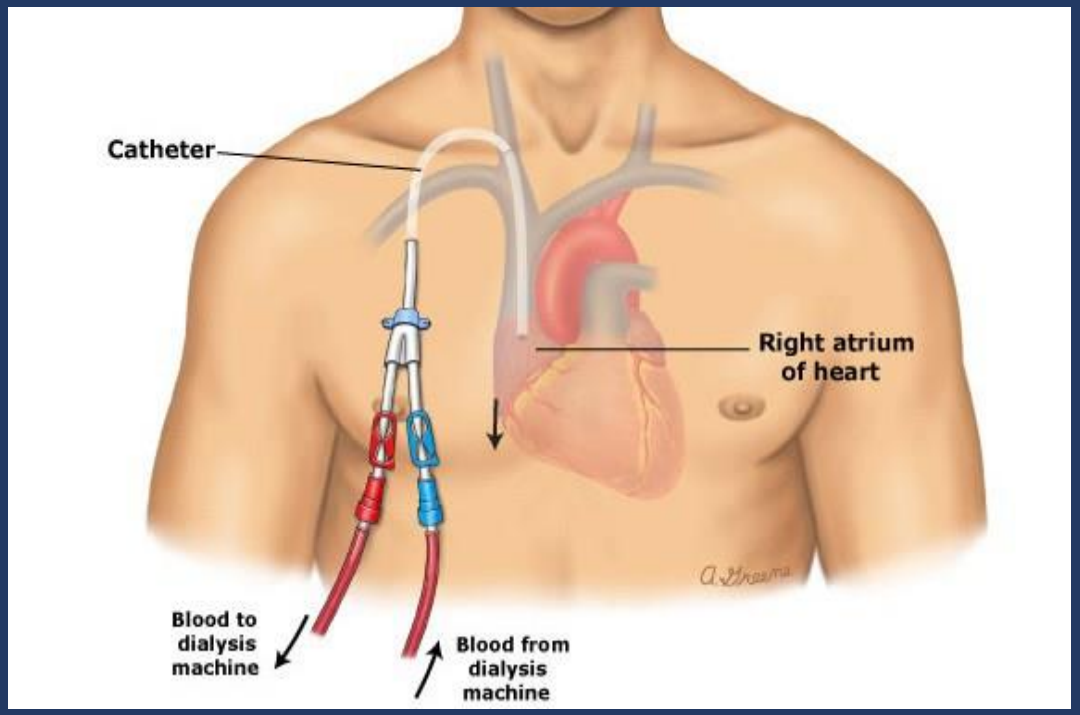
- Tunneled Dialysis Catheter (TDC)
  - What is it?
    - Dual lumen cuffed tunneled catheter with an an arterial port for blood flow out of the body and a venous port for blood return
  - How long can a TDC stay in?
    - > 3 weeks (NKF answer)
    - Until the arm access is ready (My answer)

# AV Access Options

- Tunneled Dialysis Catheter (TDC)
  - What vessel is it placed in?
    - Internal Jugular vein
    - Femoral vein
    - Subclavian vein

# AV Access Options

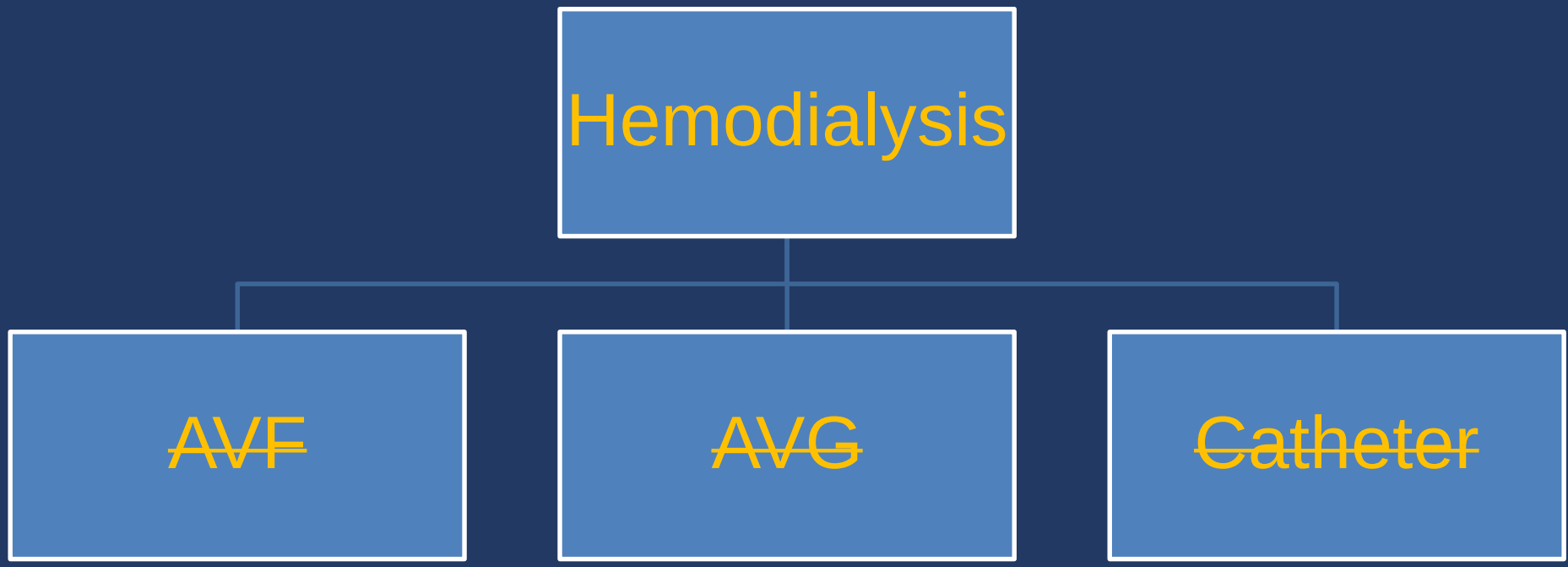
- Tunneled Dialysis Catheter (TDC)



# AV Access Options

- Tunneled Dialysis Catheter (TDC)
  - Advantages
    - Can be used immediately
  - Disadvantages
    - High infection rate - bacteremia
    - Cannot shower with catheter in place
    - Risk of causing central vein stenosis/thrombosis
    - Poor longevity

# AV Access Options



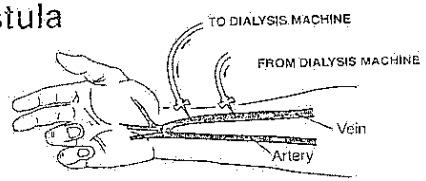

# Hemodialysis Vascular Access

Hemodialysis cleans your blood through a fistula, graft or catheter. If you have kidney failure, one of these will be your **LIFELINE!**

Talk with your doctor to decide which type of vascular access is best for you.

arteriovenous
**FISTULAFIRST**
AVF — The first choice for hemodialysis

## Fistula




A fistula directly connects an artery to a vein. The vein stretches over time, allowing needles to be put in it.

**Fistulas are the gold standard for hemodialysis.**

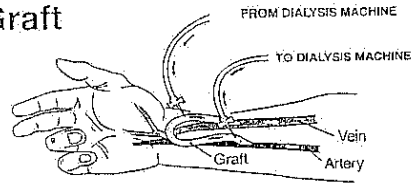
### Advantages

- ✓ Permanent
- ✓ Beneath the skin
- ✓ Lasts longest, up to 20 years
- ✓ Provides greater blood flow for better treatment
- ✓ Fewer infections & other complications
- ✓ Fewer hospitalizations
- ✓ Better survival (lower risk of dying than patients with catheters)

### Disadvantages

- ✗ May not mature/develop
- ✗ Not possible for all patients
- ✗ Usually cannot be used for at least 6–8 weeks

## Graft




A graft is a tube, usually made of plastic, that connects an artery to a vein, allowing needles to be put in it. Grafts are the second best way to get access to the bloodstream for hemodialysis.

### Advantages

- ✓ Permanent
- ✓ Beneath the skin
- ✓ May be used after 2 weeks, in some cases
- ✓ May work in patients with poor veins

### Disadvantages

- ✗ Increased hospitalizations
- ✗ Increased risk for clotting
- ✗ Increased risk for serious infections
- ✗ Increased risk for other complications and repair procedures
- ✗ Does not last as long as a fistula

## Catheter

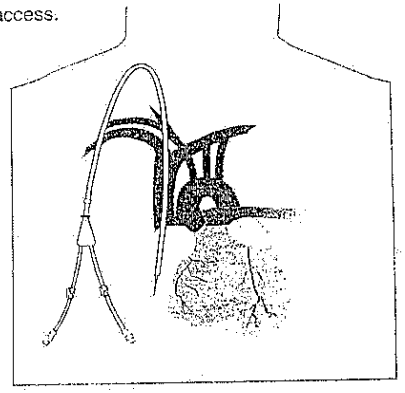
A catheter is a tube inserted into a vein in the neck or chest to provide vascular access for hemodialysis. The tip rests in your heart. It is usually a **temporary** access. It is the third choice for getting access to the bloodstream for hemodialysis. For some patients it is the only choice and it will need to be used as a permanent access.

### Advantages

- ✓ Can be used immediately after placement

### Disadvantages

- ✗ Higher infection rates, which can be very serious or fatal
- ✗ Increased hospitalizations
- ✗ Does not last long, usually less than one year
- ✗ May require longer treatment times
- ✗ Prolonged use may lead to inadequate dialysis
- ✗ Cannot shower without special appliance
- ✗ High rate of clotting requiring frequent procedures
- ✗ Risk of destroying important vein



# AV Access Case

- 63 year old African American male referred to vascular surgery office for AV access
- NOT on dialysis
- Nephrologist told him he has CKD 4
- Right hand dominant

# AV Access Case

- On Focused examination
  - 2+ pulses bilaterally
  - No visible veins noted in upper extremities
- Bilateral upper extremity vein mapping demonstrates
  - Left arm – Good caliber ( > 3mm) cephalic vein (starting at elbow) and axillary vein patent
  - Right arm – All veins are small (< 2mm) and sclerotic, axillary vein patent

# AV Access Case

- What are the options?
  - Right arm AVG
    - Brachial artery to Axillary vein
  - Left arm AVF
    - Brachiocephalic (Kaufman)
- KDOQI Guidelines
  - Fistula over Graft
  - Non dominant arm

# AV Access Case

- Surgery
  - Patient undergoes Left arm Kaufman AVF creation
- Post op AVF duplex shows that AVF is maturing nicely – Rule of 6's
  - Permission to use AVF
- 1 month later patient gets admitted for uremic symptoms
- Nephrologist wants to initiate maintenance HD

# AV Access Case

- Vascular Surgery
  - Evaluate AVF and give permission to access
- In patient Dialysis Unit
  - Unable to access AVF
- Vascular surgery called to dialysis unit

# AV Access Case

# AV Access Case

- Vascular Surgery
  - TDC inserted to allow Lt arm infiltration to resolve
- Pt seen in office in 3 weeks
  - Infiltration resolved
  - AVF duplex is normal
  - Permission to use AVF again
- Outpatient dialysis unit successfully cannulated AVF
- TDC eventually removed

# Take Home Points

- NKF – KDOQI guidelines
  - Fistula First Initiative
  - Upper extremity > Lower extremity
  - Work distal to proximal
  - Preferably non dominant arm
  - Graft only when AVF not possible/successful

# Thank You