Case presentation

- ID: 56 y.o. male
- HPI: Patient felt sick recently with SOB and emesis. He states that this has been ongoing for a long time. Had bilateral LE edema, worse on left for about 3 months.
- PMH: Chronic kidney disease, poorly controlled HTN, Deaf, GERD, Schizophrenia
- Current Medications: Amplodipine, Haloperidol, Omeprazole, ranitidine, risperidone
Case Presentation

- Surgical history: appendectomy
- Family history: CAD in mother and father
- Social history: Previous smoker for 10 years, quit 26 years ago. No alcohol use. No illicit drug use.
- Nephrology consulted vascular surgery team for TCC placement and fistula creation for dialysis due to ESRD
Dialysis Access Evaluation

- Measured: Venous and arterial patency, arterial blood flow velocity and phasicity, Vein diameter
- Patient: No arterial or venous disease noted in UE and adequate size for access of basilic and cephalic veins
Patient Course

- TCC placed and left brachiobasilic fistula created as inpatient 11/2014
- F/u 1/2015 and no thrill found in left AVF
- New dialysis access evaluation: RUE cephalic and basilic veins too small for use in AVF
- 2/3/2015 went for RUE brachiobasilic graft creation with poor flow and a right brachial to axillary AV graft was performed
- Duplex showed complete occlusion of AV graft 2/18/15
- Hypercoag workup negative
- Venogram: Right arm has open cephalic and subclavian vein with central filling to SVC. Left arm has small veins and occlusion proximal to left subclavian
- 3/17/15 Creation of left basilic upper arm loop prosthetic arteriovenous graft
Types of chronic vascular access for hemodialysis

- Native arteriovenous fistulas
- Arteriovenous shunts using graft material
- Tunneled double lumen catheters
Native arteriovenous fistulas

- Preferred method
- Best long term primary patency rate and lowest thrombosis rate
- Requires fewest interventions of any type of access
- Lowest incidence of morbidity and mortality
Native Fistula Types

- Simple direct fistula: distal end of vein attached to adjacent artery

- Vein transposition fistula: the distal portion of the vein is transposed to a position that facilitates cannulation using the creation of a tunnel to be a bed for the newly positioned vein

- Vein translocation fistula: vein moved from normal location to another using a veno-venous and veno-arterial anastomosis – similar to that of an AV graft
Fistula creation sites

- Radial Cephalic: most straightforward to create, use a simple direct fistula type, often the first used to preserve upper arm vessel in case of failure

- Brachial Cephalic: use transposition fistula, get more blood flow, lowest rate of primary failure

- Brachial Basilic: use transposition fistula, associated with more morbidity, deep position makes it better preserved, used in patients with multiple fistula creation failures, high incidence of steal syndrome
Approach to fistula creation

- Start distal and move proximally – preserve proximal vessels and steal syndrome is more prevalent in proximal vessels
- Use easier creation sites first – cephalic sites are easier
- exhaust all options for native AV fistulas before moving to an AV graft
- try to use non-dominant arm
- use venous mapping to find the best site
Requirements of adequate fistulas

- Anatomically accessible: the forearm, anterior or lateral surface of upper arm
- Superficial: within 1 cm of skin
- Straight segment: 6 cm straight length for dialysis needle
- Blood flow: minimum range of 600-700 mL/min
- Maturity: wait at least 14 days to cannulate - if done prior to 14 days associated with 2.1 fold increase in risk of failure
Evaluation of Patient

- Blood pressure with focus of differences in BP in each arm
- Pulses
- Allen test
- Arterial imaging: ultrasonography
  - heavily calcified arteries can’t be used, want diameter > 2 mm, unobstructed inflow, patent palmar arch
- Venous evaluation: vein mapping with ultrasound is primarily used, focusing of vein depth and diameter
  - lumen diameter >2.5 mm, straight segment, vein depth <1cm from surface
- Venogram: used in patients where outflow stenosis is suspected and has a more complete view of venous system—more difficult to perform, need to obtain venous access to perform, use of contrast
Vascular Ultrasonography


- ESRD patients analyzed by PE and ultrasound. Ultrasound report randomly given to surgeon for review prior to surgery.

- Ultrasound group had lower rate of immediate failure (4 vs 11 %)

- among failed fistulas, the ultrasound group had lower rate of thrombosis (38 vs 67 %)

- one year AVF survival was better in ultrasound group (80 vs 65 %)
Risk of Failure

- Inadequate anatomy: AV graft may be better choice
- Obesity: venous mapping important, may need to superficialize the fistula
- Age
- Females
- Cardiac disease: increased CO and LV end diastolic diameter
- Diabetes
Primary Failure

- Fistula never cannulates
- Can take 2 weeks up 6 months to mature
- Native AVFs have a higher incidence of primary failure than grafts
- Recommended that cannulation is not attempted prior to 14 days
Secondary Failure

- AVF cannulates initially but then fails later
- AV grafts have a higher incidence of secondary failure – Native grafts have higher incidence of long term patency
Complications

- Thrombosis – more common with grafts
- Infection - more common with grafts
- Steal syndrome
- Aneurysms
- Venous hypertension
- Seromas – more common with grafts
- High Output Heart failure
- Local bleeding
Questions?

Resources

- Up to date